



Thermo Scientific

Dionex Aquion Ion Chromatography System

Operator's Manual

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Thermo
SCIENTIFIC

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Revision 02 released June 2016; support for auxiliary valve added

Software version: Chromeleon 7.2 SR4 and later

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

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Preface

This manual provides instructions for the operation of the Thermo Scientific™ Dionex™ Aquion Ion Chromatography System.

Contents

- [Related Documentation](#)
- [Safety Information](#)
- [Regulatory Compliance](#)
- [Deionized Water Requirements for IC](#)
- [Contacting Us](#)

Related Documentation

In addition to this manual, these related documents are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891):

- *Dionex Aquion Ion Chromatography System Installation Instructions* (Document No. 22176-97002)
- *Dionex AS-AP Autosampler Operator's Manual* (Document No. 065361)
- *Dionex AS-DV Autosampler Operator's Manual* (Document No. 065259)
- Manuals for consumable products (columns, suppressors, CR-TC)
- *Chromeleon 7 Installation Guide* (Document No. 7229.0003)

Safety Information

The Dionex Aquion was manufactured by Thermo Fisher Scientific at the following location: Thermo Finnigan LLC 355 River Oaks Parkway, San Jose, CA 95134 USA. The Dionex Aquion is designed for IC (ion chromatography) applications and should not be used for any other purpose. Operation of a Dionex Aquion in a manner not specified by Thermo Fisher Scientific may result in personal injury.

If there is a question regarding appropriate usage, contact Technical Support for Dionex products. In the U.S. and Canada, call 1-800-532-4752. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

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:



DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Each DANGER notice is accompanied by an appropriate CAUTION symbol.



CAUTION Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

IMPORTANT Highlights information necessary to prevent damage to the system or software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

Note Highlights information of general interest.

Tip Highlights helpful information that can make a task easier.

Safety Symbols

These symbols appear on the Dionex Aquion or on labels affixed to the system:



Alternating current



Primary protective conductor terminal



Secondary protective conductor terminal



Power supply is on



Power supply is off



Indicates a potential hazard. Refer to the operator's manual for an explanation of the hazard and how to proceed.

Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in this section.

Changes that you make to your system may void compliance with one or more of these EMC and safety standards. Changes to your system include replacing a part or adding components, options, or peripherals not specifically authorized and qualified by Thermo Fisher Scientific. To ensure continued compliance with EMC and safety standards, replacement parts and additional components, options, and peripherals must be ordered from Thermo Fisher Scientific or one of its authorized representatives.

The regulatory symbols on the model/data label of the Dionex Aquion Ion Chromatography System indicate that the system is in compliance with the following Safety and EMC standards:

- EN 61010-1:2010
- UL 61010-1:2012
- CAN/CSA-C22.2 No. 61010-1-12
- EN 61326-1:2013

The CE mark on the model/data label of the Dionex Aquion Ion Chromatography System indicates that the system is in compliance with the following European Community Directives as is evidenced by compliance to the associated standard where appropriate:

- Low Voltage/Safety Directive: 2014/35/EU by conforming to EN61010-1:2013 (3rd edition)
- EMC Directive: 2014/30/EU by conforming to EN61326-1:2013 (3rd edition)

Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument *requires a team effort* to lift and/or move the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: This instrument must be used in the manner specified by Thermo Fisher Scientific to ensure protections provided by the instrument are

not impaired. Deviations from specified instructions on the proper use of the instrument include changes to the system and parts replacement. Accordingly, order replacement parts from Thermo Fisher Scientific or one of its authorized representatives.

Notice on the Susceptibility to Electromagnetic Transmission

Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

For manufacturing location, see the label on the instrument.

WEEE Compliance

This product complies with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Fisher Scientific is registered with B2B Compliance ([B2Bcompliance.org.uk](https://www.b2bcompliance.org.uk)) in the UK and with the European Recycling Platform ([ERP-recycling.org](https://www.erp-recycling.org)) in all other countries of the European Union and in Norway.

If this product is located in Europe and you want to participate in the Thermo Fisher Scientific Business-to-Business (B2B) Recycling Program, send an email request to weee.recycle@thermofisher.com with the following information:

- WEEE product class
- Name of the manufacturer or distributor (where you purchased the product)
- Number of product pieces, and the estimated total weight and volume
- Pick-up address and contact person (include contact information)
- Appropriate pick-up time
- Declaration of decontamination, stating that all hazardous fluids or material have been removed from the product

For additional information about the Restriction on Hazardous Substances (RoHS) Directive for the European Union, search for RoHS on the Thermo Fisher Scientific European language websites.

Conformité DEEE

Ce produit est conforme avec la directive européenne (2002/96/EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant:



Thermo Fisher Scientific s'est associé avec une ou plusieurs sociétés de recyclage dans chaque état membre de l'Union Européenne et ce produit devrait être collecté ou recyclé par celle(s)-ci. Pour davantage d'informations, rendez-vous sur la page www.thermoscientific.fr/rohs.

WEEE Konformität

Dieses Produkt entspricht der EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96/EC. Es ist mit dem folgenden Symbol gekennzeichnet:



Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Weitere Informationen finden Sie unter www.thermoscientific.de/rohs.

Deionized Water Requirements for IC

For eluent generation or when manually preparing eluent and regenerant, use ASTM Type I (18 megohm-cm) filtered and deionized water that meets the specifications listed in [Table 1](#).

Table 1. ASTM filtered, Type I deionized water specifications for ion chromatography

| Contaminant | Specification |
|-------------------------|-------------------|
| Ions–Resistivity | >18.0 (megohm-cm) |
| Organics–TOC | <10 ppb |
| Iron/Transition Metals* | <1 ppb |
| Pyrogens | <0.03 (Eu/mL) |
| Particulates > 0.2 µm | <1 (units/mL) |
| Colloids–Silica | <10 ppb |
| Bacteria | <1 (cfu/mL) |

* Iron/transition metal content not specified for ASTM Type I water

Contacting Us

❖ For Technical Support for Dionex products

In the U.S. and Canada, call 1-800-532-4752.

Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

❖ For additional contact information

Go to www.thermofisher.com/us/en/home/technical-resources/contact-us.html.

| CAUTION Symbol | CAUTION | VORSICHT | PRECAUCIÓN | MISE EN GARDE |
|---|--|--|---|---|
|  | Risk electric shock: This instrument uses voltages that can cause electric shock and/or personal injury. Before servicing, shut down the instrument and disconnect it from line power. While operating the instrument, keep covers on. Do not remove the protective covers from the printed circuit board assemblies (PCBAs). | Stromschlaggefahr: Dieses Gerät arbeitet mit Spannungen, die Stromschläge und/oder Personenverletzungen verursachen können. Vor Wartungsarbeiten muss das Gerät abgeschaltet und vom Netz getrennt werden. Betreiben Sie das Gerät nicht mit abgenommenen Abdeckungen. Nehmen Sie die Schutzabdeckungen von Leiterplatten nicht ab. | Riesgo de descargas eléctricas: Este instrumento utiliza voltajes que pueden causar descargas eléctricas y/o lesiones personales. Antes de revisar o reparar el instrumento, apáguelo y desconéctelo de la red eléctrica. Mantenga colocadas las cubiertas mientras se utiliza el instrumento. No retire las cubiertas protectoras del circuito impreso completo (PCBA). | Risque de choc électrique : l'instrument utilise des tensions susceptibles de provoquer une électrocution et/ou des blessures corporelles. Il doit être arrêté et débranché de la source de courant avant toute intervention. Ne pas utiliser l'instrument sans ses couvercles. Ne pas enlever les capots de protection des cartes à circuit imprimé (PCBA). |
|  | Chemical hazard: Wear gloves and other protective equipment, as appropriate, when handling toxic, carcinogenic, mutagenic, corrosive, or irritant chemicals. Use approved containers and proper procedures to dispose of waste oil and when handling wetted parts of the instrument. | Gefahr durch Chemikalien: Tragen Sie beim Umgang mit toxischen, karzinogenen, mutagenen, ätzenden oder reizenden Chemikalien Schutzhandschuhe und weitere geeignete Schutzausrüstung. Verwenden Sie bei der Entsorgung von verbrauchtem Öl und beim Umgang mit medienberührenden Komponenten die vorgeschriebenen Behälter, und wenden Sie ordnungsgemäße Verfahren an. | Peligro por sustancias químicas: Cuando manipule sustancias químicas, tóxicas, carcinogénicas, mutágenas, corrosivas o irritantes, utilice guantes y otro equipo de protección. Utilice siempre recipientes homologados y siga los procedimientos adecuados cuando deseche aceite residual o manipule partes mojadas del instrumento. | Danger lié aux produits chimiques : porter des gants et d'autres équipements de protection appropriés pour manipuler les produits chimiques toxiques, cancérogènes, mutagènes, corrosifs ou irritants. Utiliser des récipients homologués et des procédures adéquates pour la mise au rebut des huiles usagées et lors de la manipulation des pièces de l'instrument en contact avec l'eau. |
|  | Hot surface: Before touching, allow any heated components to cool. | Heiße Oberflächen: Lassen Sie heiße Komponenten vor der Berührung abkühlen. | Superficies calientes: Antes de tocar los componentes calientes, espere a que se enfríen. | Surface chaude : laisser refroidir les composants chauffés avant toute manipulation. |
|  | Flammable substances hazard: Use care when operating the system in the presence of flammable substances. | Gefahr durch entzündbare Substanzen: Beachten Sie die einschlägigen Vorsichtsmaßnahmen, wenn Sie das System in Gegenwart von entzündbaren Substanzen betreiben. | Peligro por sustancias inflamables: Tenga mucho cuidado cuando utilice el sistema cerca de sustancias inflamables. | Danger lié aux substances inflammables : agir avec précaution lors de l'utilisation du système en présence de substances inflammables. |
|  | Risk of eye injury: Eye injury could occur from splattered chemicals, airborne particles, or sharp objects. (Sharp objects that customers might install in the instrument include fused-silica tubing, the autosampler needle, and so on.) Wear safety glasses when handling chemicals or servicing the instrument. | Augenverletzungsrisiko: Verspritzte Chemikalien, Schwebstoffpartikel oder scharfe Objekte können Augenverletzungen verursachen. (Scharfe Objekte, die Kunden möglicherweise im Gerät installieren, sind z. B. Quarzglas-Kapillaren, die Nadel des Autosamplers, usw.) Tragen Sie beim Umgang mit Chemikalien oder bei der Wartung des Gerätes eine Schutzbrille. | Riesgo de lesiones oculares: Las salpicaduras de sustancias químicas, las partículas flotantes en el aire y los objetos afilados pueden causar lesiones oculares. (Entre los objetos afilados que los clientes pueden instalar en el instrumento se encuentran tubos de sílice fundida, agujas del muestreador automático, etc.). Para manipular sustancias químicas o realizar tareas de mantenimiento, utilice gafas de seguridad. | Risque de lésion oculaire : les projections chimiques, les particules en suspension dans l'air et les objets tranchants peuvent entraîner des lésions oculaires. (Les objets tranchants pouvant être installés par les clients dans l'instrument comprennent les tubes en silice fondue, les aiguilles du passeur automatique, etc.). Porter des lunettes de protection lors de toute manipulation de produit chimique ou intervention sur l'instrument. |
|  | General hazard: A hazard is present that is not included in the other categories. This symbol also appears on the instrument. For details about the hazard, refer to the instrument manual. When the safety of a procedure is questionable, contact Technical Support for Thermo Scientific Sunnyvale products. | Allgemeine Gefahr: Es besteht eine weitere Gefahr, die nicht in den vorstehenden Kategorien beschrieben ist. Dieses Symbol wird auch auf dem Gerät angebracht. Einzelheiten zu dieser Gefahr finden Sie in den Gerätehandbüchern. Wenn Sie sich über die Sicherheit eines Verfahrens im Unklaren sind, setzen Sie sich, bevor Sie fortfahren, mit dem technischen Support für Thermo Scientific Sunnyvale Produkte in Verbindung. | Peligro general: Existen peligros que no se incluyen en las otras categorías. Este símbolo también aparece en el instrumento. Si desea obtener más información sobre estos peligros, consulte el manual del instrumento. En caso de duda sobre la seguridad de un procedimiento, póngase en contacto con el personal de servicio técnico de los productos Thermo Scientific Sunnyvale. | Danger d'ordre général : indique la présence d'un risque n'appartenant pas aux catégories citées plus haut. Ce symbole figure également sur l'instrument. Pour plus de détails sur ce danger potentiel, se reporter au manuel de l'instrument. Si la sûreté d'une procédure est incertaine, contacter l'assistance technique pour les produits Thermo Scientific Sunnyvale. |

| CAUTION Symbol | CAUTION | VORSICHT | PRECAUCIÓN | MISE EN GARDE |
|--|---|--|--|---|
|  | Laser hazard: This instrument uses a laser that is capable of causing personal injury. This symbol also appears on the instrument. For details about the hazard, refer to the instrument manual. | Gefahr durch Laserstrahlen: Der in diesem Gerät verwendete Laser kann zu Verletzungen führen. Dieses Symbol wird auch auf dem Gerät angebracht. Einzelheiten zu dieser Gefahr finden Sie in den Gerätehandbüchern. | Peligro por láser: Este instrumento utiliza un láser que puede producir lesiones personales. Este símbolo también aparece en el instrumento. Si desea obtener más información sobre el peligro, consulte el manual del instrumento. | Danger lié au laser : l'instrument utilise un laser susceptible de provoquer des blessures corporelles. Ce symbole figure également sur l'instrument. Pour plus de détails sur ce danger potentiel, se reporter au manuel de l'instrument. |
|  | Ultra violet light hazard: Do not look directly at the ultra-violet (UV) light or into the UV source. Exposure can cause eye damage. Wear UV eye protection. | Gefahr durch UV-Licht: Richten Sie Ihren Blick nicht direkt auf ultraviolettes Licht (UV-Licht) oder in die UV-Quelle. Dies kann zu Augenschäden führen. Tragen Sie eine UV-Schutzbrille. | Peligro por luz ultravioleta: No mire directamente a una luz ultravioleta (UV) ni a una fuente UV. La exposición puede causar daños oculares. Lleve protección ocular para UV. | Danger lié aux rayons ultraviolets : ne jamais regarder directement la lumière ultraviolette (UV) ou la source d'UV. Une exposition peut entraîner des lésions oculaires. Porter des protections oculaires anti-UV. |
|  | Sharp object: Avoid physical contact with the object. | Scharfes Objekt: Vermeiden Sie den physischen Kontakt mit dem Objekt. | Objeto puntiagudo: Evite el contacto físico con el objeto. | Objet tranchant : éviter tout contact physique avec l'objet. |
|  | Pinch point: Keep hands away from this area. | Quetschgefahr: Halten Sie Ihre Hände von diesem Bereich fern. | Puntos de pincamiento: Mantenga las manos apartadas de esta área. | Risque de pincement : éloigner les mains de cette zone. |
|  | Heavy objects: Never lift or move the instrument by yourself; you can suffer personal injury or damage the equipment. For specific lifting instructions, refer to the instrument manual. | Schweres Objekt: Bewegen und heben Sie das Gerät niemals allein an; dies kann zu Verletzungen oder zur Beschädigung des Geräts führen. Spezifische Anweisungen zum Anheben finden Sie im Gerätehandbuch. | Objeto pesado: Nunca levante ni mueva el instrumento por su cuenta, podría sufrir lesiones personales o dañar el equipo. Para obtener instrucciones específicas sobre levantamiento, consulte el manual del instrumento. | Objet lourd : ne jamais soulever ou déplacer l'instrument seul sous peine de blessure corporelle ou d'endommagement de l'instrument. Pour obtenir des instructions de levage spécifiques, se reporter au manuel de l'instrument. |
|  | Trip obstacle: Be aware of cords, hoses, or other objects located on the floor. | Stolpergefahr: Achten Sie auf Kabel, Schläuche und andere Objekte auf dem Fußboden. | Tropiezo con obstáculos: Tenga en cuenta los cables, mangueras u otros objetos colocados en el suelo. | Risque de trébuchement : faire attention aux câbles, tuyaux et autres objets situés sur le sol. |
| | When the safety of a procedure is questionable, contact Technical Support for Thermo Scientific Sunnyvale products. | Wenn Sie sich über die Sicherheit eines Verfahrens im unklaren sind, setzen Sie sich, bevor Sie fortfahren, mit Ihrer lokalen technischen Unterstützungsorganisation für Thermo Scientific Sunnyvale Produkte in Verbindung. | En caso de duda sobre la seguridad de un procedimiento, póngase en contacto con el personal de servicio técnico de los productos Thermo Scientific Sunnyvale. | Si la sûreté d'une procédure est incertaine, contacter l'assistance technique pour les produits Thermo Scientific Sunnyvale. |

| CAUTION Symbol | CAUTION | 警告 | 危険警告 |
|---|---|--|--|
|  | <p>Risk electric shock: This instrument uses voltages that can cause electric shock and/or personal injury. Before servicing, shut down the instrument and disconnect it from line power. While operating the instrument, keep covers on. Do not remove the protective covers from the printed circuit board assemblies (PCBAs).</p> | <p>感電の危険性: この機器では、感電および/または身体傷害を引き起こすおそれのある電圧を使用しています。整備点検の前には、機器の電源を切り、電源コードを抜いてください。機器の作動中は、カバーを付けたままにしてください。プリント基板アセンブリ (PCBA) から保護カバーを取り外さないでください。</p> | <p>触电危险: 本仪器所用电压可能导致电击或人身伤害。进行维修服务前, 务必关闭仪器电源并断开其电源连接。操作此仪器时, 不要卸下顶盖。勿卸下印刷电路板组件 (PCBA) 的保护盖。</p> |
|  | <p>Chemical hazard: Wear gloves and other protective equipment, as appropriate, when handling toxic, carcinogenic, mutagenic, corrosive, or irritant chemicals. Use approved containers and proper procedures to dispose of waste oil and when handling wetted parts of the instrument.</p> | <p>化学的危険性: 毒性、発癌性、変異原性、腐食性、または刺激性のある化学薬品を取り扱うときは、必要に応じて手袋などの保護具を着用します。廃油を処分したり、機器の接液部品を取り扱うときは、認可された容器を使用し、適切な手順に従います。</p> | <p>化学品危险: 当处理毒性、致癌性、致突变性、腐蚀性或者刺激性化学品时, 佩戴手套和其他保护性设备。当处理浸湿的仪器部件以及废油时, 使用认可的容器和合适的步骤。</p> |
|  | <p>Hot surface: Before touching, allow any heated components to cool.</p> | <p>高温面: 触れる前に、加熱した部品を冷ましてください。</p> | <p>热表面: 待高温部件冷却之后再行维修。</p> |
|  | <p>Flammable substances hazard: Use care when operating the system in the presence of flammable substances.</p> | <p>可燃性物質の危険性: 可燃性物質があるところでシステムを作動させる場合は十分注意してください。</p> | <p>易燃物危险: 在有易燃物质的场地操作该系统时, 务必小心谨慎。</p> |
|  | <p>Risk of eye injury: Eye injury could occur from splattered chemicals, airborne particles, or sharp objects. (Sharp objects that customers might install in the instrument include fused-silica tubing, the autosampler needle, and so on.) Wear safety glasses when handling chemicals or servicing the instrument.</p> | <p>眼外傷の危険性: 飛散した化学薬品、浮遊粒子、または鋭利な物体によって眼外傷を負うおそれがあります (機器に取り付けられる可能性がある鋭利な物体は、ヒューズドシリカ、オートサンプラーニードルなどです)。化学薬品を取り扱ったり、機器を整備点検するときは、保護メガネを着用します。</p> | <p>眼睛伤害风险: 眼睛受伤可能源自飞溅的化学品、空气中的颗粒, 或者锋利的物体。(安装在仪器内的锋利物体包括熔融石英管、自动进样器的进样针等。) 处理化学品或对仪器进行维修服务时, 务必戴上防护眼镜。</p> |
|  | <p>General hazard: A hazard is present that is not included in the other categories. This symbol also appears on the instrument. For details about the hazard, refer to the instrument manual. When the safety of a procedure is questionable, contact Technical Support for Thermo Scientific Sunnyvale products.</p> | <p>一般的な危険性: それぞれのカテゴリーに当てはまらない危険があります。この標識記号は機器にも表示されています。この危険の詳細については、機器のマニュアルを参照してください。手順の安全性にご不明な点がある場合は、Thermo Scientific Sunnyvale 製品のテクニカルサポートまでお問い合わせください。</p> | <p>普通危険: 未归入其他类别的危险。此符号也会在仪器上出现。有关此危险的详细信息, 参阅适当的仪器手册。若对任何步骤的安全事项有疑问, 联系 Thermo Scientific Sunnyvale 产品的技术支持中心。</p> |

| CAUTION Symbol | CAUTION | 警告 | 危険警告 |
|----------------|---|--|--|
| | Laser hazard: This instrument uses a laser that is capable of causing personal injury. This symbol also appears on the instrument. For details about the hazard, refer to the instrument manual. | レーザー光線の危険性: この機器では、身体傷害を引き起こすおそれのあるレーザーを使用しています。この標識記号は機器にも表示されています。この危険の詳細については、機器のマニュアルを参照してください。 | 激光危险: 本仪器所用激光会导致人身伤害。此符号也会在仪器上出现。有关此危险的详细信息, 参阅适当的仪器手册。 |
| | Ultra violet light hazard: Do not look directly at the ultra-violet (UV) light or into the UV source. Exposure can cause eye damage. Wear UV eye protection. | 紫外光の危険性: 紫外 (UV) 光または UV 光源を直接見ないでください。照射によって眼損傷を引き起こすおそれがあります。UV 保護メガネを着用します。 | 紫外光危険: 不要直视紫外 (UV) 光或者紫外光源。直视可能导致眼睛伤害。佩戴紫外线防护眼镜。 |
| | Sharp object: Avoid physical contact with the object. | 鋭利な物体: 物体との身体的接触を避けてください。 | 锋利物体: 避免直接接触锋利的物体。 |
| | Pinch point: Keep hands away from this area. | ピンチポイント: この部分には手を挟まれないようにしてください。 | 夹点: 勿将手放在此部位。 |
| | Heavy objects: Never lift or move the instrument by yourself; you can suffer personal injury or damage the equipment. For specific lifting instructions, refer to the instrument manual. | 重量物: 1 人で機器を持ち上げたり移動しないでください。身体傷害を負ったり、機器を損傷するおそれがあります。具体的な持ち上げ方法については、機器のマニュアルを参照してください。 | 重物: 切勿独自提起或移动本仪器; 可能遭受人身伤害或损坏仪器。有关具体的提起说明, 参阅仪器手册。 |
| | Trip obstacle: Be aware of cords, hoses, or other objects located on the floor. | 作業の障害物: 床にあるコード、ホース、その他の物体に注意してください。 | 绊倒危険: 注意地面上的线、管或其他物品。 |
| | When the safety of a procedure is questionable, contact Technical Support for Thermo Scientific Sunnyvale products. | 手順の安全性にご不明な点がある場合は、Thermo Scientific Sunnyvale 製品のテクニカルサポートまでお問い合わせください。 | 如对安全程序有疑问, 联系 Thermo Scientific Sunnyvale 产品的技术支持中心。 |

Introduction

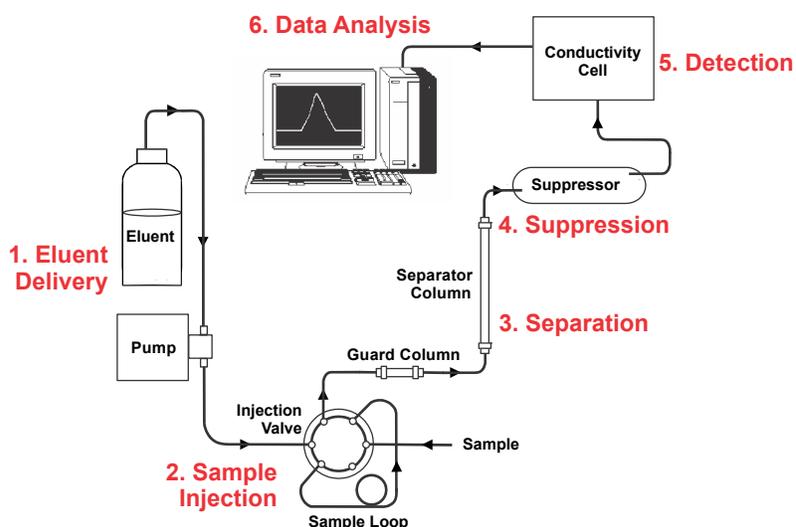
Introduction to Ion Chromatography (IC)

The Dionex Aquion Ion Chromatography System performs ion analyses using suppressed or non-suppressed conductivity detection. An ion chromatography system typically consists of a liquid eluent, a high-pressure pump, a sample injector, a guard and separator column, a chemical suppressor, a conductivity cell, and a data collection system.

Before running a sample, the ion chromatography system is calibrated using a standard solution. By comparing the data obtained from a sample to that obtained from the known standard, sample ions can be identified and quantitated. The data collection system, typically a computer running chromatography software, produces a chromatogram (a plot of the detector output vs. time). The chromatography software converts each peak in the chromatogram to a sample concentration and produces a printout of the results.

A typical IC analysis consists of six stages (see [Figure 1](#)).

Figure 1. Ion analysis process



1. Eluent Delivery

- Eluent, a liquid that helps to separate the sample ions, carries the sample through the ion chromatography system. The Dionex Aquion is an isocratic delivery system. This means that the eluent composition and concentration remain constant throughout the run.

2. Sample Injection

- The liquid sample is loaded into a sample loop manually or automatically (if an automated sampler is installed). When triggered, the Dionex Aquion injects the sample into the eluent stream.
- The pump pushes the eluent and sample through the guard and separator columns (chemically-inert tubes packed with a polymeric resin). The guard column removes contaminants that might poison the separator column.

3. Separation

- As the eluent and sample are pumped through the separator column, the sample ions are separated. In the Dionex Aquion, the mode of separation is called ion exchange. This is based on the premise that different sample ions migrate through the IC column at different rates, depending upon their interactions with the ion exchange sites.

4. Suppression

- After the eluent and sample ions leave the column, they flow through a suppressor that selectively enhances detection of the sample ions while suppressing the conductivity of the eluent.

5. Detection

- A conductivity cell measures the electrical conductance of the sample ions as they emerge from the suppressor and produces a signal based on a chemical or physical property of the analyte.

6. Data Analysis

- The conductivity cell transmits the signal to a data collection system.
- The data collection system (for the Dionex Aquion, this is the Thermo Scientific™ Dionex™ Chromeleon™ 7 Chromatography Data System) identifies the ions based on retention time, and quantifies each analyte by integrating the peak area or peak height. The data is quantitated by comparing the sample peaks in a chromatogram to those produced from a standard solution. The results are displayed as a chromatogram and the concentrations of ionic analytes can be automatically determined and tabulated.

Overview of the Dionex Aquion

The Dionex Aquion is an integrated ion chromatography system containing a pump, injection valve, and conductivity detector. Other system components, including a guard column, separator column, and suppressor vary, depending on the analyses to be performed.

The Dionex Aquion can optionally be configured with a column heater for temperature control of the column.

Dionex Aquion operation is controlled remotely by a personal computer running the Microsoft® Windows® 8.1 or Windows 7 operating system and Chromeleon software (version 7.2 SR4 or later). Chromeleon also provides data acquisition and data processing functions.

For communication between the Dionex Aquion and Chromeleon, the Dionex Aquion is connected to a USB (Universal Serial Bus) port on the computer or a USB hub. For details, refer to the Dionex Aquion installation instructions.

1 Introduction

Overview of the Dionex Aquion

Description

This chapter describes key Dionex Aquion features and introduces the Chromeleon user interface.

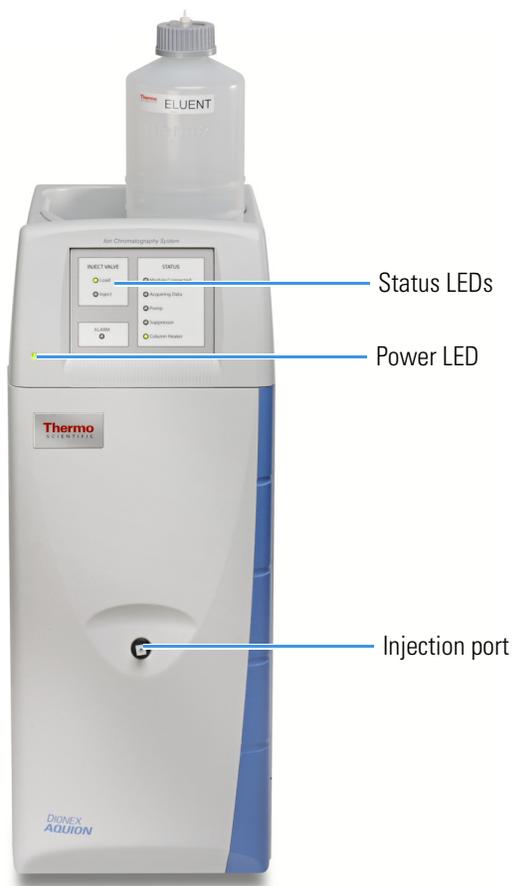
Contents

- [Operating Features](#)
- [Flow Schematics](#)
- [Chromeleon 7 Chromatography Data System](#)
- [System Component Details](#)

Operating Features

Front Panel

Figure 2. Dionex Aquion front panel



Injection Port

The sample to be analyzed can be injected manually into the injection port, using a syringe. For automated sample injection, the Dionex Aquion must be connected to an autosampler. For more information about sample injection, see [“Operation Overview”](#) on [page 26](#).

LEDs

The status LEDs indicate the status of various system functions. See [Table 2](#) for a description of each LED’s function. The power LED indicates whether the Dionex Aquion power is on.

Figure 3. Status LEDs

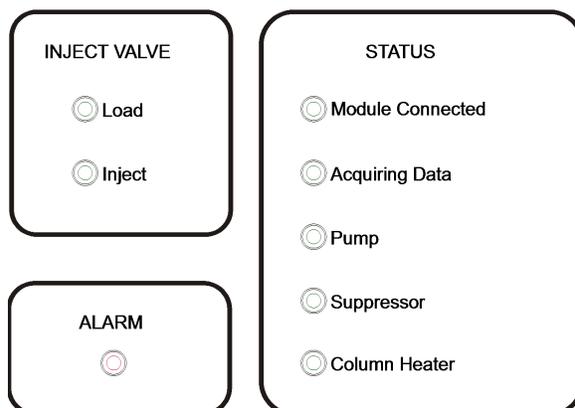


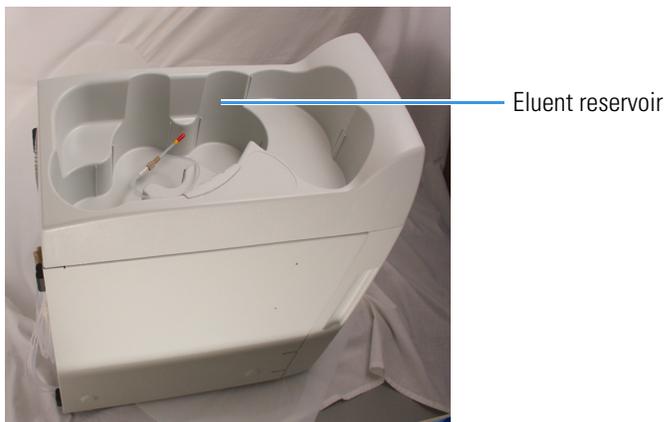
Table 2. Dionex Aquion status LED states

| LED Label | If On (Green) | If Flashing |
|------------------|--|---|
| Load | Injection valve is in Load position. | Valve error. |
| Inject | Injection valve is in Inject position. | Valve error. |
| Alarm | This LED does not have an “on” (green) state. | Error detected. Check the Chromeleon audit trail for the cause. |
| Module Connected | Dionex Aquion is connected to a Chromeleon instrument. | Does not flash. |
| Acquiring Data | Sequence or manual data acquisition is in progress. | Sequence has stopped due to an error. |
| Pump | Pump is on. | High or low pressure limit is exceeded. The pump is turned off. |
| Suppressor | Suppressor is on and current is being applied to it. | Continuity check failed or suppressor is over the voltage, current, or power limit. The suppressor is turned off. |
| Column Heater | Column heater is at set temperature. | Column heater is transitioning to a new temperature. |

Top Cover

Figure 4 shows the top cover of the Dionex Aquion.

Figure 4. Dionex Aquion top view



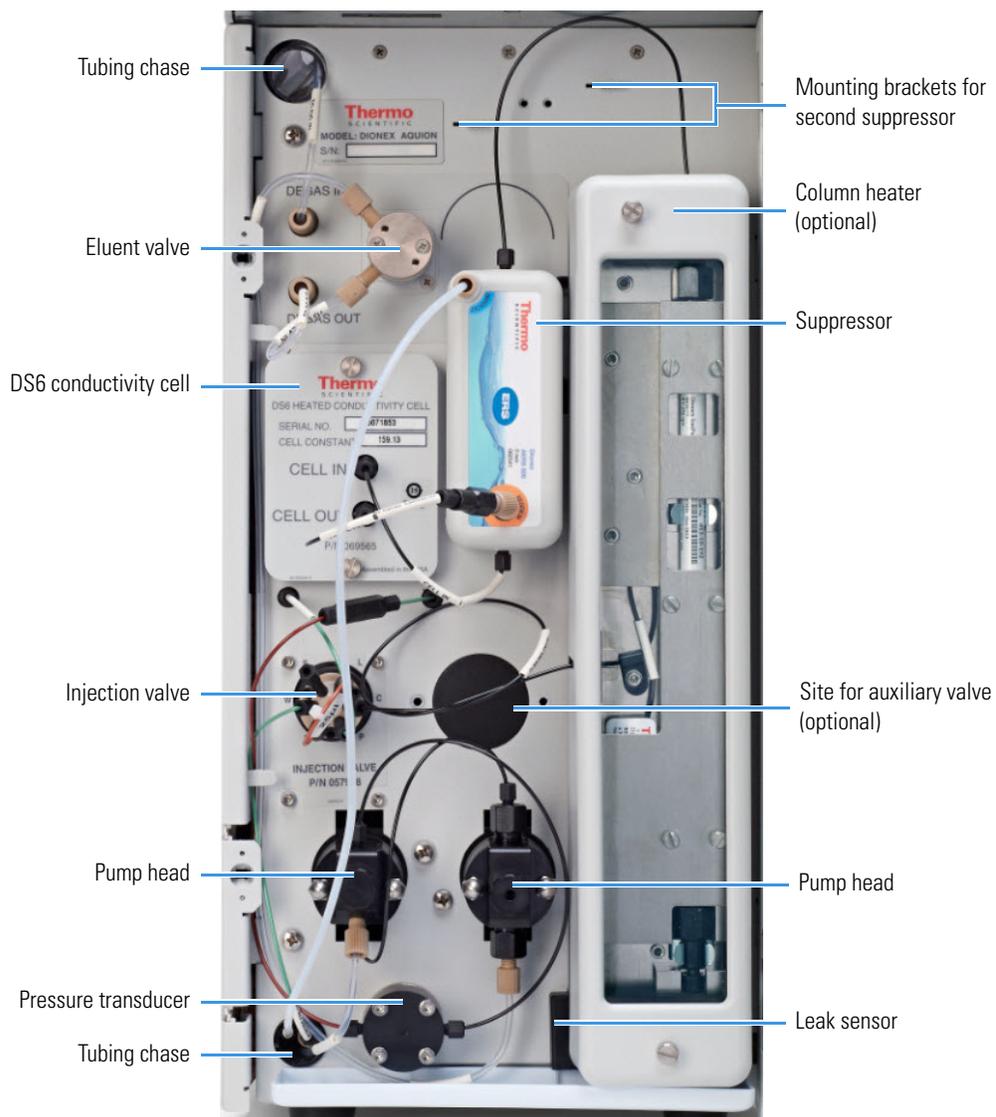
Reservoir Storage

The Dionex Aquion top cover has room for up to three 2-L plastic reservoirs (P/N 046548) or one 4-L plastic reservoir (P/N 039164).

Component Panel

Figure 5 shows the user-accessible components installed on the component panel behind the Dionex Aquion front door.

Figure 5. Dionex Aquion component panel



Pressure Transducer

The pressure transducer measures the system backpressure.

Leak Sensor

The leak sensor is installed in the drip tray at the bottom of the component panel. If liquid accumulates in the tray, an error message is logged in the Chromeleon audit trail and the Alarm LED flashes.

Pump Heads

The Dionex Aquion includes a dual-piston serial pump. The flow rate can be set to 0.00 mL/min or to between 0.05 and 5.00 mL/min. However, for optimum performance, set the flow rate to between 0.40 and 2.00 mL/min. Setting the flow rate to 0.00 mL/min turns off the pump. See “[Pump](#)” on [page 18](#) for details about the pump.

Injection Valve

The injection valve is a six-port, electrically-activated Rheodyne™ valve. A 25- μ L sample loop (P/N 042857) is installed on the valve at the factory. See “[Injection Valve](#)” on [page 20](#) for details about valve operation.

Auxiliary Valve (Optional)

The auxiliary valve is a two-position, electrically-activated Rheodyne valve (6-Port Valve; 10-Port Valve, 0.010-in ports; 10-Port Valve, 0.020-in ports). See “[Auxiliary Valve \(Optional\)](#)” on [page 21](#) for details about valve operation.

DS6 Heated Conductivity Cell

The flow-through conductivity cell measures the electrical conductance of analyte ions as they pass through the cell. A heat exchanger inside the cell regulates the temperature, which can be set to between 30 and 55 °C. For optimum performance, set the temperature to at least 7 °C above the ambient temperature and 5 °C above the column oven temperature. See “[DS6 Heated Conductivity Cell](#)” on [page 10](#) for details about the cell.

Suppressor

The suppressor reduces the eluent conductivity and enhances the conductivity of the sample ions, thereby increasing detection sensitivity. Either a Thermo Scientific™ Dionex™ ERS™ 500 Electrolytically Regenerated Suppressor or Thermo Scientific™ Dionex™ CRS™ 500 Chemically Regenerated Suppressor can be used with the Dionex Aquion. See “[Suppressor](#)” on [page 23](#) for details about the suppressor.

Separator and Guard Columns

Both the separator and guard columns are packed with resin and perform the separation of the sample ions. The main function of the guard column is to trap contaminants and remove particulates that might damage the separator column.

Column Heater (Optional)

The column heater controls the temperature of the separator and guard columns. The temperature can be set to between 30 and 60 °C; however, it must be set to at least 5 °C above the ambient temperature. See “[Column Heater \(Optional\)](#)” on [page 22](#) for details about the column heater.

Eluent Valve

The eluent valve controls the flow from the eluent reservoir. The eluent valve opens automatically when the pump is started and closes when the pump is turned off.

Tubing Chases

The upper tubing chase routes tubing from the top cover to the component panel. The lower tubing chase routes tubing from the component panel, through the interior of the Dionex Aquion, to the rear panel.

Rear Panel

Figure 6 shows the Dionex Aquion rear panel.

Figure 6. Dionex Aquion rear panel



Analog Output Connector

The analog output connector outputs conductivity data (as a 0 to 1 V signal) to an integrator or recording device. For connection and setup information, refer to the Dionex Aquion installation instructions.

USB Connectors

A USB receptacle is provided to allow connection to the Chromeleon computer. Two USB ports are provided for connecting to other USB devices. For connection instructions, refer to the Dionex Aquion installation instructions.

TTL and Relay Connector

The TTL and Relay connector strip provides two TTL outputs, two relay outputs, and four TTL inputs. The outputs can be used to control functions in other TTL- or relay-controllable devices. The inputs can be used to switch the injection valve position, turn on the pump, perform an autozero command, and send an event mark to the analog output. See “TTL and Relay Control” on page 95 for connection instructions.

Tubing Chase

The tubing chase routes tubing from the rear panel to the component panel.

Tubing Clips

The tubing clips hold tubing routed from the top cover in place.

Power Switch

The power switch provides on/off control of power to the Dionex Aquion.

Main Power Receptacle

The power supply cord plugs into the AC power receptacle.



CAUTION The power supply cord is used as the main disconnect device. Verify that the socket-outlet is near the Dionex Aquion and is easily accessible.



MISE EN GARDE Le cordon d'alimentation principal est utilisé comme dispositif principal de débranchement. Veillez à ce que la prise de base soit située/installée près du module et facilement accessible.



VORSICHT Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

Flow Schematics

Figure 7 shows the liquid flow path through the Dionex Aquion when using suppression in autorecycle mode.

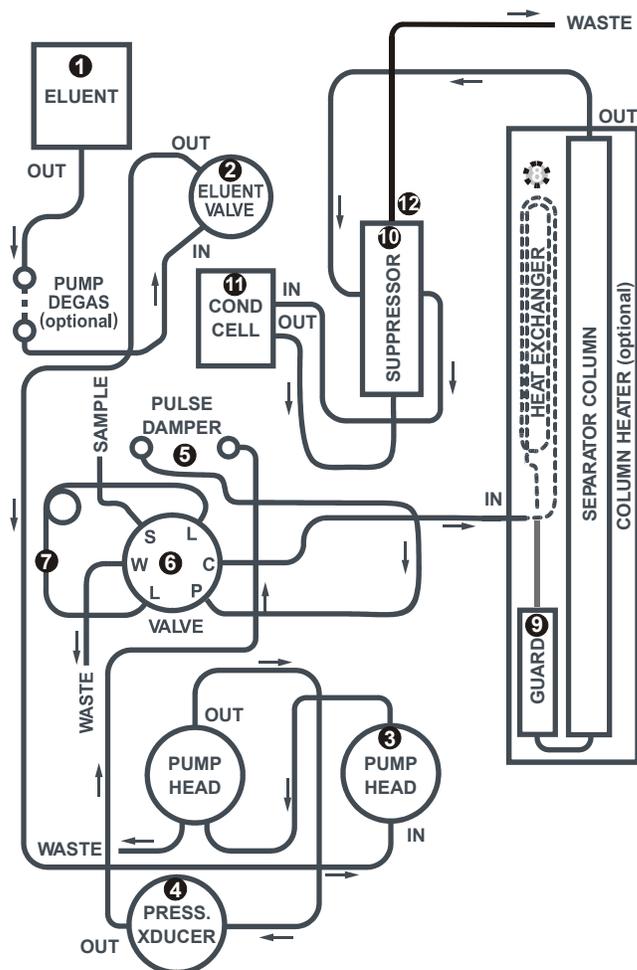
Flow Description

- Eluent from the eluent reservoir (1) flows through the pump degas assembly (if it is installed) and through the eluent valve (2) to the pump (3). The eluent is pushed through the pressure transducer (4), which measures the system pressure.
- The eluent is pushed through a pulse damper (5), which smooths minor pressure variations from the pump to minimize baseline noise. The eluent flows into the injection valve (6).
- After the sample is loaded into the sample loop (7) and the injection valve is toggled to the Inject position, eluent passes through the sample loop.
- If the optional column heater is installed, the eluent/sample mixture is pumped through the heat exchanger (8), which heats the mixture to the column heater temperature.
- The mixture then goes to the guard and separator columns (9) and through the suppressor (10).
- From the suppressor, the mixture flows through the cell (11), where the analytes are detected. A digital signal is sent to Chromeleon software. Analog output can be collected simultaneously.
- The mixture flows out of the cell and is recycled back into the suppressor, where it is used as the water source for the regenerant chamber. Flow is routed to waste (12).

2 Description

Chromeleon 7 Chromatography Data System

Figure 7. Dionex Aquion flow schematic



Chromeleon 7 Chromatography Data System

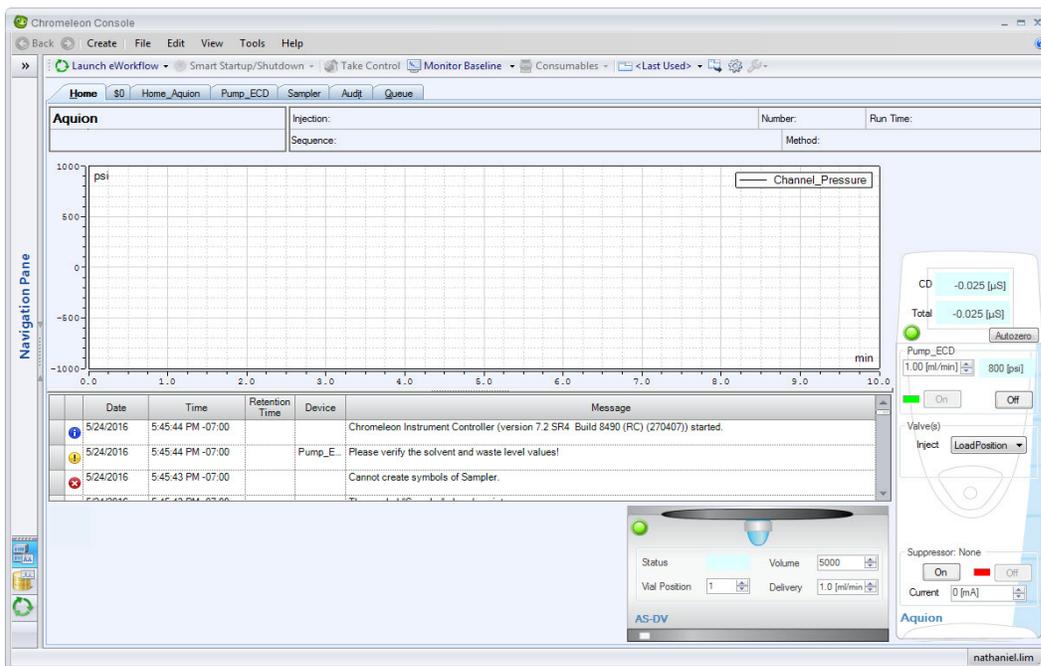
The Chromeleon 7 Chromatography Data System is used to control the Dionex Aquion and to acquire and process data.

Two modes of software control are available: automated control and direct control.

- With automated control, you create a list of control commands to be executed in chronological order.
- With direct control, you use the controls on an ePanel Set to issue commands and enter operating parameters. Direct control commands and parameter settings are executed as soon as they are entered.

Individual tabs on the ePanel Set provide access to detailed status and control functions for each system component (pump, detector, and so on). A Home tab includes system status information, a signal plot, and controls for the most commonly used system functions.

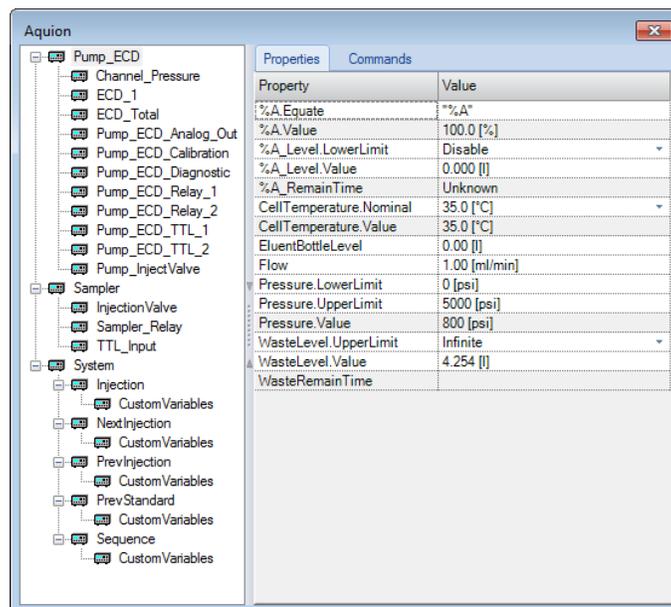
Figure 8. Example Chromeleon ePanel Set



For instructions on how to connect to the ePanel Set, see [“Connecting to Chromeleon”](#) on page 29.

If the function to be performed is not available on the ePanel Set, click the **Command**  icon on the Instrument toolbar above the ePanel Set or press the **F8** key to open the Chromeleon Command window (see [Figure 9](#)). From there, you can access all commands available for the system.

Figure 9. Chromeleon Command window



System Component Details

This section provides details about Dionex Aquion system components, including the vacuum degas assembly (optional), pump, injection valve, column heater (optional), suppressor, and conductivity cell.

Vacuum Degas Assembly (Optional)

The vacuum degas assembly provides online eluent degassing at a time and duration specified by the user. The assembly, which must be installed in the Dionex Aquion at the factory, consists of:

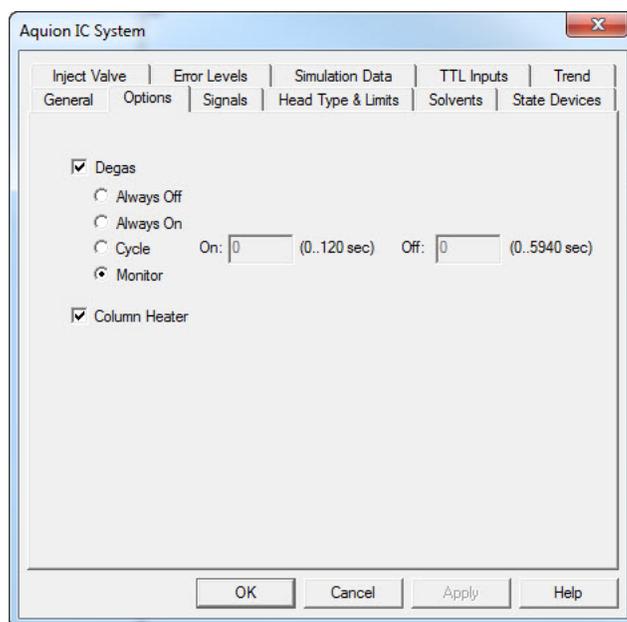
- A single-channel degas chamber (with degas membranes) with internal capacity of 17 mL
- A dual-stage diaphragm vacuum pump
- A solenoid valve
- An on-board vacuum sensor
- The electronics required to operate the vacuum pump
- Tubing, fittings, and other accessories

By default, the Dionex Aquion monitors the degas pressure reading and turns the degas pump on and off as needed. Different degas operating modes can be selected from Chromeleon.

❖ **To select the degas operating options**

1. Open the Chromeleon Instrument Configuration Manager.
2. Under the instrument, right-click the Dionex Aquion, and click **Properties**.
3. Click the **Options** tab and select the degas options (see [Figure 10](#)).

Figure 10. Dionex Aquion Properties dialog box: Options tab page



Degas Options

- **Always Off:** The degas pump is always off.
- **Always On:** The degas pump is always on. This setting is for test purposes by Thermo Fisher Scientific field service personnel. Do not use this setting for routine operation.
- **Cycle:** The degas pump cycles on and off according to the times specified in the **On** and **Off** fields. **On** specifies for how long the degas pump runs during a cycle. **Off** specifies the time between cycles.
- **Monitor:** (default mode) The Dionex Aquion monitors the degas pressure reading and turns the degas pump on and off as required.

Eluent Valve

Figure 11. Eluent valve



The eluent valve controls the flow from the eluent reservoir. The valve opens automatically when the pump is started and closes when the pump is turned off. The valve can also be opened and closed manually from the Chromeleon ePanel (see [“Chromeleon 7 Chromatography Data System”](#) on page 14). This lets you perform service procedures on pump components without eluent leaks occurring.

Pump

The Dionex Aquion pump is a microprocessor-based isocratic eluent delivery system. Its variable speed, dual-piston series design ensures pulse-free pumping for the most demanding applications.

Primary Pump Head

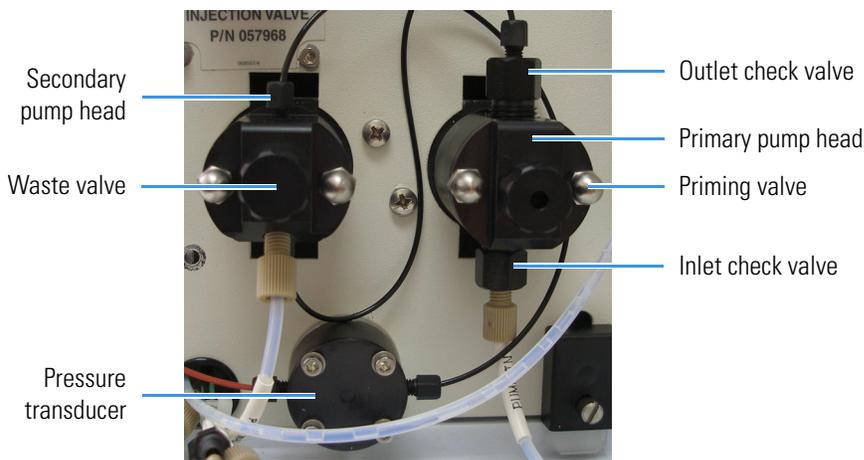
The primary pump head pumps eluent into the secondary head (see [Figure 12](#)). The check valves, which prevent reverse flow through the pump, are on the bottom (inlet) and top (outlet) of the primary pump head. The priming valve is on the front of the pump head.

To open the priming valve, turn the knob one-quarter to one-half turn counterclockwise. When the priming valve is open, liquid can flow into and out of the primary pump head via the port in the front of the valve.

Note The priming valve must be open when the pump is being primed with a syringe or with isopropyl alcohol. For detailed priming instructions, see [“Priming the Pump”](#) on page 84.

Secondary Pump Head

Figure 12. Secondary pump head



The secondary pump head delivers eluent to the remainder of the chromatography system (the injection valve, column, and detector). The waste valve is on the front of the secondary pump head (see [Figure 12](#)).

To open the waste valve, turn the knob one-quarter to one-half turn counterclockwise. When the waste valve is in the open position, all pump flow is directed to waste.

Note The waste valve must be open when the pump is being primed using the **Prime** button. For detailed priming instructions, see [“Priming the Pump”](#) on [page 32](#).

Pressure Transducer

Flow exiting the secondary pump head is directed to the pressure transducer, which measures the system pressure (see [Figure 12](#)).

Pressure readings indicate that the pumping system is delivering smooth, accurate flow. They can be monitored from the Chromeleon ePanel.

The system pressure should remain consistent (no more than a 3% difference from one pressure reading to the next). High and low pressure limits can be used to stop the pump flow if a limit is exceeded. The pressure limits can be set from Chromeleon (in the Instrument Configuration Manager or on the ePanel). See [“Troubleshooting Error Messages”](#) on [page 45](#) for troubleshooting information if a pressure limit is exceeded.

Pulse Damper

Flow output from the pressure transducer continues to the pulse damper, which smooths minor pressure variations. From there, flow is directed to the injection valve and then to the remainder of the chromatography system.

Piston Seal Wash

The pump includes a piston seal wash assembly that can be set up to continuously rinse the back of the piston seals to remove salt crystals and prolong the life of the seals. To use this feature, an external water source must be connected. For connection instructions, refer to the Dionex Aquion installation instructions.

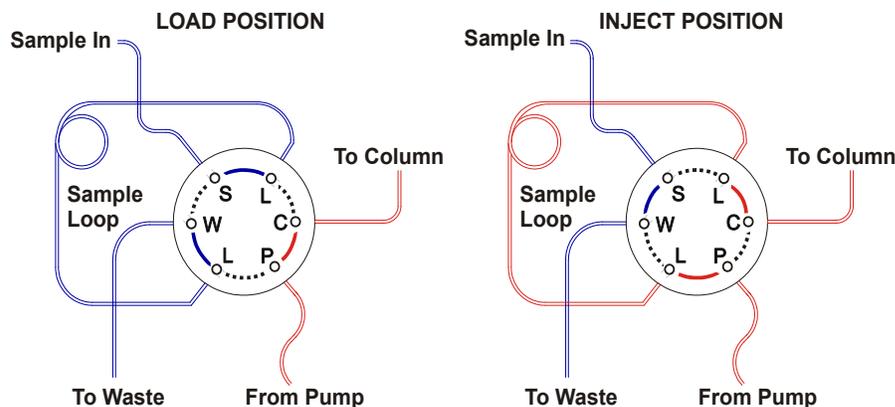
For continued protection of the pump, replace the piston rinse seals and O-rings in the seal wash assembly every 6 months, or whenever you replace the main piston seals for the Dionex Aquion pump (see “Replacing a Pump Piston Seal and Piston Rinse Seal” on page 68).

Injection Valve

The injection valve (P/N 057968) is a six-port, electrically-activated valve. A 25- μ L sample loop (P/N 042857) is installed on the valve at the factory.

The valve has two operating positions: Load and Inject (see Figure 13).

Figure 13. Injection valve flow schematics

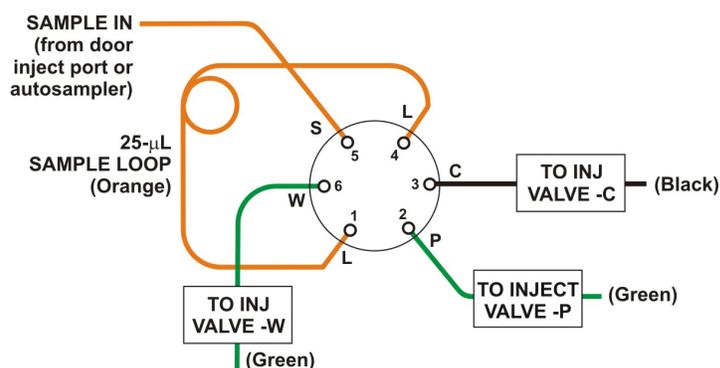


Eluent flows through the Load or Inject path, depending on the valve position.

- Load position: Sample is loaded into the sample loop, where it is held until injection. Eluent flows from the pump, through the valve, and to the column, bypassing the sample loop. Sample flows from the syringe or automated sampler line (if installed), through the valve, and into the sample loop. Excess sample flows out to waste.
- Inject position: Sample is swept to the column for analysis. Eluent flows from the pump, through the sample loop, and on to the column, carrying the contents of the sample loop with it. To inject samples, see “Loading and Injecting Samples” on page 35.

Figure 14 shows the injection valve connections. The injection valve is plumbed at the factory with all tubing and fittings for connection to the pump, injection port, column, and waste. A 25- μ L PEEK™ sample loop (P/N 042857) is installed between ports L (1) and L (4). Thermo Fisher Scientific offers sample loops in various sizes. If necessary, replace the pre-installed 25- μ L loop with a loop that has a different sample injection volume.

Figure 14. Injection valve plumbing



Auxiliary Valve (Optional)

The auxiliary valve is a high-pressure Rheodyne valve. The electrically-activated, 2-position PEEK valve is offered in both 6-port and 10-port (0.010-in ports; 0.020-in ports) models.

The auxiliary valve enables a variety of sample preparation activities, including:

- Online filtration
- Matrix elimination (for example, the removal of high backgrounds of chloride or organic material)
- Concentrator-based techniques
- Conditional injections (large loop/small loop applications where the data system monitors sample concentration and reinjects the sample, using the smaller loop, if the concentration is too high)
- AutoNeutralization™
- Matrix diversion prior to MS (mass spectrometry) detection

The auxiliary valve must be installed on-site by Thermo Fisher Scientific field service personnel.

Column Heater (Optional)

Figure 15. Column heater



The column heater provides temperature control for the separator and guard columns.

The heater temperature can be set to between 30 °C and 60 °C. However, the set temperature must be at least 5 °C above the ambient temperature. A thermistor mounted in the heater block monitors the temperature. Setting the temperature to 0 °C turns off the column heater.

If the temperature exceeds 65 °C, the column heater is shut off and the error message “Column heater exceeds safe temperature.” is displayed in the Chromeleon audit trail. See [“Troubleshooting Error Messages”](#) on [page 45](#) for troubleshooting information.

The column heater can be installed at the factory or ordered separately (P/N 069564) and installed on-site.

Note

- For best results with 2-mm columns, install a microbore heat exchanger (P/N 060943) in the column heater (see “[Replacing the Column Heater Heat Exchanger](#)” on [page 79](#)).
- Use red 0.125-mm (0.005-in) ID PEEK tubing (P/N 044221) (rather than the standard black tubing) for all tubing connections between the:
 - Injection valve and column heat exchanger
 - Guard column and separator column
 - Separator column to detector cell

Suppressor

The suppressor reduces the eluent conductivity and enhances the conductivity of the sample ions, thereby increasing detection sensitivity. A Thermo Scientific™ Dionex™ Atlas™ Electrolytic Suppressor (AES™) or Thermo Scientific™ Dionex™ CRS™ 500 Suppressor can be used with the Dionex Aquion.

For details about any of the suppressors or for information about selecting a suppressor for your application, refer to the suppressor manuals. The manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

DS6 Heated Conductivity Cell

The flow-through conductivity cell measures the electrical conductance of analyte ions as they pass through the cell. Two passivated 316 stainless steel electrodes are permanently sealed into the PEEK cell body. The cell design provides efficient sweep-out, low volume (1 µL), and low dispersion. Temperature control and compensation help verify good peak reproducibility and baseline stability.

Temperature Control

Temperature directly affects the conductivity of a solution. For example, laboratory heating and air conditioning systems can cause a regular slow cycling in the baseline. This, in turn, can affect the reproducibility of an analysis. The higher the conductivity, the more pronounced the effect.

In ion analysis, the effect of temperature variation is minimized by suppressing eluent conductivity. To further reduce the effect of temperature variation, a heater inside the cell regulates the temperature. The cell heater can be set to between 30 °C and 55 °C. The set temperature must be at least 7 °C above the ambient temperature. Setting the cell temperature to 0 °C turns off the cell heater.

2 Description

System Component Details

Temperature Compensation

Built-in preset temperature compensation of 1.7% per °C helps minimize changes in the baseline or in peak heights when the operating temperature is different from the temperature at which the cell was calibrated.

DS6 Heated Conductivity Cell Components

The cell front cover provides **CELL IN** and **CELL OUT** fittings for connecting the cell to the suppressor (see [Figure 5](#)). The remaining cell components are mounted behind the component panel. To replace the cell, remove the screws on the cell front cover and pull the entire cell assembly out through the component panel. See [“Replacing the Conductivity Cell”](#) on [page 75](#) for cell replacement instructions.

Operation

This chapter describes routine operating and maintenance procedures for the Dionex Aquion.

The Dionex Aquion is designed for IC (ion chromatography) applications and should not be used for any other purpose. Operation of the Dionex Aquion in a manner not specified by Thermo Fisher Scientific may result in personal injury.

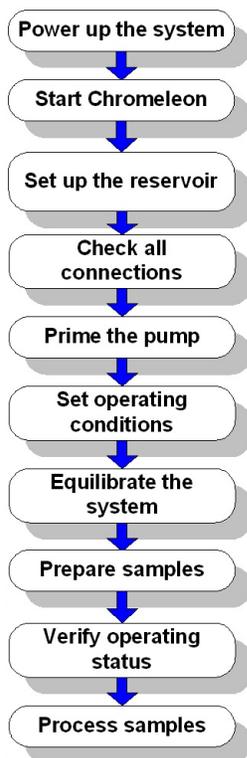
Contents

- [Operation Overview](#)
- [Turning On the System Power](#)
- [Connecting to Chromeleon](#)
- [Setting Up the Eluent Reservoir](#)
- [Checking All Connections](#)
- [Priming the Pump](#)
- [Setting System Operating Conditions](#)
- [Equilibrating the System and Verifying Operational Status](#)
- [Preparing Samples](#)
- [Loading and Injecting Samples](#)
- [Processing Samples](#)
- [Performing Sample Analyses](#)

Operation Overview

Figure 16 shows the basic steps for routine operation of the Dionex Aquion.

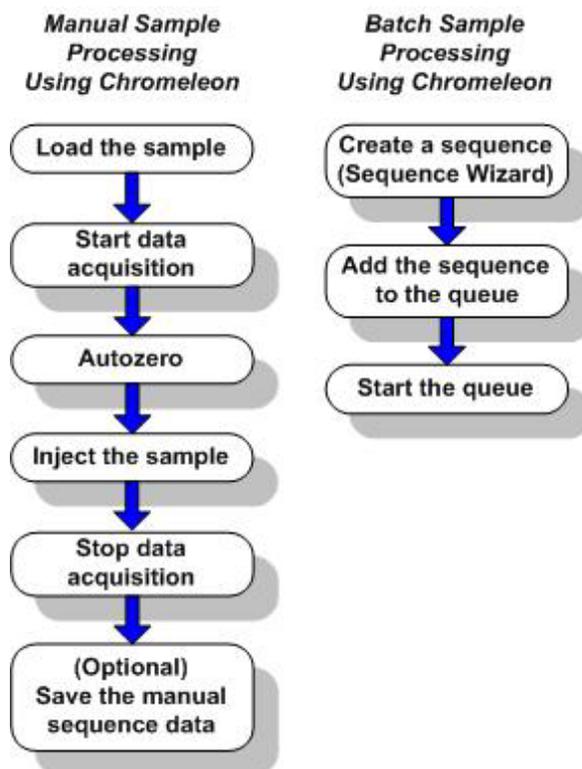
Figure 16. Operation flow chart



Sample Processing Overview

Samples can be run manually (one at a time), or they can be grouped and run automatically in batches. [Figure 17](#) shows the typical steps for manual and batch sample processing.

Figure 17. Sample processing overview

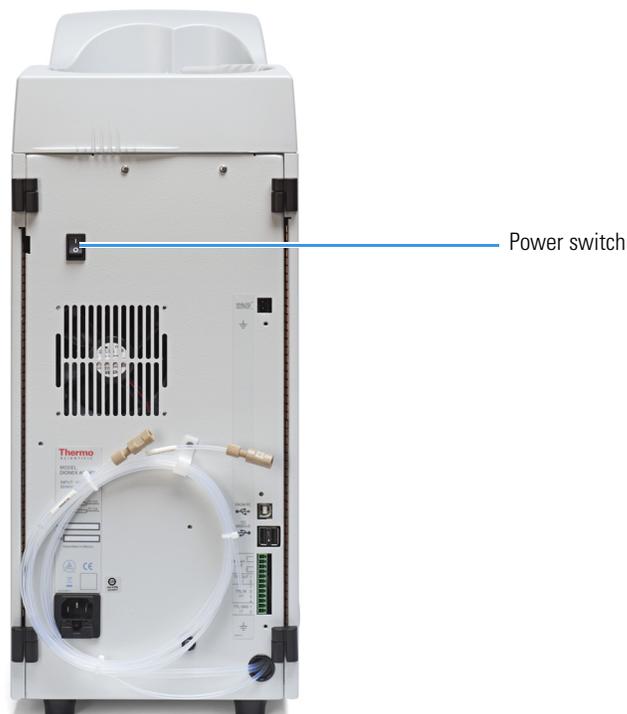


Turning On the System Power

❖ **To turn on the power**

1. Press the power switch on the Dionex Aquion rear panel (see [Figure 18](#)).

Figure 18. Dionex Aquion rear panel



2. Turn on the power to the computer and the autosampler (if used).

Table 3. Dionex Aquion power-up conditions

| Feature | Power-Up Conditions |
|------------------------------------|--|
| Pump | Off |
| Injection valve | Load position |
| Cell | Reading current value |
| Suppressor | Off* |
| Cell heater | Set to the last value used. The default when the Dionex Aquion is turned on for the first time is 35 °C. |
| Column oven temperature (optional) | Set to the last value used. The default when the Dionex Aquion is turned on for the first time is 30 °C. |

* When you start the suppressor, the value used last is restored.

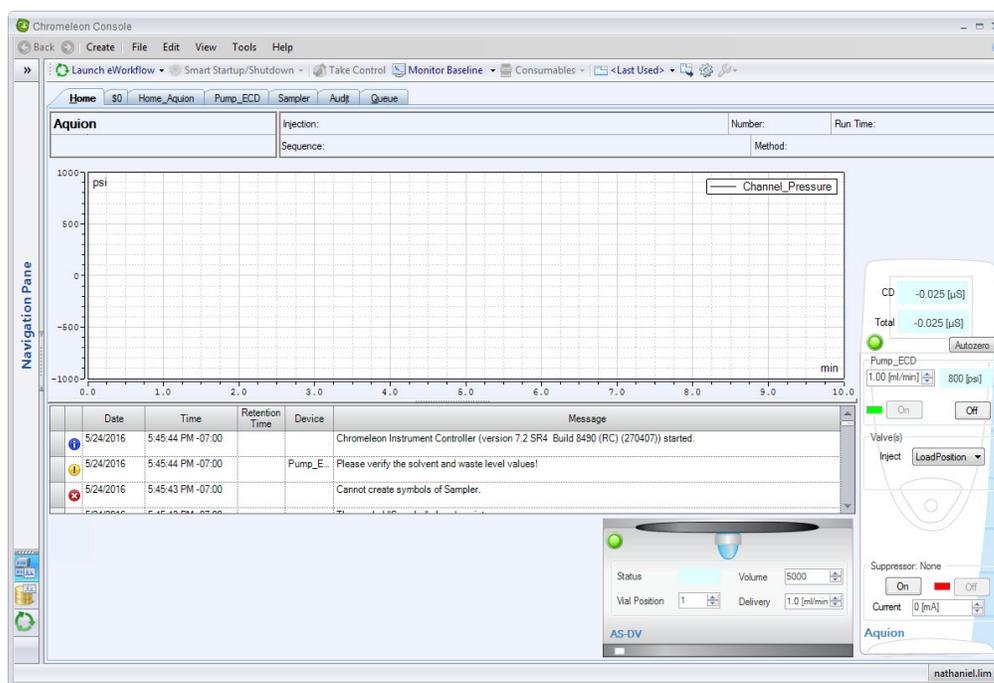
Connecting to Chromeleon

Note If you are beginning operation of a Dionex Aquion that has not been configured in a Chromeleon instrument, refer to the Dionex Aquion installation instructions for Chromeleon setup instructions.

❖ To start the Chromeleon client

1. Click **Start > All Programs > Thermo Chromeleon 7 > Chromeleon 7**.
2. In the Console, click the **Instruments** Category Bar.
3. Select the name of the instrument in which the Dionex Aquion is configured. Chromeleon connects to the instrument and displays the ePanel Set (see [Figure 19](#)).

Figure 19. Dionex Aquion ePanel in Chromeleon



Setting Up the Eluent Reservoir

Eluent quality significantly affects the performance of the Dionex Aquion. To verify optimal pump performance:

- Thermo Fisher Scientific strongly recommends vacuum degassing all eluents. This helps prevent bubbles, caused by outgassing, from forming in the pump heads and the detector flow cell.

- The optional vacuum degas assembly provides programmable, online degassing. The degas assembly must be installed in the Dionex Aquion at the factory. If the Dionex Aquion does not contain a degas assembly, manually degas eluent daily (following the instructions below) and store it in pressurized reservoirs.

❖ To degas the eluent

1. Prepare the eluent according to the instructions in the column manual. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
2. Pour the eluent for the application into a vacuum flask.
3. Attach the flask to a vacuum pump or water aspirator.
4. Vacuum degas the eluent for 5 to 10 minutes by shaking or sonication.
5. Remove the flask from the vacuum. **Do not allow eluent to flow from the aspirator back into the flask.**
6. Pour the degassed eluent into a pressurizable reservoir. **Do not shake the eluent.**
7. Install an end-line filter on the eluent line (see “To filter the eluent” on page 30).
8. (Optional) Pressurize the reservoir.

The Dionex Aquion does not require pressurized reservoirs. However, if eluent is manually degassed or is sensitive to contamination, Thermo Fisher Scientific recommends pressurizing the reservoir with helium or nitrogen.

The air regulator accessory (P/N 060054) for pressurizing the eluent reservoir must be ordered separately. For more information, refer to the Dionex Aquion installation instructions.

❖ To filter the eluent

Filtering removes small particulates in the eluent that may contaminate the pump check valves and cause erratic flow rates or loss of prime. An end-line filter (P/N 045987) is provided in the Dionex Aquion Ship Kit (P/N 057905) for this purpose.

1. Install the end-line filter on the end of the eluent line, inside the reservoir.
2. Verify that the end of the filter extends to the bottom of the reservoir and that the filter is submerged in eluent. This prevents air from being drawn through the lines.

❖ To fill the eluent reservoir

Fill the reservoir with the prepared eluent.

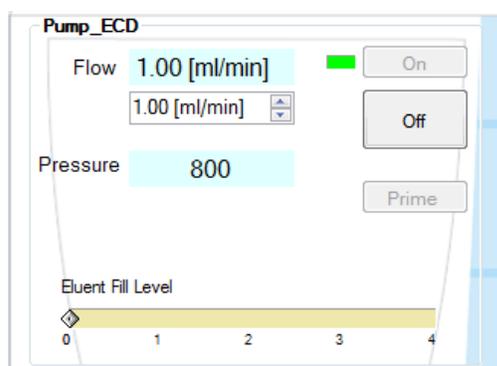
❖ **To set the eluent level**

After filling the reservoir, use the slider on the Chromeleon ePanel to set the eluent fill level (see [Figure 20](#)).

Chromeleon determines the eluent usage by monitoring the flow rate and the length of time the pump is on. The eluent fill level volume is updated as the eluent is depleted. A warning appears if the level falls below 200 mL. Warnings are repeated at 100 mL and 0 mL.

IMPORTANT For the level shown in the Eluent Fill Level to be accurate, you must enter the level when the reservoir is filled. The Dionex Aquion does not automatically detect when the reservoir is filled, nor when it is empty.

Figure 20. Pump settings



❖ **To connect the eluent reservoir**

If it is not already connected, connect the **ELUENT BOTTLE OUT** line from the reservoir cap to the **ELUENT IN** line, which extends from the tubing chase on the top of the Dionex Aquion.

Checking All Connections

To prevent leaks, check that the eluent reservoir is filled and the tubing connecting the reservoir to the Dionex Aquion tubing is securely connected.

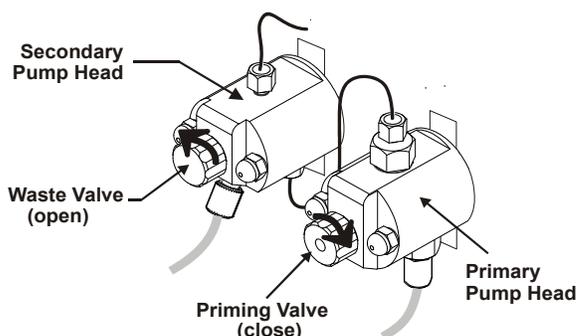
Priming the Pump

IMPORTANT If you changed eluent, or if the eluent lines are dry, prime the lines first with a syringe (see [page 84](#)) before priming the pump.

❖ To prime the pump

1. Verify that the priming valve on the primary pump head is closed (turned all the way clockwise) (see [Figure 21](#)).

Figure 21. Pump heads



2. Open the waste valve on the secondary pump head by turning the knob one-quarter to one-half turn counterclockwise. Opening the valve directs the eluent flow path to waste and eliminates backpressure.
3. Click **Prime** on the Chromeleon ePanel. The pump will begin pumping at approximately 3 mL/min.
4. Continue priming the Dionex Aquion until all air and previous eluent are purged and no air bubbles are exiting the waste line.
5. Click the **Off** button to turn the pump off.
6. Close the waste valve. **Do not overtighten.** The pump is now ready for operation.

Setting System Operating Conditions

Note This section is an overview of the steps needed to start up the system and begin running samples. Actual operating parameters (flow rate, cell heater temperature, suppressor current, and so on) depend on the application to be run. Refer to the column manual for the required parameters for your application.

Set or verify system operating parameters from the Chromeleon ePanel. Operating parameters can also be set automatically by loading a Chromeleon sequence.

Note Clicking the on/off buttons on the Chromeleon ePanel starts and stops the pump. The suppressor is activated via the on/off slider. The flow rate and suppressor current settings that were in effect when the system was shut down are restored.

❖ **To set operating conditions**

1. Verify that the pump is on and set to the correct flow rate.
2. Verify that the suppressor current is on and that the setting is correct.
3. Verify that the cell heater is set to the correct value.
4. Verify that the column heater is set to the correct value.

Equilibrating the System and Verifying Operational Status

❖ **To equilibrate the system and verify status**

1. Allow the system to equilibrate.

During equilibration, the Chromeleon ePanel displays the background conductivity (the conductivity of the eluent before sample injection) and the system backpressure.
2. Monitor the background conductivity. Refer to the column manual for the appropriate background conductivity for your application.
3. Offset the background and zero the reading by clicking the **Autozero** button on the Chromeleon ePanel (see [Figure 19](#)).
4. Monitor the system pressure from the ePanel to verify that it is at the expected pressure for the installed column (refer to the column manual for details) and is stable.
 - If the pressure is less than the expected amount, gas may be trapped in the system. To release the gas, remove the pump fitting on the injection valve port, labeled **P (2)**. Allow the air to escape and then reconnect the fitting.
 - If the pressure fluctuates by more than about 0.13 MPa (20 psi), prime the pump. See [“Pump Difficult to Prime or Loses Prime”](#) on [page 53](#) for additional troubleshooting information.
 - If the pressure is too high, there may be a restriction in the system plumbing. See [“Pump Difficult to Prime or Loses Prime”](#) on [page 53](#) for troubleshooting information.
5. Verify that the baseline conductivity is at the expected reading for your application and is stable. In general, it should be <30 μS for a system set up for anion analyses and <2 μS for a system set up for cation analyses. See [“High Cell Output”](#) on [page 58](#) for troubleshooting information if the conductivity is too high. See [“Baseline Noise or Drift”](#) on [page 58](#) if the baseline is drifting or has excessive “noise” (large fluctuations in readings).

6. Verify that the cell heater is at the set point and is stable. The temperature is at equilibrium when the **Set Temperature** and **Current Temperature** readings on the ePanel are the same.
7. Verify that the column heater temperature (if installed) is at the set point and stable. The temperature is at equilibrium when the **Set Temperature** and **Current Temperature** readings on the ePanel are the same.

The system is now ready for sample processing.

Preparing Samples

Note Sample preparation can be performed while the system is equilibrating.

Collecting and Storing Samples

Collect samples in high density polyethylene containers that have been thoroughly cleaned with deionized (DI) water. Do not clean containers with strong acids or detergents because these can leave traces of ions on the container walls. The ions may interfere with the analysis.

If samples will not be analyzed on the day they are collected, filter them through clean 0.45 µm filters immediately after collection; otherwise, bacteria in the samples may cause the ionic concentrations to change over time. Refrigerating the samples at 4° C (39° F) will reduce, but not eliminate, bacterial growth.

Analyze samples containing nitrite or sulfite as soon as possible. Nitrite oxidizes to nitrate, and sulfite to sulfate, thus increasing the measured concentrations of these ions in the sample. In general, samples that do not contain nitrite or sulfite can be refrigerated for at least one week with no significant changes in anion concentrations.

Pretreating Samples

Analyze rainwater, drinking water, and air particulate leach solutions directly with no sample preparation (other than filtering and possibly diluting).

Filter groundwater and wastewater samples through 0.45 µm filters before injection, unless samples were filtered after collection.

Before injection, pretreat samples that may contain high concentrations of interfering substances by putting them through Thermo Scientific™ Dionex™ OnGuard™ cartridges. Refer to *Installation and Troubleshooting Guide for OnGuard Cartridges* (Document No. 032943) for instructions.

Diluting Samples

Because the concentrations of ionic species in different samples can vary widely from sample to sample, no single dilution factor can be recommended for all samples of one type. In some cases (for example, many water samples), concentrations are so low that dilution is not necessary.

Use eluent or ASTM filtered, Type I (18-megohm) deionized water to dilute the sample. When using carbonate eluents, diluting with eluent minimizes the effect of the water dip at the beginning of the chromatogram. If you dilute the sample with eluent, also use eluent from the same lot to prepare the calibration standards. This is most important for fluoride and chloride, which elute near the water dip.

To improve the accuracy of early eluting peak determinations, such as fluoride, at concentrations below 50 ppb, dilute standards in eluent or spike the samples with concentrated eluent to minimize the water dip. For example, spike a 100 mL sample with 1.0 mL of a 100 X eluent concentrate.

Loading and Injecting Samples

Note Samples can be injected using either the standard injection valve or the optional auxiliary valve, if installed. For more information, see the Chromeleon Help or user's manual.

There are two techniques for loading samples into the sample loop:

- With an autosampler
- With a syringe or vacuum syringe through the injection port on the Dionex Aquion front door

For autosampler injections, the injection port tubing is disconnected from the Dionex Aquion injection valve and replaced by the autosampler outlet tubing. Other setup requirements depend upon the model of autosampler.

The Dionex Aquion injection valve (or the auxiliary valve, if installed) must be specified as the injection valve and must be linked to the autosampler in the Chromeleon instrument.

Setup for a Dionex AS-DV Autosampler

To use a Thermo Scientific™ Dionex™ AS-DV Autosampler with the Dionex Aquion, the Dionex Aquion injection valve must be linked to the Dionex AS-DV in the Chromeleon instrument.

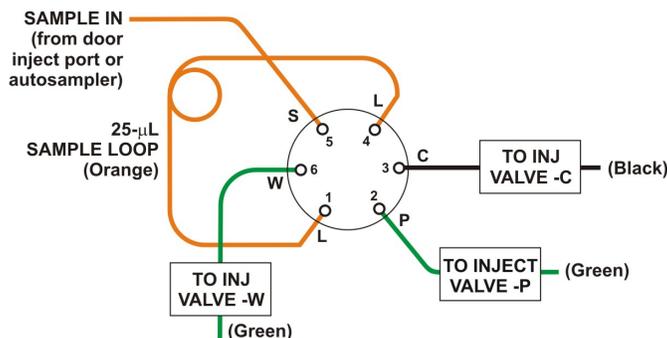
Setup for a Dionex AS-AP Autosampler

For setup information for the Dionex AS-AP, refer to *Dionex AS-AP Autosampler Operator's Manual* (Document No. 065361). The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

❖ To load samples with a syringe

1. Verify that the injection port on the Dionex Aquion front door (see [Figure 2](#)) is connected to sample port **S (5)** on the injection valve (see [Figure 22](#)).

Figure 22. Injection valve connections



2. Fill the 1 cc syringe (P/N 016388) provided in the Dionex Aquion Ship Kit (P/N 057905) with a calibration standard or sample.
3. Insert the syringe into the injection port on the Dionex Aquion front door (see [Figure 2](#)).
4. Verify that the injection valve is in the Load position.
5. Overfill the sample loop with several sample loop volumes. Excess sample will exit through the injection valve waste line.
6. Leave the syringe in the port.
7. Switch the injection valve to the Inject position (see “[To inject samples](#)” on [page 37](#)).

❖ To load samples with a vacuum syringe

1. Disconnect the waste line from port **W (6)** of the injection valve (see [Figure 22](#)) and attach a shorter line: 25 to 30 cm (10 to 12 inches) of PEEK or PTFE (polytetrafluoroethylene) tubing.
2. Place the free end of the line into the sample.
3. Verify that the injection valve is in the Load position.
4. Insert the 1 cc syringe (P/N 016388) provided in the Dionex Aquion Ship Kit (P/N 057905) into the injection port on the Dionex Aquion front door (see [Figure 2](#)) and pull out the plunger to draw the sample into the injection valve.
5. Switch the injection valve to the Inject position (see “[To inject samples](#)” on [page 37](#)).

❖ **To load samples with an autosampler**

1. Verify that the autosampler output line is connected to port **S (5)** of the Dionex Aquion injection valve.
2. Prepare and fill the sample vials and place them in the autosampler tray or cassette. Refer to the autosampler manual for detailed instructions.
3. The sample loading process depends on the autosampler. Refer to the autosampler manual for detailed instructions. In general, do one of these:
 - Include the commands for controlling sample loading in a Chromeleon method. (If necessary, refer to the Chromeleon Help or user manual for assistance.)
 - Enter the commands for loading the sample on the autosampler front panel.
4. Switch the injection valve to the Inject position (see [“To inject samples”](#) on page 37).

❖ **To inject samples**

After loading the sample in the sample loop, use one of the following methods to switch the injection valve to the Inject position.

- Manually: Click the **Inject** button on the Chromeleon ePanel (see [“Dionex Aquion ePanel in Chromeleon”](#) on page 29).
- Automatically: Include the Inject command in a Chromeleon method. (If necessary, refer to the Chromeleon Help or user manual for assistance.)

Processing Samples

Samples can be run manually (one at a time) or can be grouped and run automatically in batches.

Manual Sample Processing

To manually process a sample, select operating parameters and commands from the Chromeleon ePanel. Commands are executed as soon as they are entered.

Summary of Manual Sample Processing

1. Complete the instructions in [“Turning On the System Power”](#) on page 28 through [“Equilibrating the System and Verifying Operational Status”](#) on page 33 to prepare the Dionex Aquion for operation and to prepare the sample for processing.
2. Load the sample, using a syringe, vacuum syringe, or autosampler (see [“Loading and Injecting Samples”](#) on page 35).
3. On the Chromeleon ePanel, click the **Autozero** button.

4. Inject the sample (see [“To inject samples”](#) on page 37).

The signal plot is displayed on the ePanel.

5. Monitor the chromatogram. When sample data has been collected, click the **Monitor Baseline** button on the Instrument toolbar above the ePanel Set.

❖ **To save manual data**

Data from manual processing is saved in the **manual** sequence under the instrument folder in the local data vault. To save the data from a manual run:

1. Select the **manual** folder and select **File > Save As**.
2. Enter a new name for the sequence.
3. Select the **Save raw data** check box.
4. Click **Save**.

Automated (Batch) Sample Processing

You can use Chromeleon to create a list of samples (a sequence) to be processed automatically. For each sample, the sequence includes:

- A method with commands and parameters for controlling the Dionex Aquion and autosampler (if used) and for acquiring sample data.
- A processing method for peak identification and area determination.
- Additional sample processing parameters (sample name, sample type, injection volume, etc.).

After creating the sequence, you can start batch processing.

Summary of Automated Sample Processing

1. Complete the instructions in [“Turning On the System Power”](#) on page 28 through [“Equilibrating the System and Verifying Operational Status”](#) on page 33 to prepare the Dionex Aquion for operation and to prepare the sample for processing.
2. If an autosampler is installed, prepare and fill the sample vials and place them in the autosampler tray or cassette. Refer to the autosampler manual for detailed instructions. Autosampler manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
3. If an autosampler is not installed, load the sample into the injection valve sample loop through the sample port on the Dionex Aquion front door (see [“To load samples with a syringe”](#) on page 36).

Performing Sample Analyses

This section is an overview of the steps required for performing sample analyses using Chromeleon. For details about how to perform these steps, refer to the Chromeleon Help.

To perform sample analyses with a Dionex Aquion, first add sample injections to a Chromeleon sequence. The sequence determines how a group of injections will be analyzed and the order in which they will be run. For each injection, the sequence typically includes the following elements:

- An *instrument method*—a predefined list of commands and parameters for controlling the system and acquiring sample data.
- The chromatographic data acquired.
- A *processing method*—a predefined set of instructions for evaluating the acquired data.
- Templates for displaying chromatographic data on the screen and for printing reports.

Creating Sequences

Two methods are available for creating a new sequence in Chromeleon:

- eWorkflows provide predefined templates and rules for creating new sequences. If they have been defined for your laboratory, eWorkflows are the preferred method for creating a new sequence.
- The Sequence Wizard provides a series of dialog boxes that guide you through the sequence creation process.

Running Sequences

After creating the sequence, load it into a queue and start the run. Chromeleon performs a Ready Check to verify that the instrument is ready for operation and the instrument methods specified in the sequence are error-free. If the Ready Check passes and another sequence is not currently running, the sequence is started.

Note Chromeleon cannot run a sequence until the list of trackable consumables installed in the Dionex Aquion has been approved in the Consumables Inventory window. For details about how to approve consumables, refer to the Chromeleon Help.

3 Operation

Performing Sample Analyses

Maintenance

This chapter describes routine maintenance procedures that users may perform. Thermo Fisher Scientific personnel must perform all other maintenance procedures.

As Needed

- Regularly check the eluent level and refill the reservoir when needed.
- Make fresh eluent as needed.

Daily Maintenance

- Check for leaks or spills on the component panel (see [Figure 5](#)). Wipe up spills. Isolate and repair leaks (see [“Liquid Leaks”](#) on [page 51](#)). Rinse off any dried eluent with deionized water.
- Check the waste container daily and empty when needed.

Weekly Maintenance

- Check for crimps or discoloration in the fluid lines. Replace any pinched lines. Replace damaged lines.
- Check for evidence of liquid leaks in the junctions between the pump heads and the pump casting. If the piston seal wash tubing is not connected, check for evidence of moisture in the drain tubes at the rear of the pump heads. Normal friction and wear may gradually result in small liquid leaks around the piston seal. If unchecked, these leaks can gradually contaminate the piston housing, causing the pump to operate poorly. If leaks occur, replace the piston seals (see [“Replacing a Pump Piston Seal and Piston Rinse Seal”](#) on [page 68](#)).
- Check the end-line filter (P/N 045987) for discoloration or bacterial buildup and change if needed. When new, end-line filters are pure white. If the system is in continuous operation, change the end-line filter weekly, or whenever it becomes discolored. Replace the filter more often if bacterial buildup is visible or if the eluent does not contain solvent.

Note Regularly replace end-line filters when using aqueous eluents, which may contaminate the filter with bacteria or algae. The bacterial buildup may not be visible.

Semiannual Maintenance

- Replace the pump piston rinse seals and piston seals (see [“Replacing a Pump Piston Seal and Piston Rinse Seal”](#) on page 68).

Annual Maintenance

- Thermo Fisher Scientific recommends performing preventive maintenance annually, as well as before scheduled Performance Qualification tests. A Dionex Aquion Preventive Maintenance Kit (P/N 057954) is available for this purpose. The kit provides parts and instructions for performing the procedure.
- Rebuild the auxiliary valve, if installed (see [“Rebuilding the Injection Valve or Auxiliary Valve”](#) on page 64).
- If a Dionex AS-AP Autosampler is installed, perform the Dionex AS-AP preventive maintenance procedure. A Dionex AS-AP Preventive Maintenance Kit (P/N 60-065438) is available for this purpose. The kit provides parts and instructions for performing the procedure.
- If a Dionex AS-DV Autosampler is installed, replace the tip and tubing. The Dionex AS-DV Preventive Maintenance Kit (P/N 60-065335) contains all of the components required to replace the sampling tip and the tubing between the tip and the injection valve. Instructions are included with the kit.

Troubleshooting

This chapter is a guide to troubleshooting minor issues that may arise during operation of the Dionex Aquion. Turn to the section of this chapter that best describes the operating problem or symptom that you see. Each section lists possible causes of the problem or symptom in order of probability. A systematic troubleshooting approach is the most effective way to determine the root cause.

If you are unable to resolve a problem by following the instructions here, contact Technical Support for Dionex products. In the U.S. and Canada, call 1-800-532-4752. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office. Have this chapter at hand when talking with Technical Support personnel.

Contents

- [Error Messages](#)
- [Troubleshooting Error Messages](#)
- [Troubleshooting System Component Symptoms](#)

Error Messages

The instrument control firmware installed in the Dionex Aquion periodically checks the status of certain parameters. If a problem is detected, it is reported to Chromeleon and logged in the audit trail. Each error message is preceded by an icon that identifies the seriousness of the underlying problem (see Table 4). You can change the severity level assigned to a problem whenever appropriate.

Table 4. Chromeleon audit trail severity levels

| Icon | Severity Level | Description |
|---|----------------|---|
|  | Warning | A message is displayed in the audit trail, but the current run is not interrupted. |
|  | Error | A message is displayed in the audit trail, and the system attempts to correct the problem (sometimes by using an alternative parameter). An Error never interrupts the current analysis; however, if it occurs during the Ready Check, the queue will not be started until the error is resolved. |
|  | Abort | A message is displayed in the audit trail, and the running queue is aborted. |

Table 5 shows the most frequently observed Dionex Aquion error messages. For troubleshooting assistance, refer to the page indicated in the table.

Table 5. Audit trail error messages

| Icon | Message | See |
|---|--|-------------------------|
|  | Column heater exceeds safe temperature | page 45 |
|  | Column heater open circuit | page 45 |
|  | Column heater short circuit | page 45 |
|  | Degas calibration failed | page 46 |
|  | Hardware not present | page 46 |
|  | Leak sensor wet | page 46 |
|  | Load/Inject valve error | page 46 |
|  | Option not installed | page 47 |
|  | Pressure slope calibration error | page 47 |
|  | Pump motor lost control | page 47 |
|  | Pump over pressure | page 47 |
|  | Pump pressure hardware error | page 47 |
|  | Pump stopped due to lost USB communication error | page 48 |
|  | Pump under pressure | page 48 |

Table 5. Audit trail error messages, continued

| Icon | Message | See |
|---|---------------------------------------|---------|
|  | Second valve error | page 48 |
|  | Suppressor not connected | page 49 |
|  | Suppressor over current | page 49 |
|  | Suppressor over power | page 49 |
|  | Suppressor over voltage | page 50 |
|  | Suppressor stopped for zero flow rate | page 50 |

Troubleshooting Error Messages

Column heater exceeds safe temperature

This error occurs when the column heater temperature is higher than the maximum allowed. This error may occur if the Dionex Aquion is operating in an extreme environment (greater than 40 °C (104 °F)).

❖ To troubleshoot

See “[Environmental](#)” on [page 89](#) for environmental specifications.

Column heater open circuit

This error occurs when the column heater is unplugged from the component panel.

❖ To troubleshoot

1. Verify that the column heater is plugged into the component panel.
2. If the error persists, the column heater may be faulty. Replace the column heater (see “[Replacing the Column Heater](#)” on [page 78](#).)

Column heater short circuit

This error occurs when there is a short circuit on the thermistor input used to measure the column heater temperature. This error indicates a faulty column heater.

❖ To troubleshoot

Replace the column heater (see “[Replacing the Column Heater](#)” on [page 78](#).)

Degas calibration failed

This error occurs when the degas vacuum does not reach the expected level during calibration.

❖ To troubleshoot

1. Retry the calibration.
2. If calibration still fails, the vacuum degas assembly may need to be replaced. Contact Technical Support for Dionex products for assistance.

Hardware not present

This error indicates a problem in the Dionex Aquion electronics.

❖ To troubleshoot

Contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Leak sensor wet

The leak sensor is installed in the drip tray at the bottom of the component panel (see [Figure 5](#)). If liquid accumulates in the tray, the sensor signals the problem and this error message appears.

❖ To troubleshoot

1. Locate the source of the leak by visually inspecting the tubing, fittings, and components on the component panel (see [“Liquid Leaks”](#) on [page 51](#)).
2. Tighten fittings or replace tubing and fittings as required. See [“Liquid Leaks”](#) on [page 51](#) for detailed troubleshooting of various types of leaks.
3. After fixing the leak, dry the drip tray thoroughly to prevent the leak sensor from triggering additional error messages.

Load/Inject valve error

If the injection valve fails to switch position within 1 second of being toggled, the Dionex Aquion firmware reports an error to Chromeleon and this error message appears.

❖ To troubleshoot

1. If a sequence is being executed, terminate the sequence by selecting **Stop** on the Chromeleon ePanel.
2. Try to toggle the valve from **LoadPosition** to **InjectPosition** by clicking the down arrow next to **Inject** on the Home ePanel.

3. Turn off the Dionex Aquion power briefly and restart.
4. If the problem persists, repeat [Step 2](#).
5. If the problem persists, contact Technical Support for Dionex products for assistance.

Option not installed

This error occurs if a command is issued to control an option that is not installed.

❖ To troubleshoot

Check the Chromeleon Instrument Configuration Manager to verify that the option is enabled or configured.

Pressure slope calibration error

This error occurs if you try to calibrate the pressure slope when the pressure is less than 3 MPa (500 psi).

❖ To troubleshoot

Contact Technical Support for Dionex products for assistance.

Pump motor lost control

This error indicates a problem in the pump controller electronics.

❖ To troubleshoot

Contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Pump over pressure

If the system pressure exceeds the set limit for at least 0.5 second, this error message appears and the pump stops. Pressure limits can be set in the Chromeleon Instrument Configuration Manager or in the instrument method.

❖ To troubleshoot

1. Check for blockages in the liquid lines by working your way backward from the cell to the pump (see [“Flow Schematics”](#) on [page 13](#)).
2. Verify that the flow rate is set to the correct value.
3. Verify that the high pressure limit is set to the correct value.
4. Restart the pump.

Pump pressure hardware error

This error indicates a problem in the pump controller electronics.

❖ To troubleshoot

Contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Pump stopped due to lost USB communication error

This error occurs if the Dionex Aquion loses communication with Chromeleon.

❖ To troubleshoot

Verify that the USB cable is connected correctly from the Dionex Aquion rear panel to the Chromeleon PC.

Pump under pressure

If the system pressure falls below the low pressure limit, the pump stops and this error message appears. Pressure limits can be set in the Chromeleon Instrument Configuration Manager or in the instrument method.

❖ To troubleshoot

1. Verify that the eluent reservoir is full.
2. Check for liquid leaks (see “[Liquid Leaks](#)” on [page 51](#)).
3. Verify that the waste valve is closed.
4. Prime the pump (see “[Priming the Pump](#)” on [page 84](#)).
5. Restart the pump.

Second valve error

If the auxiliary valve fails to switch position within 1 second of being toggled, the Dionex Aquion reports an error to Chromeleon and this error message appears.

❖ To troubleshoot

1. If a sequence is being executed, terminate the sequence by selecting **Stop** on the Queue ePanel in Chromeleon.
2. Try to toggle the valve from position A to position B by clicking the corresponding buttons on the Chromeleon ePanel (or by clicking **Stop** in the Data category bar).
3. Turn off the Dionex Aquion power briefly and then restart.

4. If the problem persists, repeat [Step 2](#).
5. If the problem persists, contact Technical Support for Dionex products for assistance.

Suppressor not connected

This error occurs if you turn on the suppressor and the Dionex Aquion cannot establish a connection with the suppressor.

❖ **To troubleshoot**

1. Check the suppressor cable connection (see [“Replacing the Suppressor”](#) on [page 76](#)).
2. If the error persists, there may be a problem in the suppressor controller electronics. Contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Suppressor over current

This error may be caused by an expended or dirty suppressor, or by a malfunction in the suppressor controller electronics.

❖ **To troubleshoot**

1. Follow the instructions in the suppressor manual to regenerate the suppressor. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
2. Follow the instructions in the suppressor manual to clean the suppressor.
3. If a malfunction in the suppressor controller is suspected, contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Suppressor over power

This error occurs when, to maintain the selected current, the Dionex Aquion is required to apply a higher voltage than the suppressor can support.

❖ **To troubleshoot**

1. Reduce the flow rate.
2. Rehydrate the suppressor. Refer to the suppressor manual for instructions. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
3. If the error persists, replace the suppressor (see [“Replacing the Suppressor”](#) on [page 76](#)).

Suppressor over voltage

This error occurs if you turn on the suppressor but the Dionex Aquion cannot establish a connection with the suppressor.

❖ To troubleshoot

1. Verify that the suppressor cable is connected (see “Replacing the Suppressor” on page 76).
2. If the error persists, replace the suppressor (see “Replacing the Suppressor” on page 76).

Suppressor stopped for zero flow rate

This error message appears when you click the **Shutdown** button on the Chromeleon ePanel. The message also appears anytime you turn off the pump flow while the suppressor is on. The suppressor is automatically turned off to prevent damage to the suppressor.

❖ To troubleshoot

If the pump stopped unexpectedly, see “No Flow” on page 54 for pump troubleshooting information.

Troubleshooting System Component Symptoms

Table 6 lists symptoms related to problems with system components that may occur during operation of the Dionex Aquion.

Table 6. System component symptoms

| Symptom Category | Symptom | See |
|------------------|---|---------|
| Leaks | Liquid Leaks | page 51 |
| Pump | Pump Difficult to Prime or Loses Prime | page 53 |
| | Pump Does Not Start | page 54 |
| Pressure | No Flow | page 54 |
| | Erratic Flow/Pressure Reading | page 55 |
| | Excessive System Backpressure | page 55 |
| Ghosting | Peak Ghosting | page 56 |
| Timing | Insufficient Time Between Sample Injections | page 56 |
| | Nonreproducible Peak Height or Retention Time | page 56 |
| | Abnormal Retention Time or Selectivity | page 57 |
| Cell | No Cell Response | page 57 |
| | High Cell Output | page 58 |

Table 6. System component symptoms, continued

| Symptom Category | Symptom | See |
|-------------------------|------------------------------------|---------|
| Baseline Noise or Drift | Baseline Noise or Drift | page 58 |
| Degas | Degas Calibration Failed | page 59 |
| Hardware | Hardware Not Present | page 59 |
| Sensor | Leak Sensor Wet | page 60 |
| Degas Assembly | Vacuum Degas Assembly Does Not Run | page 60 |

Liquid Leaks

| Possible Cause | Solution |
|--------------------------------------|---|
| Leaking fitting | Locate the source of the leak. Tighten or, if necessary, replace the liquid line connection (see “Replacing Tubing and Fittings” on page 63). Refer to <i>Installation of Dionex Liquid Line Fittings</i> (Document No. 031432) for tightening requirements. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Broken liquid line | Replace the line and fittings with tubing of the same length and internal diameter (see “Replacing Tubing and Fittings” on page 63). |
| Blocked or improperly installed line | Verify that the lines are not crimped or otherwise blocked. Also, if the blocked line is a waste line, verify that it is not elevated at any point after it exits the Dionex Aquion. If a line is blocked, replace it (see “Isolating a Restriction in the Liquid Lines” on page 62). |
| Loose pump check valve | <ol style="list-style-type: none"> 1. Verify that the check valves are firmly seated in the pump head. If they are not, tighten them carefully with an open-end wrench just until the leak stops. 2. If the leak persists, replace the check valve (see “Cleaning and Replacing the Pump Check Valves” on page 66). |
| Leaking seal wash port | Leaking from the seal wash port indicates a leaking piston seal. Replace the seal (see “Replacing a Pump Piston Seal and Piston Rinse Seal” on page 68). |
| Damaged pump piston seal | <ol style="list-style-type: none"> 1. Replace the piston seal (see “Replacing a Pump Piston Seal and Piston Rinse Seal” on page 68). 2. If the leak persists, replace the piston (see “Replacing a Pump Piston” on page 73). |

| Possible Cause | Solution |
|---|--|
| Pump head not tight against casting | Carefully tighten the pump head mounting nuts just until the leak stops. Do not overtighten! |
| Leaking pressure transducer | <ol style="list-style-type: none"> 1. Verify that the liquid line connections into the pressure transducer are tight. Refer to <i>Installation of Dionex Liquid Line Fittings</i> (Document No. 031432) for tightening requirements. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). Replace any damaged fittings. 2. If the pressure transducer continues to leak, contact Technical Support for Dionex products for assistance. |
| <p>Note Dionex Aquion electronics components cannot be serviced by the user.</p> | |
| Leaking pump head waste valve | <ul style="list-style-type: none"> • Verify that the waste valve is closed. To close the valve, turn the knob clockwise, and tighten fingertight. Do not overtighten! Overtightening may damage the valve and the pump head. • If the leak persists, replace the waste valve O-ring (see “Replacing the Waste Valve or Priming Valve O-Ring” on page 74). |
| Leaking suppressor | Refer to the suppressor manual for troubleshooting procedures. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Leaking injection valve or auxiliary valve | <ol style="list-style-type: none"> 1. Verify that the liquid line connections to the transducer are tight. Refer to <i>Installation of Dionex Liquid Line Fittings</i> (Document No. 031432) for tightening requirements. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). Replace any damaged fittings. 2. Liquid leaks from behind the valve stator may indicate a scratched rotor seal. Rebuild the valve (see “Rebuilding the Injection Valve or Auxiliary Valve” on page 64). |

| Possible Cause | Solution |
|---|---|
| Leaking detector cell | <ol style="list-style-type: none"> 1. Check for blockage in the waste lines; trapped particles can plug the lines and cause a restriction and/or leak. If necessary, clear the waste lines by reversing the direction of flow. 2. Verify that the plumbing downstream from the cell is clear; a blockage may overpressurize the cell, causing it to leak. If the problem continues, contact Technical Support for Dionex products for assistance. |
| <p>Note Dionex Aquion electronics components cannot be serviced by the user.</p> | |

Pump Difficult to Prime or Loses Prime

Excessive pressure fluctuations (more than 3% difference from one pressure reading to the next) indicate that the pump is out of prime.

| Possible Cause | Solution |
|---|--|
| Empty eluent reservoir and/or no eluent connected | Fill the reservoir. Verify that all connections are secure. |
| Eluent improperly or insufficiently degassed | <ul style="list-style-type: none"> • If the Dionex Aquion does not contain a vacuum degas assembly, degas the eluent manually (see “To degas the eluent” on page 30). • If the Dionex Aquion contains a vacuum degas assembly, check the degas options (see Figure 10) in the Chromeleon Instrument Configuration Manager. <ol style="list-style-type: none"> a. Verify that the Degas check box is selected. b. In the Degas options, select either the Monitor option or the Cycle option. If you select Cycle, set the time On to 30 seconds and the time Off to 600 seconds. If Cycle is already selected, try increasing the time on or decreasing the time off. |
| End-line filter is dirty or clogged | When new, end-line filters (P/N 045987) are pure white. If the system is in continuous operation, change the end-line filter weekly, or whenever it becomes discolored. Replace the filter more often if bacterial buildup is visible or if the eluent does not contain solvent. |
| <p>IMPORTANT Regularly replace end-line filters when using aqueous eluents, which may contaminate the filter with bacteria or algae. The bacterial buildup may not be visible.</p> | |

| Possible Cause | Solution |
|---|--|
| Blockages in inlet tubing | Kinked or clogged tubing causes the pump to be “starved” for eluent. Replace the tubing and fittings (see “ Replacing Tubing and Fittings ” on page 63). |
| Dirty check valve | Clean or replace the pump check valve (see “ Cleaning and Replacing the Pump Check Valves ” on page 66). |
| Liquid leaks at junction between pump head and pump casting | <ul style="list-style-type: none"> Use the open-end wrench (P/N 014605) provided in the Dionex Aquion Ship Kit (P/N 057905) to tighten the two acorn nuts that attach the pump head to the pump housing (see Figure 28). Tighten the nuts evenly (12 in-lb torque). If the leak persists, replace the piston seal (see “Replacing a Pump Piston Seal and Piston Rinse Seal” on page 68). |
| Liquid leaks from seal wash port | Replace the piston seal (see “ Replacing a Pump Piston Seal and Piston Rinse Seal ” on page 68). |
| Scratched pump piston | Check for scratches on the pump pistons and replace if necessary (see “ Replacing a Pump Piston ” on page 73). |

Pump Does Not Start

| Possible Cause | Solution |
|--|---|
| No power (front Power LED indicator is not lit) | <ul style="list-style-type: none"> Verify that the power cord is plugged in. Replace the main power fuses, if necessary (see “Changing the Main Power Fuses” on page 87). |
| No communication between Dionex Aquion and Chromeleon | Verify that the USB cable is connected correctly. For connection and setup information, refer to the Dionex Aquion installation instructions. |
| Pump is turned off | Turn on the pump from the Chromeleon ePanel. |
| Flow rate is set to 0 | Set the flow rate from the Chromeleon ePanel. |

No Flow

| Possible Cause | Solution |
|---|---|
| Pump waste or priming valve open (see Figure 35) | Close the valves by turning the knobs clockwise until fingertight. Do not overtighten! Over tightening may damage the valve and the pump head. |
| Flow rate is set to 0 | Set the flow rate from the Chromeleon ePanel. |
| Eluent valve is closed | Turn on the pump from the Chromeleon ePanel. |

| Possible Cause | Solution |
|--------------------|--|
| Pump not primed | Prime the pump (see “ Priming the Pump with Isopropyl Alcohol ” on page 86). |
| Broken pump piston | Replace the piston (see “ Replacing a Pump Piston ” on page 73). |

Erratic Flow/Pressure Reading

| Possible Cause | Solution |
|----------------------------------|--|
| Pump not primed | Prime the pump (see “ Priming the Pump with Isopropyl Alcohol ” on page 86). |
| Damaged piston seal | Replace the piston seal (see “ Replacing a Pump Piston Seal and Piston Rinse Seal ” on page 68). |
| Dirty pump check valve | Clean or replace the check valve (see “ Cleaning and Replacing the Pump Check Valves ” on page 66). |
| Leaking liquid lines or fittings | Check for small leaks in the liquid lines and fittings. Tighten or, if necessary, replace the liquid line connection (see “ Replacing Tubing and Fittings ” on page 63). Refer to <i>Installation of Dionex Liquid Line Fittings</i> (Document No. 031432) for tightening requirements. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |

Excessive System Backpressure

| Possible Cause | Solution |
|--|--|
| Restriction in the system plumbing | <ul style="list-style-type: none"> Check for crimping or blockage in all liquid lines. Verify that the ferrule fittings are not overtightened onto tubing. Refer to <i>Installation of Dionex Liquid Line Fittings</i> (Document No. 031432) for details. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). If you have trouble isolating the restriction, refer to “Isolating a Restriction in the Liquid Lines” on page 62. |
| Plugged or damaged fitting | Isolate the faulty fitting by loosening each fitting until the pressure returns to normal. Repair or replace the fitting (see “ Replacing Tubing and Fittings ” on page 63). |
| Flow rate through the columns too high | Set the correct flow rate for your application. |

| Possible Cause | Solution |
|---|--|
| Clogged column bed supports | Refer to the instructions in the column manual for troubleshooting guidance. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Contaminated columns | Clean the columns as instructed in the column manual, or replace the guard column. |
| Plugged injection valve or auxiliary valve passages | Rebuild the valve (see “Rebuilding the Injection Valve or Auxiliary Valve” on page 64). |

Peak Ghosting

“Ghosting” is the appearance of extraneous peaks in a chromatogram. These may be late-eluting peaks from a previous injection. They may also be the result of a contaminated standard or eluent, or a malfunctioning injection valve. These peaks may co-elute with peaks of interest, resulting in nonreproducible peak heights/areas.

Insufficient Time Between Sample Injections

Wait until the previous sample has been completely eluted before making another injection.

| Possible Cause | Solution |
|---|--|
| Insufficient flush between samples | Flush the sample loop with at least 10 loop volumes of deionized water or sample between sample injections. |
| Incorrect or contaminated standards | Remake standards. |
| Incorrect or contaminated eluent | <ul style="list-style-type: none"> Remake the eluent. Refer to the instructions in the column manual provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). Install or replace the end-line filter on the end of the deionized water line (see “To filter the eluent” on page 30). |
| Malfunctioning injection valve or auxiliary valve | If the valve leak persists, contact Technical Support for Dionex products for assistance. |

Nonreproducible Peak Height or Retention Time

| Possible Cause | Solution |
|--------------------|---|
| Column overloading | Dilute the sample (see “Diluting Samples” on page 35). |
| Liquid leaks | Locate and eliminate the leaks (see “Liquid Leaks” on page 51). |

| Possible Cause | Solution |
|--|---|
| Incomplete or imprecise filling of the sample loop | <ol style="list-style-type: none"> 1. Fill the sample loop until excess sample exits the waste line. 2. Inspect the 1-cc syringe (P/N 016388) and replace if damaged. |
| Pump not primed properly | Prime the pump (see “Priming the Pump with Isopropyl Alcohol” on page 86). |

Abnormal Retention Time or Selectivity

| Possible Cause | Solution |
|----------------------------------|--|
| Incorrect or contaminated eluent | Remake the eluent, using concentrated eluent and ASTM filtered, Type I (18-megohm) deionized water. |
| Contaminated or degraded sample | Take appropriate precautions when preparing and storing samples to prevent contamination and degradation (see “Preparing Samples” on page 34). |
| Contaminated column | <ol style="list-style-type: none"> 1. Clean the column as instructed in the column manual. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). 2. If cleaning is unsuccessful, replace the column. |

No Cell Response

| Possible Cause | Solution |
|-----------------------------|---|
| Cell not properly installed | Verify that the cell front cover is flush against the component panel. If necessary, tighten the two mounting screws. When the cell is correctly installed and the screws tightened, an electronics connector on the cell plugs into a receptacle inside the Dionex Aquion. |
| No flow from pump | This condition has several possible causes (see “Pump Does Not Start” on page 54 and “No Flow” on page 54). |

High Cell Output

| Possible Cause | Solution |
|--|--|
| Background not suppressed by suppressor | Verify that the suppressor is turned on and the current is set to the correct value. Refer to the suppressor manual for additional troubleshooting guidance. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Sample concentration too high | Dilute the sample (see “ Diluting Samples ” on page 35). |
| Wrong eluent | Verify that you are using the correct eluent for your application. |
| Background conductivity not offset from conductivity reading | Before making an injection, allow the background conductivity to equilibrate, and click Autozero on the Chromeleon ePanel. |

Baseline Noise or Drift

| Possible Cause | Solution |
|--------------------------------------|---|
| Flow system leak; erratic baseline | Check for leaks in all fittings and liquid lines. Tighten or, if necessary, replace all liquid line connections. Refer to <i>Installation of Dionex Liquid Line Fittings</i> (P/N 031432) for tightening requirements. The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Trapped gases | Release any trapped gases in the cell by loosening the lines to and from the cell and then retightening them. Also loosen and retighten the fittings to and from the suppressor eluent ports. |
| Pump not properly primed | Prime the pump (see “ Priming the Pump with Isopropyl Alcohol ” on page 86). |
| Contaminated or incorrect eluent | Remake the eluent, using concentrated eluent and ASTM filtered, Type I (18-megohm) deionized water. |
| Rapid changes in ambient temperature | <ul style="list-style-type: none"> • Verify that the ambient temperature is between 4 and 40 °C (40 and 104 °F). • Verify that air conditioning and heating vents are directed away from the Dionex Aquion, and that the Dionex Aquion front door is closed. |

| Possible Cause | Solution |
|---|---|
| Insufficient system equilibration following changes to operating parameters; especially apparent when operating at high sensitivities | Allow a longer system equilibration time (up to 2 hours) before starting operation. |
| Incorrect suppressor operating conditions | Refer to the suppressor manual for troubleshooting information. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891). |
| Cell above or below temperature | Contact Technical Support for Dionex products for assistance. |
| Damaged piston seal | Replace the piston seal (see “ Replacing a Pump Piston Seal and Piston Rinse Seal ” on page 68). |

Degas Calibration Failed

This error occurs when the degas vacuum does not reach the expected level during calibration.

❖ To troubleshoot

1. Retry the calibration.
2. If calibration still fails, the vacuum degas assembly may need to be replaced. Contact Technical Support for Dionex products for assistance.

Hardware Not Present

This error indicates a problem in the Dionex Aquion electronics.

❖ To troubleshoot

Contact Technical Support for Dionex products for assistance.

Note Dionex Aquion electronics components cannot be serviced by the user.

Leak Sensor Wet

The leak sensor is installed in the drip tray at the bottom of the component panel (see [Figure 5](#)). If liquid accumulates in the tray, the sensor signals the problem and this error message appears.

❖ To troubleshoot

1. Locate the source of the leak by visually inspecting the tubing, fittings, and components on the component panel (see [“Liquid Leaks”](#) on [page 51](#)).
2. Tighten fittings or replace tubing and fittings as required. See [“Liquid Leaks”](#) on [page 51](#) for detailed troubleshooting of various types of leaks.
3. After fixing the leak, dry the drip tray thoroughly to prevent the leak sensor from triggering additional error messages.

Vacuum Degas Assembly Does Not Run

This error occurs when the degas option is not enabled in Chromeleon.

❖ To troubleshoot

1. Open the Chromeleon Instrument Configuration Manager.
2. Right-click the Dionex Aquion in the instrument, and click **Properties**.
3. Check that the **Degas** check box is selected (see [Figure 10](#)).
4. Under **Degas**, verify that the **Always Off** option is *not* selected. If it is, select one of these settings, instead:
 - **Cycle**; also specify 30 seconds for **On** and specify 600 seconds for **Off**.
 - **Monitor**
5. If the **Degas** options are correct, but the degas assembly still does not run, test the assembly by selecting the **Always On** option. The pump should turn on immediately. If it does not, the vacuum degas assembly may need to be replaced. Contact Technical Support for Dionex products for assistance.

IMPORTANT Select the **Always On** option only when testing the vacuum degas assembly. Do not select the **Always On** option for routine use.

Service

This chapter describes the Dionex Aquion service and repair procedures that users may perform. All procedures not included here, including electronics-related repair procedures, must be performed by Thermo Fisher Scientific personnel. For assistance, contact Technical Support for Dionex products. In the U.S. and Canada, call 1-800-532-4752. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

Before replacing any part, verify the cause of the problem by referring to the information in [Chapter 5, “Troubleshooting.”](#)

IMPORTANT Substituting non-Dionex/Thermo Fisher Scientific parts may impair system performance, thereby voiding the product warranty. Refer to the warranty statement in the Dionex Terms and Conditions for more information.

Contents

- [Isolating a Restriction in the Liquid Lines](#)
- [Replacing Tubing and Fittings](#)
- [Rebuilding the Injection Valve or Auxiliary Valve](#)
- [Replacing the Auxiliary Valve Pod](#)
- [Cleaning and Replacing the Pump Check Valves](#)
- [Replacing a Pump Piston Seal and Piston Rinse Seal](#)
- [Replacing a Pump Piston](#)
- [Replacing the Waste Valve or Priming Valve O-Ring](#)
- [Replacing the Conductivity Cell](#)
- [Replacing the Suppressor](#)
- [Replacing the Column Heater](#)
- [Replacing the Column Heater Heat Exchanger](#)

Contents, continued

- [Replacing the Eluent Valve](#)
- [Replacing the Leak Sensor](#)
- [Priming the Pump](#)
- [Priming the Pump with Isopropyl Alcohol](#)
- [Changing the Main Power Fuses](#)



CAUTION Before servicing the Dionex Aquion, allow any heated components to cool.



MISE EN GARDE Laisser refroidir les composants chauffés du système Dionex Aquion, avant de procéder à des travaux de maintenance.



VORSICHT Lassen Sie heiße Komponenten abkühlen, bevor Sie Wartungsarbeiten am Dionex Aquion System durchführen.

Isolating a Restriction in the Liquid Lines

A restriction in the liquid plumbing will cause excessive system backpressure.

❖ To isolate a restriction in the line

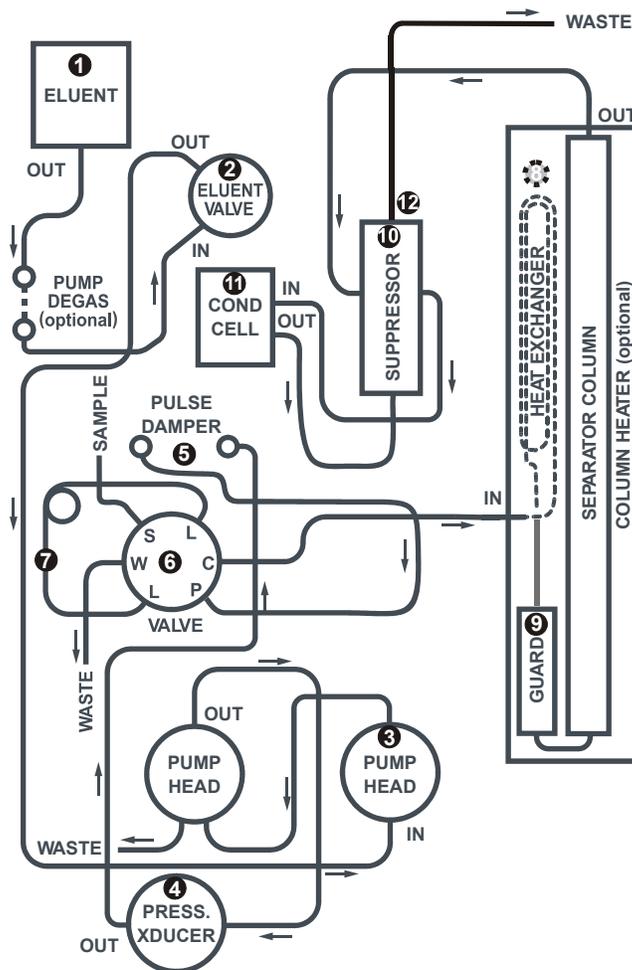
1. Begin pumping eluent through the system (including the columns).
2. Follow the flow schematic in [Figure 23](#) and work backward through the system, beginning at the suppressor **Regen Out** port. One at a time, loosen each fitting and observe the pressure. The connection at which the pressure drops abnormally indicates the point of restriction.

IMPORTANT The numbers on the flow schematic indicate the order in which liquid flows through the system components.

If the restriction has caused such high pressure that the system cannot be operated, you must work forward through the flow schematic, adding parts one at a time until an abnormal pressure increase (and hence, the restriction) is found.

3. If the restriction is in the tubing or fitting, remove the restriction by back flushing or by replacing the tubing or fitting (see [“Replacing Tubing and Fittings”](#) on [page 63](#)).

Figure 23. Dionex Aquion flow schematic



Replacing Tubing and Fittings

The Dionex Aquion is plumbed with the tubing and tubing assemblies shown below.

| Tubing Size and Type | Color | Used for |
|--|--------|--|
| 0.125-mm (0.005-in) ID PEEK (P/N 044221) | Red | Connection from pump pulse damper to pressure transducer |
| 0.25-mm (0.010-in) ID PEEK (P/N 042690) | Black | Connections between other system components |
| 0.50-mm (0.020-in) ID PEEK (P/N 042855) | Orange | Connection from injection port to injection valve |
| 0.75-mm (0.030-in) ID PEEK (P/N 044777) | Green | Connection from injection valve to waste |

| Tubing Size and Type | Color | Used for |
|---|--------|---|
| 1.58-mm (0.062-in) ID PTFE (P/N 014157) | Clear | Connection from pump to degas or eluent reservoir; pump waste |
| 25 µL sample loop (P/N 042857) | Orange | Connection between ports L (1) and L (4) on the injection valve |

- 10-32 fittings (P/N 043275) and ferrules (P/N 043276) are used for most tubing connections. For tightening requirements, refer to *Installation of Dionex Liquid Line Fittings* (Document No. 031432). The manual is provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
- 1/8-in fittings (P/N 052267) and ferrules (P/N 048949) are used for connections to the suppressor **REGEN OUT** port and the eluent reservoir.

Rebuilding the Injection Valve or Auxiliary Valve

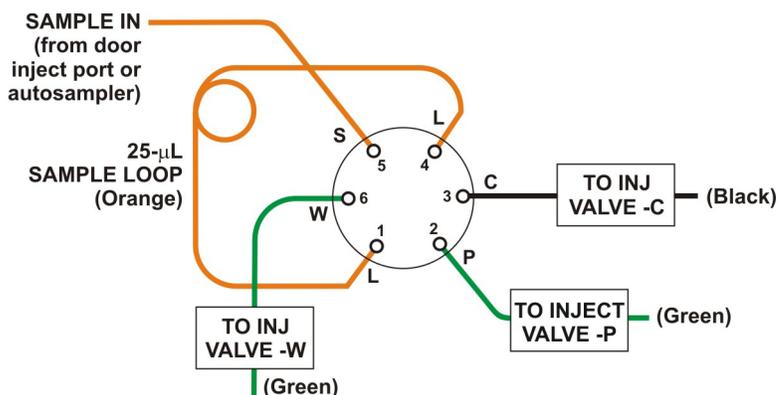
Thermo Fisher Scientific recommends rebuilding the injection valve and the auxiliary valve (if installed) annually. The Injection Valve Rebuild Kit (P/N 075973) contains all required replacement parts for either valve.

Note If you prefer, you can replace the auxiliary valve “pod,” instead of rebuilding the valve. Replacing the pod is easier and faster than rebuilding the auxiliary valve. For instructions, see [page 65](#).

❖ To rebuild the valve

1. Turn off the pump on the Chromeleon ePanel.
2. Open the Dionex Aquion front door.
3. Disconnect each liquid line connected to the valve.
4. Follow the instructions provided in the Rebuild Kit to replace the rotor seal and stator face.
5. Reconnect all liquid lines to the injection valve (see [Figure 24](#)) or auxiliary valve.
6. Close the door.
7. Turn on the pump.

Figure 24. Injection valve plumbing



Replacing the Auxiliary Valve Pod

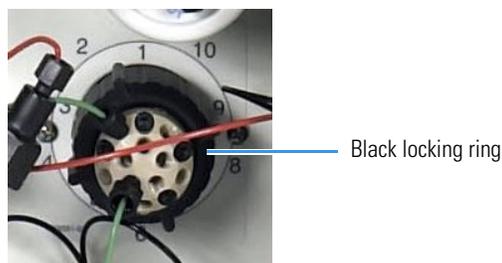
This procedure describes how to replace the mechanical part (the “pod”) of the optional auxiliary valve. This procedure is an alternative to rebuilding the valve (see [page 64](#)).

Note If the valve electronics require service, contact Thermo Fisher Scientific. Electronics-related repair procedures must be performed by Thermo Fisher Scientific personnel.

❖ To replace the auxiliary valve pod

1. Turn off the pump flow on the Chromeleon ePanel.
2. Open the Dionex Aquion front door.
3. Disconnect each liquid line connected to the auxiliary valve.
4. Unscrew the black locking ring on the front of the valve and remove the ring (see [Figure 25](#)).

Figure 25. Unscrew the auxiliary valve locking ring



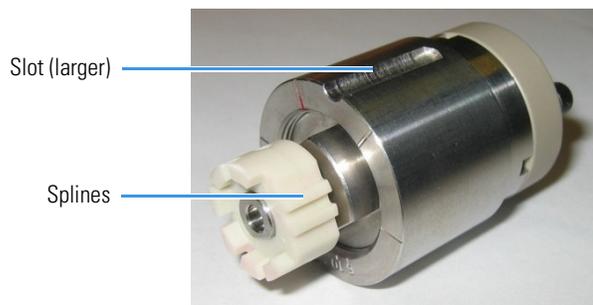
5. Grasp the front of the valve pod and pull firmly to remove it from the Dionex Aquion.
6. Check that the new pod (6-port, P/N 061947; 10-port, P/N 061948) has the correct number of ports for the valve being serviced.

6 Service

Cleaning and Replacing the Pump Check Valves

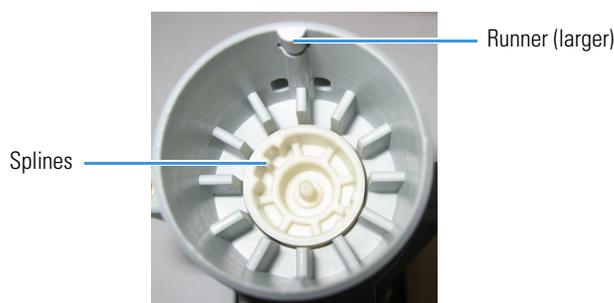
7. Align the slots in the new pod with the runner in the valve holder on the Dionex Aquion (see [Figure 26](#)). Valve pods are keyed to fit only one way (one slot is narrower than the other). Verify that the slots are aligned with their matching runners.

Figure 26. Auxiliary valve pod



8. Also verify that the two splines on the pod align with the matching splines inside the valve holder (see [Figure 27](#)). If necessary, twist the end of the pod to adjust the position of the splines.

Figure 27. Auxiliary valve holder



9. Push the pod into the holder until it clicks into place. Replace the black locking ring.
10. Reconnect all liquid lines to the valve.
11. Turn on the pump flow. Check for leaks from the valve. Tighten fittings as required (see [“Liquid Leaks”](#) on [page 51](#)).
12. Close the door.

Cleaning and Replacing the Pump Check Valves

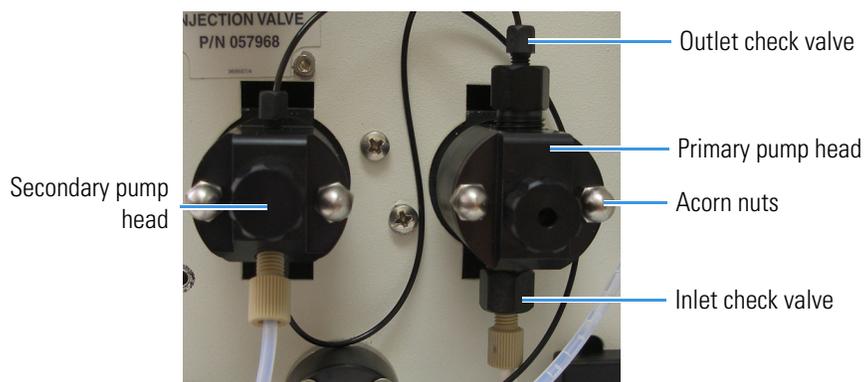
A dirty check valve causes erratic flow rates and pressures. In addition, it may cause the pump to lose prime and/or be difficult to reprime. If possible, replace dirty check valves. If new check valves are not available, follow the instructions for cleaning.

❖ To replace the check valves

1. Turn off the pump from the Chromeleon ePanel.

2. Turn off the main power switch, to ensure that you do not unintentionally start the Dionex Aquion.
3. To prevent contamination of pump parts, put on a pair of rubber gloves before disassembling the pump head.
4. Disconnect the tube fittings from the inlet and outlet check valve assemblies on the primary pump head (see [Figure 28](#)).
5. Use a 1/2-inch wrench to loosen both check valve assemblies. Remove the check valve assemblies from the pump head.

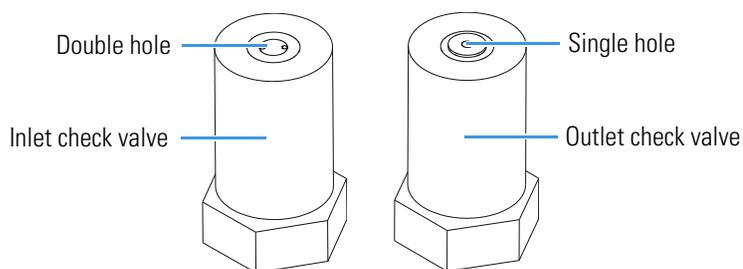
Figure 28. Pump heads



Note The *inlet* check valve assembly housing has a 1/4-28 port. The *outlet* check valve assembly housing has a 10-32 port.

6. If you are installing new cartridges (P/N 045994) in the existing check valve housings, place the cartridge in the *inlet* check valve housing with the double-hole end of the cartridge visible and place the cartridge in the *outlet* housing with the single-hole end visible (see [Figure 29](#)).

Figure 29. Check valves showing holes



Note The pump will not operate properly unless the cartridge is installed in the housing in the correct orientation. Liquid flows through the check valve in the large single hole and out the small double holes.

7. Install the inlet check valve assembly (P/N 045722) on the bottom of the primary pump head.

8. Install the outlet check valve assembly (P/N 045721) on the top of the head.
9. Tighten the check valves finger-tight, and then use a wrench to tighten an additional one-quarter to one-half turn.

IMPORTANT Overtightening may damage the pump head and check valve housing and crush the check valve seats.

10. Reconnect the liquid lines. Turn on the Dionex Aquion main power.
11. Prime the pump (see “[Priming the Pump with Isopropyl Alcohol](#)” on [page 86](#)).
12. When the Dionex Aquion is at operating pressure, check for leaks from the check valves. Tighten a check valve a *little more* only if it leaks.

❖ **To clean check valves**

1. Carefully remove the check valve cartridges from the valve housings.
2. Place the check valve housings and cartridges in a beaker with methanol. Sonicate or agitate the parts for several minutes.
3. Rinse each check valve housing and cartridge thoroughly with filtered deionized water.
4. To reinstall the check valves and complete the procedure, see [Step 6](#) through [Step 12](#) above.

Replacing a Pump Piston Seal and Piston Rinse Seal

A damaged seal allows leakage past the piston and leakage from the piston seal wash housing. The pump may be difficult to prime, flow rates may be unstable, and there may be baseline noise.

❖ **To prepare the pump for the seal replacement**

1. Rinse the pump flow path with deionized water. Direct the flow to waste by opening the waste valve on the secondary pump head (see [Figure 35](#)). To open the valve, turn the knob one-quarter to one-half turn counterclockwise.
2. After rinsing, close the waste valve.
3. Turn off the pump from the Chromeleon ePanel.
4. To prevent contamination of pump parts, put on a pair of rubber gloves before disassembling the pump head.

❖ To remove the pump head and piston

1. Turn off the main power switch, to ensure that you do not unintentionally start the Dionex Aquion.
2. Disconnect all tubing connections to the pump head.
3. Locate the open-end wrench (P/N 014605) provided in the Dionex Aquion Ship Kit (P/N 057905). Use the wrench to remove the two acorn nuts from the pump head (see [Figure 28](#)).
4. Slowly pull the head and allow it to separate from the housing. Carefully disengage the head from the piston by pulling the head straight off and away from its mounting studs.



CAUTION Lateral motion while disengaging the pump head from the piston may break the piston.



MISE EN GARDE Un mouvement latéral pendant la séparation de la tête et du piston peut casser le piston.



VORSICHT Vermeiden Sie Seitwärtsbewegungen, wenn Sie den Kopf vom Kolben lösen. Andernfalls kann der Kolben brechen.

5. Place the head (front end down) on a clean work surface and lift off the spacer to expose the piston seal (see the primary pump head: [Figure 30](#) or the secondary pump head: [Figure 31](#)).
6. Hold the shaft of the piston (near the base), tilt the piston slightly, and pull the piston away from the pump. The piston does not come off as part of the pump head assembly because it is captured by a magnetic retention system.

Figure 30. Primary pump head

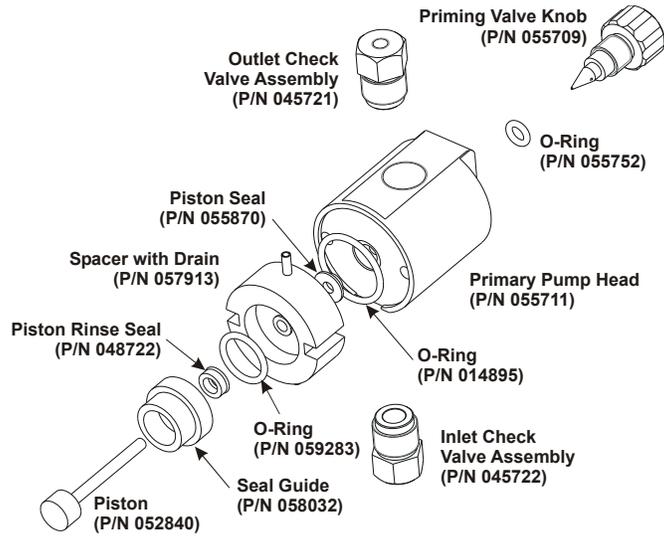
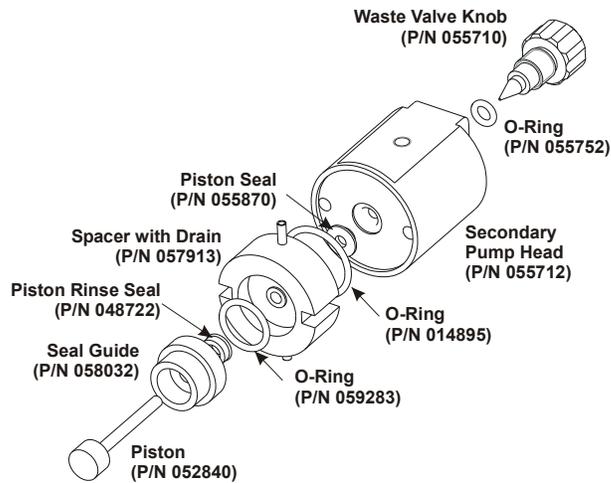


Figure 31. Secondary pump head



❖ **To install the new piston rinse seal**

1. Remove the guide from the spacer to expose the piston rinse seal and O-ring. Remove the O-ring.
2. Remove the old piston rinse seal from the guide:
 - a. Hold the guide with the flat side facing up.

- b. To dislodge the piston rinse seal, gently insert the shaft of the piston through the small hole in the center of the guide (see [Figure 32](#)).

Figure 32. Removing the piston rinse seal



- c. Pull the seal off the end of the piston shaft and remove the piston from the guide.
3. Hold the new piston rinse seal (P/N 048722) with the grooved side facing up.
 4. Using your fingertip, gently press the piston rinse seal into the guide until the edge of the seal is below the surface of the guide.

IMPORTANT The piston rinse seal is made of soft plastic. Do not press on the seal with anything hard or sharp, including your fingernail. If the seal is nicked or gouged, it will not seal properly and may result in leaks.

5. Place the new O-ring (P/N 059283) into the groove in the guide.
6. Remove the O-ring from the groove in the flat side of the spacer and replace it with the new O-ring (P/N 014895).
7. In one hand, hold the guide with the O-ring and piston rinse seal facing up (this prevents the O-ring from falling out). In the other hand, hold the spacer with the cavity facing down.
8. Gently press the guide into the cavity in the spacer until it is fully seated.

❖ **To remove the piston seal from the pump head**

1. For the *primary* pump head: Install a 10-32 fitting plug (P/N 042772) in the outlet check valve. Tighten the plug.
For the *secondary* pump head: Install a 10-32 fitting plug (P/N 042772) in both the inlet and outlet ports. Tighten the plugs.
2. Close the priming valve.

6 Service

Replacing a Pump Piston Seal and Piston Rinse Seal

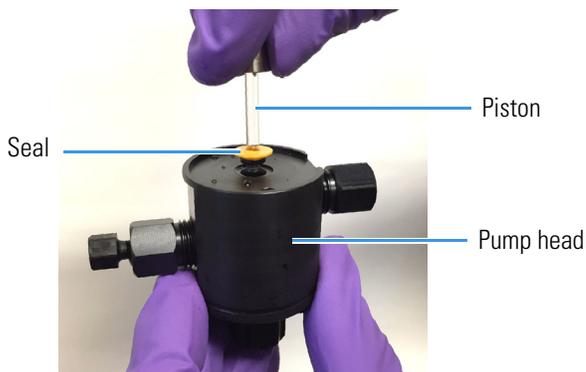
- Using a squirt bottle or a plastic syringe, fill the head cavity with deionized water through the piston opening (see [Figure 33](#)).

Figure 33. Filling the head cavity with deionized water (plastic syringe shown)



- Reinsert the piston into the seal, and then push the piston into the head (see [Figure 34](#)). The seal should hydraulically pop out from the head.

Figure 34. Seal popping out from the head



- Remove the piston and pull off the seal.
- If the main seal was not removed in [Step 4](#), follow these steps:
 - Verify that the 10-32 fitting plugs in the inlet and outlet holes are tightened enough to prevent any leaks from the pump head.
 - Fill the piston cavity with water and check for bubbles.
 - If there are no bubbles, repeat [Step 4](#).
- Remove the 10-32 fitting plug(s).

❖ To install the new piston seal

- Open the priming valve knob (primary pump head) or waste valve knob (secondary pump head) by turning the knob one-quarter to one-half turn counterclockwise.

2. Push the piston through the spacer and then through the new seal. Insert the piston and seal into the pump head until the seal makes contact with the bottom of the counterbore.

Note If necessary, lubricate the seal with a small amount of isopropyl alcohol to facilitate insertion.

3. To seat the seal, push down on the spacer until it is flush with the head. A clicking sound indicates that the seal is correctly seated.
4. Close the priming valve knob or waste valve knob.

❖ **To reinstall the head and piston**

Thermo Fisher Scientific recommends reinstalling the head and piston as a single assembly, so that the piston centers itself onto the magnetic follower.

1. Hold the assembled spacer and guide with the drain tubes aligned vertically and press the spacer into the head until it is flush with the indented surface of the head.
2. Insert the piston so that so that 6 mm (1/4 in) of the shaft is exposed. This ensures that the magnet in the follower picks up the piston. (The follower is the cylinder that holds the piston in place as it moves in and out of the pump head assembly.)
3. Reinstall the head and piston assembly. Use a wrench to tighten the nuts evenly (12 in-lb torque).

❖ **To complete the procedure**

1. Reconnect all liquid lines to the pump head.
2. Turn on the main power switch.
3. Prime the pump (see [“Priming the Pump with Isopropyl Alcohol”](#) on page 86).

Replacing a Pump Piston

Continued leaking of the piston seal after installation of a new seal (assuming the pump head is tight) indicates a dirty, scratched, or broken piston.

Follow the instructions in [“Replacing a Pump Piston Seal and Piston Rinse Seal”](#) on page 68 to install a new piston (P/N 052840) and piston seal (P/N 055870).

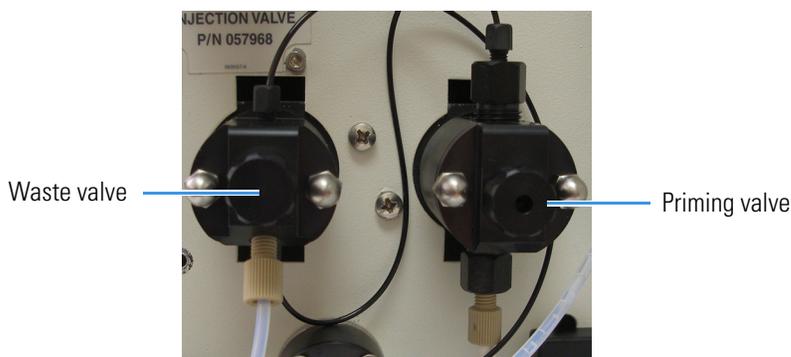
Replacing the Waste Valve or Priming Valve O-Ring

A damaged O-ring causes leakage around the base of the waste valve or priming valve knob.

❖ To replace the waste valve or priming valve O-ring

1. Turn off the pump from the Chromeleon ePanel.
2. Turn off the main power switch, to ensure that you do not unintentionally start the Dionex Aquion.
3. To remove the waste valve or priming valve from the pump head, turn the knob counterclockwise until it is loose, and pull the knob straight out of the cavity in the pump head (see [Figure 35](#)).

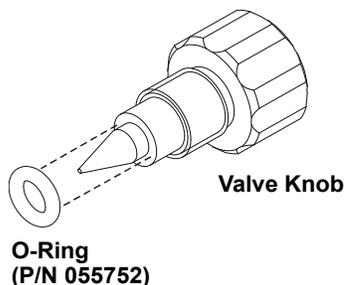
Figure 35. Waste and priming valves



4. If the O-ring is removed with the valve knob in [Step 3](#), pull the O-ring off the end of the knob (see [Figure 36](#)). If the O-ring is not removed with the valve knob, insert a thin object (for example, the bent end of a paper clip) into the cavity in the pump head and carefully pull out the O-ring.

IMPORTANT Do not scratch the cavity. Scratches in the cavity will cause leaks around the base of the knob while the pump is being primed.

Figure 36. Waste valve or priming valve O-ring replacement



5. Slide a new O-ring (P/N 055752) over the end of the valve.
6. To reinstall the valve containing the new O-ring, turn the knob clockwise and then tighten finger-tight.

Note It is normal to encounter resistance after several rotations of the knob. The O-ring is being pushed into the cavity of the pump head.

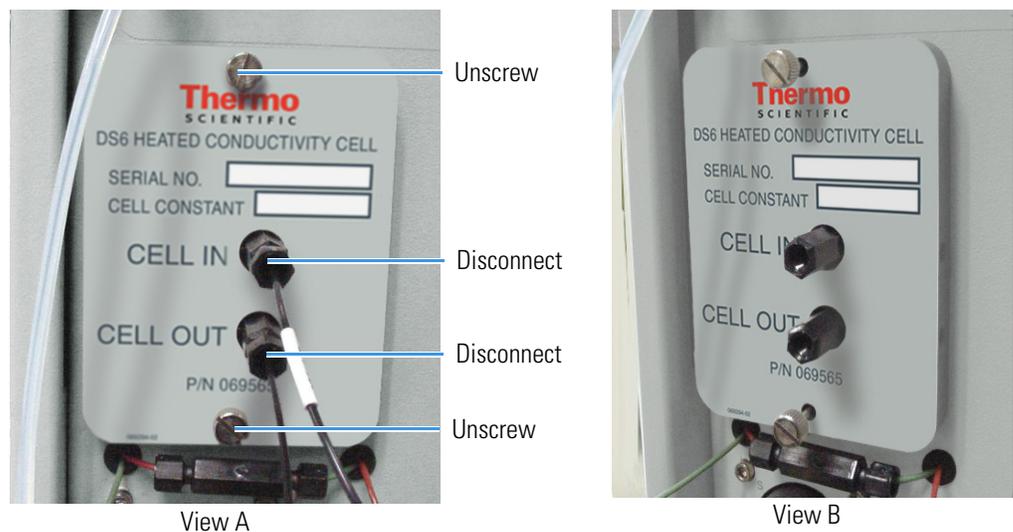
7. Turn on the main power switch.
8. Prime the pump (see “[Priming the Pump with Isopropyl Alcohol](#)” on page 86).

Replacing the Conductivity Cell

❖ To replace the cell

1. Turn off the Dionex Aquion power.
2. Open the front door and disconnect the tubing from the **CELL IN** and **CELL OUT** fittings (see [Figure 37](#), View A).
3. Loosen the two screws on the cell front cover. The screws remain attached (see [Figure 37](#), View B).

Figure 37. Removing the cell front cover



4. Grip the two loosened screws and pull the cell cover toward you to remove it from the component panel. **Do not pull from the CELL IN and CELL OUT fittings.**

5. Continue pulling on the cover until the attached cell assembly slides out the front of the Dionex Aquion (see [Figure 38](#)).

Figure 38. Removing the cell assembly



6. Slide the new cell assembly straight into the opening in the component panel until it stops and the cell cover is flush against the component panel.

The cell's electronic connector automatically plugs into a connector inside the Dionex Aquion when you push the assembly into the opening.

7. Tighten the screws on the cell front cover finger-tight.
8. Close the side panel door and tighten the two mounting screws.
9. Reconnect the inlet and outlet lines.
10. Turn on the Dionex Aquion power.

Replacing the Suppressor

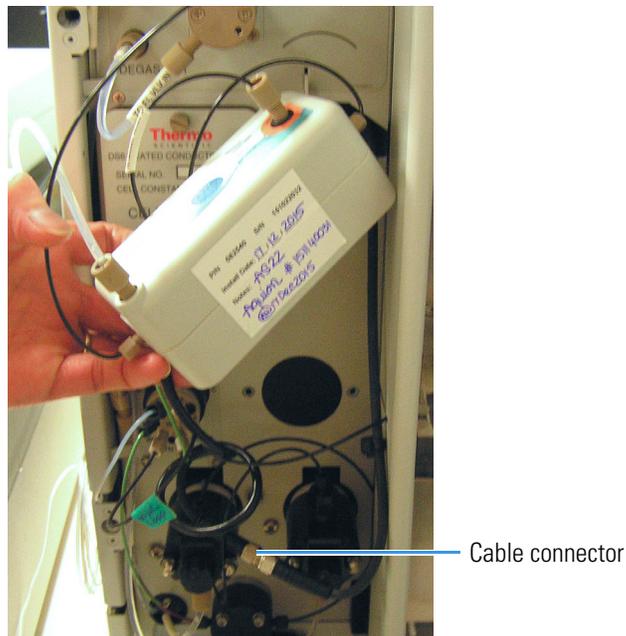
Refer to the suppressor manual for guidance about when to replace a suppressor. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

❖ To replace the suppressor

1. Refer to the suppressor quick start guide (shipped with the suppressor) for instructions on preparing the suppressor before initial use and for additional installation details.
2. Turn off the pump from the Chromeleon ePanel.
3. Open the front door of the Dionex Aquion.
4. Disconnect the two eluent and the two regenerant lines from the suppressor.
5. To remove the suppressor from the component panel, slide it up to detach it from the mounting tabs on the panel and then pull it toward you.

6. Continue pulling the suppressor out until the connector on the cable inside the Dionex Aquion is outside the panel (see [Figure 39](#)).

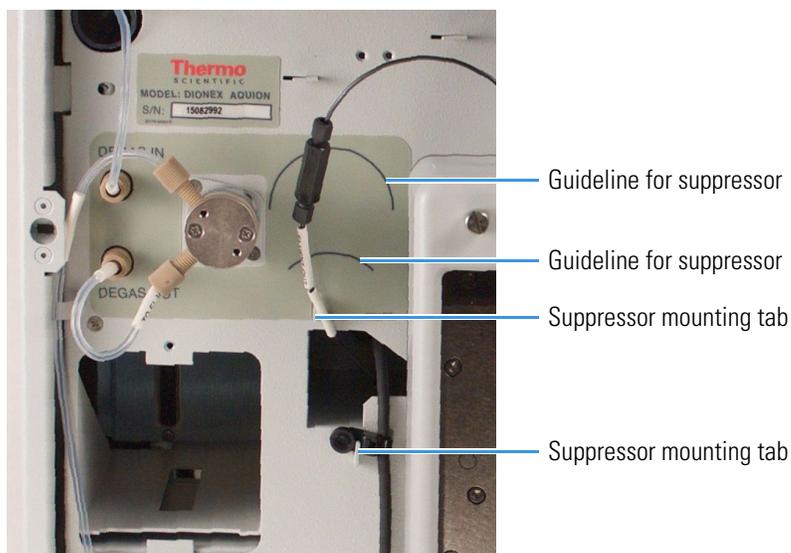
Figure 39. Removing the suppressor



7. Disconnect the suppressor cable (turn the ring on the connector and pull the two connectors apart).
8. Connect the cable from the new suppressor to the Dionex Aquion cable (align the pins on the two connectors and push them together).
9. Orient the suppressor with the **REGEN OUT** fitting on top and the cables to the right.
10. Push the cables into the opening in the component panel.

11. Align the top of the suppressor with the appropriate guideline printed on the component panel and align the slots on the rear of the suppressor with the mounting tabs on the panel (see Figure 40).

Figure 40. Suppressor guidelines and mounting tabs on component panel



12. Press the suppressor onto the tabs and then slide it down until it locks into place. Pull slightly on the center of the suppressor to verify that it is securely fastened.

Note Some suppressors require more force to secure them onto the tabs.

13. Connect the two eluent and the two regenerant lines to the new suppressor.
14. Close the Dionex Aquion front door.

Replacing the Column Heater

❖ To replace the column heater

1. Turn off the Dionex Aquion power.
2. Open the front door of the Dionex Aquion.
3. Remove the existing column heater:
 - a. Unscrew the two thumbscrews on the heater cover (they remain attached to the cover).
 - b. Pull the heater cover straight out to remove it.

- c. Unscrew the six thumbscrews on the top metal plate and remove the plate (see [Figure 41](#)).

Figure 41. Column heater cover removed



- d. Remove the columns from the column heater.
 - e. Pull the column heater straight toward you to remove it from the component panel.
4. Before installing the new column heater, write down the two calibration values (offset and slope) recorded on the back of the heater.
 5. Align the connector on the back of the new column heater (P/N 069564) with the connector on the component panel and push the column heater onto the component panel (see [Figure 4](#)).
 6. Remove the heater cover and the metal plate on the new heater.
 7. Install the columns in the new heater and replace the top metal plate and heater cover.
 8. Turn on the Dionex Aquion power.

Replacing the Column Heater Heat Exchanger

❖ To replace the column heater heat exchanger

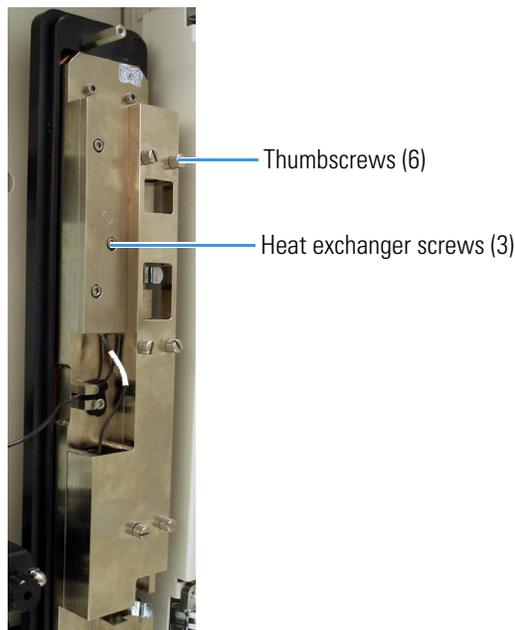
1. Turn off the Dionex Aquion power.
2. Open the front door of the Dionex Aquion.

6 Service

Replacing the Column Heater Heat Exchanger

3. Unscrew the two thumbscrews on the column heater cover (they remain attached to the cover).
4. Pull the heater cover straight out to remove it.
5. Unscrew the six thumbscrews on the top metal plate and remove the plate (see [Figure 42](#)).

Figure 42. Column heater cover removed



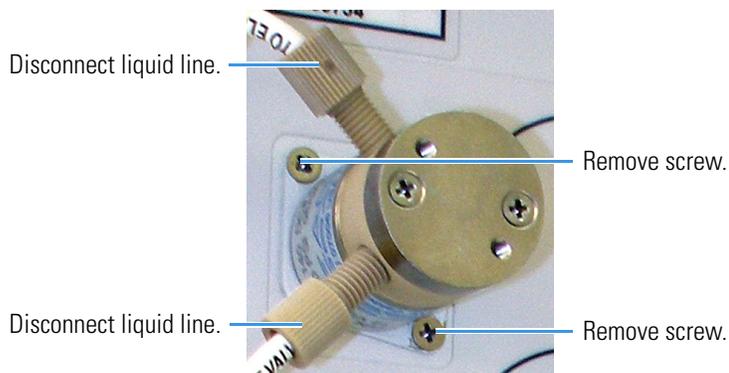
6. Disconnect the heat exchanger inlet line from port **C** on the injection valve.
7. Disconnect the heat exchanger outlet line from the guard column inlet.
8. Use an Allen wrench to remove the three screws from the heat exchanger metal plate and remove the plate (with the tubing) from the heater.
9. Remove the plastic backing from the new heat exchanger (P/N 059979, with 0.25-mm (0.010-in) ID tubing; P/N 060943, with 0.125-mm (0.005-in) ID tubing) and press the heat exchanger onto the heater.
10. Replace the screws removed in [Step 8](#).
11. Connect the new heat exchanger inlet line to port **C** on the injection valve and connect the outlet line to the guard column inlet.
12. Reinstall the top metal plate and the heater cover.

Replacing the Eluent Valve

❖ To replace the eluent valve

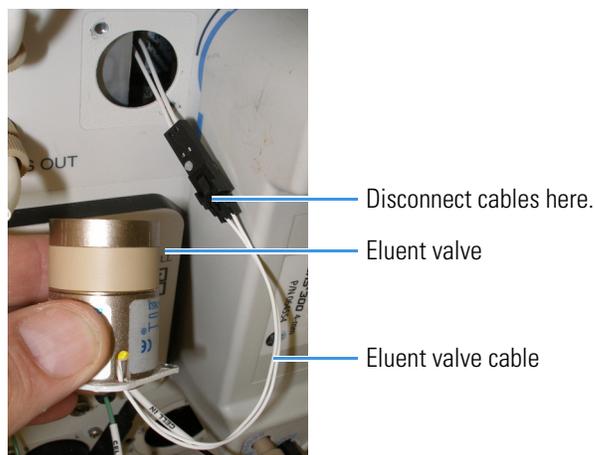
1. Turn off the power to the Dionex Aquion.
2. Open the Dionex Aquion front door.
3. To prevent an eluent leak during the valve replacement procedure, disconnect the eluent line from the reservoir cap *or* plug the line on the left side of the valve with a coupler (P/N 039056) and a plug (P/N 037628) after you disconnect the liquid line from the valve in [Step 4](#).
4. Disconnect the two liquid lines connected to the eluent valve (see [Figure 43](#)).

Figure 43. Eluent valve



5. Unscrew and remove the two screws that attach the valve to the component panel (see [Figure 43](#)). Save the screws.
6. Pull the valve straight out from the component panel and begin pulling the attached cable out of the opening in the panel. The cable is connected to a matching cable inside the Dionex Aquion. Continue pulling until the connectors for the two cables are outside the panel (see [Figure 44](#)). Disconnect the cables.

Figure 44. Eluent valve cable

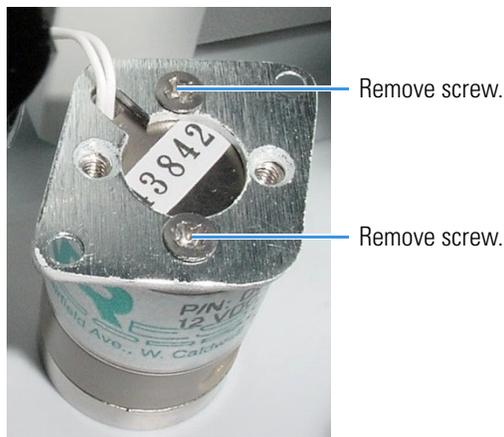


6 Service

Replacing the Leak Sensor

7. Remove the mounting plate on the old valve by unscrewing and removing the two screws (see [Figure 45](#)). Save the screws.

Figure 45. Removing the eluent valve mounting plate



8. Thread the cable from the new eluent valve (P/N 057945) through the mounting plate.
9. Attach the mounting plate to the new valve, using the screws removed in [Step 7](#).
10. Connect the cable from the new valve to the Dionex Aquion cable. Feed the cables back inside the Dionex Aquion.
11. Hold the new valve with the ports facing up and align the valve with the component panel. Attach it with the two screws removed in [Step 5](#).
12. Reconnect the liquid lines.
13. Turn on the power to the Dionex Aquion.
14. Prime the pump (see [“Priming the Pump with Isopropyl Alcohol”](#) on [page 86](#)).

Replacing the Leak Sensor

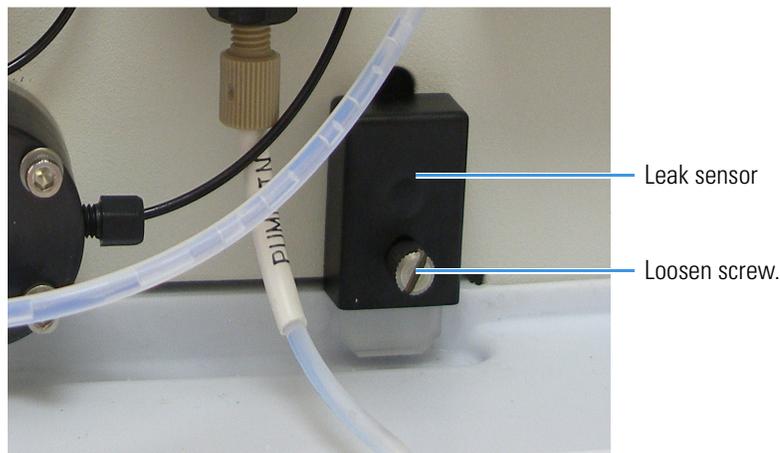
❖ To replace the leak sensor

1. Turn off the power to the Dionex Aquion.
2. Open the Dionex Aquion front door.

3. Loosen (but do not detach) the screw on the front of the leak sensor (see [Figure 46](#)).

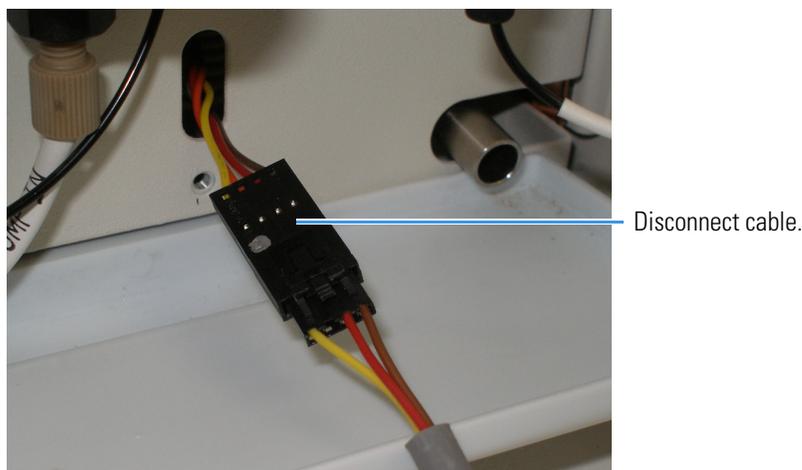
Note The screw remains attached to the sensor.

Figure 46. Leak sensor



4. Remove the leak sensor from the component panel and begin pulling the cable out of the opening in the panel. The cable attached to the leak sensor is connected to a matching cable inside the Dionex Aquion. Continue pulling the cable until the connectors for the two cables are outside the panel (see [Figure 47](#)).

Figure 47. Leak sensor cable



5. Disconnect the two cables.
6. Connect the cable from the new leak sensor (P/N 058053) to the Dionex Aquion cable.
7. Feed the cables back inside the Dionex Aquion. Align the leak sensor with the component panel opening and finger-tighten the screw.
8. Verify that the leak sensor does not touch the bottom of the drip tray.

Priming the Pump

The priming procedure consists of two parts:

- Priming the eluent lines with a syringe (see [page 84](#)). Perform this procedure at initial installation, after changing eluents, or when eluent lines are empty.
- Priming the pump heads with the **Prime** button (see [page 84](#)). Perform this procedure after the eluent lines are primed.

❖ To prepare the pump

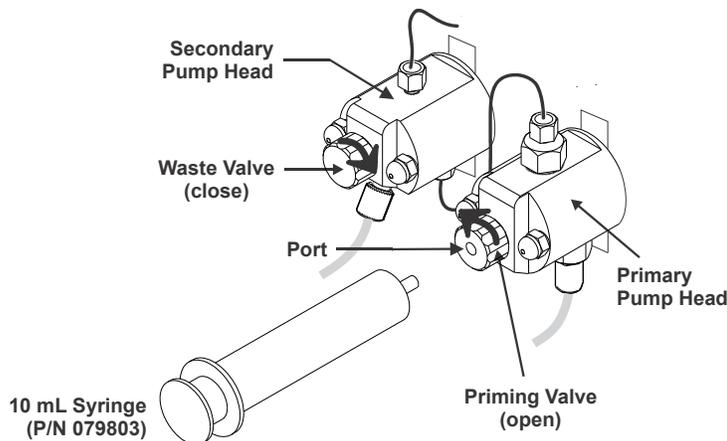
1. Before priming the pump, verify that the:
 - Eluent reservoir is filled.
 - Reservoir cap is installed and hand-tightened.
 - Liquid line from the Dionex Aquion to the reservoir cap is connected.
 - Waste lines are directed to a waste container.

❖ To prime the eluent lines with a syringe

Note Perform this procedure after initial installation, after changing eluents, or when eluent lines are empty.

1. Verify that the pump is turned off.
2. Connect a 10 mL syringe (P/N 079803) to the priming valve port on the primary pump head (see [Figure 48](#)).

Figure 48. Priming the eluent lines



3. Open the priming valve by turning it one-quarter to one-half turn counterclockwise.

4. Draw the syringe back to begin pulling eluent through the flow path. It may take several syringe draws to remove all air or previous eluent from the tubing.

Note If the vacuum degas assembly is installed, draw out an additional 20 mL of eluent.

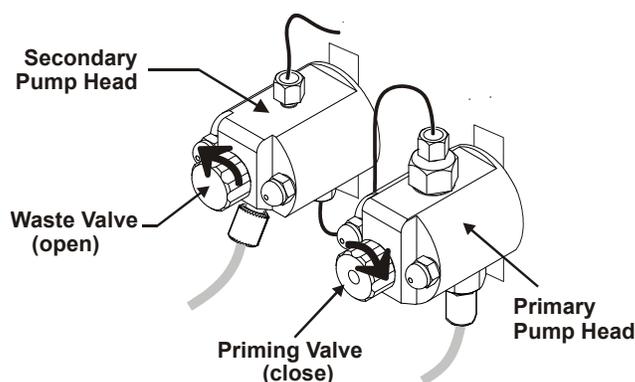
5. After priming the lines thoroughly, close the priming valve. **Do not overtighten.**

❖ **To prime the pump with the Prime button**

Note Perform this procedure after priming the eluent lines (see “To prime the eluent lines with a syringe” on page 84).

1. Verify that the priming valve on the primary pump head is closed (see Figure 49).

Figure 49. Priming the pump



2. Open the waste valve on the secondary pump head by turning the knob one-quarter to one-half turn counterclockwise. Opening the valve directs the eluent flow path to waste and eliminates backpressure.
3. Click **Prime**. Confirm that the waste valve is open by clicking **OK** when the reminder message appears. The pump will begin pumping at about 3 mL/min.
4. Continue priming the Dionex Aquion until no air bubbles are exiting the pump waste line.
5. Close the waste valve. **Do not overtighten the valve.**

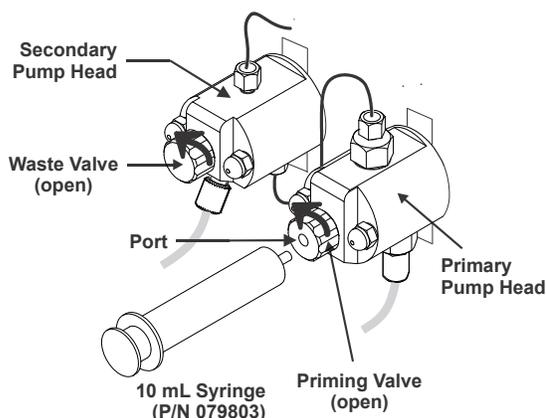
Priming the Pump with Isopropyl Alcohol

Note Prime the pump heads with isopropyl alcohol only if the two standard priming procedures described in “Priming the Pump” on page 84 are unsuccessful.

❖ To prime the pump with isopropyl alcohol

1. Connect a 10 mL syringe (P/N 079803) filled with isopropyl alcohol (IPA) to the port in the primary pump head (see Figure 50).

Figure 50. Priming the pump heads with IPA



2. Open the waste valve on the secondary pump head by turning the knob one-quarter to one-half turn counterclockwise.
3. On the Pump_ECD ePanel, click the **On** button.
4. Open the priming valve on the primary pump head by turning it one-quarter to one-half turn counterclockwise.
5. Use the syringe to slowly push alcohol through the pump.

Note Do not push any air trapped in the syringe through the pump. Check the waste line from the secondary pump head to verify that there are no air bubbles.

6. Close the priming valve. **Do not overtighten.**
7. Disconnect the syringe from the priming valve.
8. Let the pump run for several minutes to purge alcohol from the pump heads.
9. On the Chromeleon ePanel under **Pump_ECD**, click the **Prime** button to flush the heads with the eluent.

IMPORTANT Isopropyl alcohol may damage some columns. Thoroughly rinse the alcohol from the pump as described in Step 8 and Step 9.

10. Close the waste valve. **Do not overtighten.**

11. Select the flow rate required for the analysis.
12. Click the **Off** button.

Changing the Main Power Fuses

❖ To change the fuses

1. Turn off the main power switch to ensure that you do not unintentionally start the Dionex Aquion.



DANGER HIGH VOLTAGE—Disconnect the main power cord from its source and also from the rear panel of the Dionex Aquion.



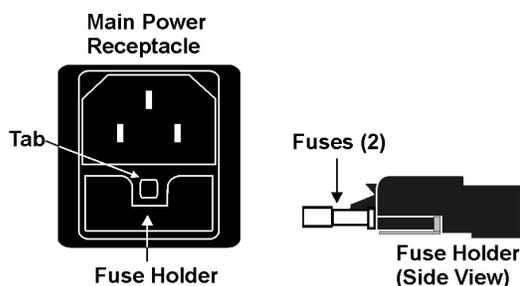
DANGER HAUTE TENSION—Débranchez le cordon d'alimentation principal de sa source et du panneau arrière du Dionex Aquion.



ACHTUNG HOCHSPANNUNG—Ziehen Sie das Netzkabel aus der Steckdose und der Netzbuchse auf der Rückseite des Dionex Aquion.

2. The fuse holder is part of the main power receptacle on the Dionex Aquion rear panel (see [Figure 51](#)). To remove the fuse holder, squeeze the tab on the top of the holder to release it and pull the holder straight out of its compartment.

Figure 51. Main power fuse holder



3. Replace the two fuses in the holder with new IEC 127 fast-blow fuses rated 3.15 amps (P/N 954745). Thermo Fisher Scientific recommends always replacing both fuses.
4. Reinsert the fuse holder into its compartment and push in until the tab clicks in place.
5. Reconnect the main power cord and turn on the power.

6 Service

Changing the Main Power Fuses

Specifications

Electrical

| | |
|------------|---|
| Main Power | 100 to 240 Vac, 50 to 60 Hz (Auto-sensing power supply; no manual voltage or frequency adjustment required) |
| Fuses | Two 3.15 amp fast-blow IEC 127 fuses (P/N 954745) |

Physical

| | |
|--------------------------------|---|
| Dimensions (without reservoir) | Height: 56.1 cm (22.1 in) Width: 22.4 cm (8.8 in) Depth: 53.3 cm (21.0 in) |
| Weight | 51 lbs (23 kg) net weight 64 lbs (29 kg) with boxes |
| Decibel Level | <52 dBA |
| Control Modes | Full control through front panel and Chromeleon software; alternative control through TTL or relay closure (two relay outputs, two TTL outputs, four programmable inputs) |
| USB Communication Protocol | One USB input; one built-in USB hub with two outputs |

Environmental

| | |
|-----------------------|---|
| Operating Temperature | 4 to 40 °C (40 to 104 °F); cold room-compatible (4 °C) as long as system power remains on |
| Operating Humidity | 5% to 95% relative humidity, noncondensing |
| Operating Pressure | 35 MPa (5000 psi) maximum liquid path (tubing, valve, columns, etc.) |

| Front Panel | |
|--------------------|--|
| Power LED | On when power is present; off when no power is present |
| Inject Valve LEDs | Indicates the injection valve position. |
| Alarm LED | Indicates an alarm state. |
| Status LEDs | Indicates the instrument status. |

| Analytical Pump and Fluidics | |
|-------------------------------------|---|
| Type | Serial dual-reciprocating pistons, microprocessor-controlled constant stroke, variable speed |
| Construction | Chemically inert, metal-free PEEK pump heads and flow paths compatible with aqueous eluents of pH 0 to 14 and reversed-phase solvents |
| Operating Pressure | 0 to 35 MPa (0 to 5000 psi) |
| Flow Rate Range | 0.00 to 5.00 mL/min in 0.01 mL/min increments without changing pump heads |
| Flow Precision | <0.1% typical |
| Flow Accuracy | <0.1% typical |
| Pressure Ripple | <1% at 13.8 MPa (2000 psi) and 1.0 mL/min |
| Eluent On/Off Valve | Standard feature |
| Piston Seal Wash | Dual-pump head; wash can be continuous when connected to rinse solution supply |
| Pressure Alarm Limits | <ul style="list-style-type: none"> • Upper limit: 0 to 35 MPa or 0 to 5000 psi in one unit (MPa or psi) increments • Lower limit: Up to one unit lower than upper limit |
| Vacuum Degas | Optional feature; automatic control |
| Eluent Bottles | Polypropylene |
| Eluent Bottle Pressure | Not required |
| Leak Detection | Built-in optical sensor |

| Detector Electronics | |
|-----------------------------|--|
| Type | Microprocessor-controlled digital signal processor |
| Cell Drive | 8 kHz square wave |
| Detector Linearity | 1% up to 1 mS |

| Detector Electronics | |
|---|--|
| Resolution | 0.00238 nS/cm |
| Full-Scale Output Ranges | <ul style="list-style-type: none"> • Digital signal range: 0 to 15,000 μS • Analog signal range: 0 to 15,000 μS |
| Electronic Noise | <p>± 0.1 nS/cm when background conductivity is 0 to 150 μS/cm</p> <p>± 2 nS/cm when background conductivity is 151 to 3200 μS/cm</p> |
| Filter | Rise times from 0 to 10 s; user-selectable |
| Temperature Compensation | Fixed at 1.7% per 1 °C at cell temperature |
| Temperature Range | Ambient +7 °C; 30 to 55 °C (86 to 130 °F) |
| Temperature Stability | <0.01 °C |
| Conductivity Cell with Heat Exchange | |
| Cell Body | Chemically inert polymeric material |
| Cell Electrodes | Passivated 316 stainless steel; compatible with MSA |
| Cell Volume | <1 μ L |
| Maximum Cell Operating Pressure | 10 MPa (1500 psi) |
| Heat Exchanger | Inert, tortuous path for low axial dispersion |
| Operating Temperature | 30 to 55 °C (86 to 130 °F); must be at least 7 °C above the ambient temperature |
| Injection Valve | |
| Injection Valve | 6-port, 2-position Rheodyne valve with PEEK wetted components; electrically-activated |
| Auxiliary Valve (Optional) | |
| Auxiliary Valve | 6-port or 10-port, 2-position Rheodyne valve with PEEK wetted components; electrically-activated |
| Vacuum Degas Assembly (Optional) | |
| Channel | Single-channel degas channel with degas membranes |
| Pump | Dual-stage diaphragm vacuum pump |
| Materials | Wetted materials, PEEK, PTFE |

| Column Heater (Optional) | |
|------------------------------------|--|
| Operating Temperature | 30 to 60 °C (86 to 140 °F); minimum 5 °C above ambient temperature. Settable range is equal to working range. |
| Temperature Stability | ±0.5 °C at sensor |
| Temperature Accuracy | ±0.5 °C at sensor, at 40 °C |
| Maximum Column Lengths | 250 mm analytical column with 50 mm guard column |
| Suppressors | |
| Chemical Suppression | 2 mm and 4 mm anion and cation, membrane suppression bed types |
| Displacement Chemical Regeneration | 2 mm and 4 mm anion and cation, membrane suppression bed types |
| Electrolytic Suppression | <ul style="list-style-type: none"> • Self-Regenerating: 2 mm and 4 mm anion and cation; both membrane and MonoDisk™ suppression bed types available • Self-Regenerating with External Water Mode: 2 mm and 4 mm anion and cation; both membrane and MonoDisk suppression bed types available |
| Current Control Range | AES: 0 to 150 mA in 1 mA increments CMD: 0 to 500 mA in 1 mA increments SRN: 0 to 500 mA in 1 mA increments |
| Salt Converter | 2 mm and 4 mm versions available |
| Dionex AMMS ICE™ | 2 mm and 4 mm versions available |
| Carbonic Acid Removal for Anions | ASRS™ 300 with CRD 200 for hydroxide eluents ASRS 300 with CRD 300 for carbonate eluents |
| Non-Suppressed | Supported |
| Suppressor Wear Parts | None; peristaltic pump and inline filters not required |

Suppressors

| | |
|----------------------|---|
| Suppression Capacity | Anion CRS 300 (4 mm): 150 µeq/min Cation CRS 300 (4 mm): 150 µeq/min Anion CRS 300 (2 mm): 37.5 µeq/min Cation CRS 300 (2 mm): 37.5 µeq/min Anion AES: 25 µeq/min Cation AES: 25 µeq/min |
| Void Volume | CRS 300 (4 mm): <50 µL CRS 300 (2 mm): <15 µL AMMS ICE 300 (4 mm): <50 µL AMMS ICE 300 (2 mm): <15 µL Anion AES: <35 µL Cation AES: <35 µL |

Autosampler

| | |
|---------------------------------------|---|
| Automation Using Autosampler | Dionex AS-AP or Dionex AS-DV Autosampler (or third-party autosampler) |
| Sequential/ Simultaneous Injection | May be available; depends on autosampler capabilities |
| Online Sample Degassing | Optional; CRD 200/300 required |
| Online Filtration | Available with a Dionex AS-DV Autosampler or an inline filter |
| Automation Flexibility | High, using Chromeleon software and post-run features |

System Software

| | |
|--|--|
| Software | Chromeleon 7 Chromatography Data System; validated for use with Windows |
| Automated Procedure Wizards | Standard feature |
| Predictive Performance | Standard feature |
| Data Trending Plots | Numerical device parameters can be plotted |
| Virtual Column Simulator | <ul style="list-style-type: none"> • Evaluation mode: Standard feature • Isocratic and gradient modes: Optional features |
| Application Templates | Standard feature |
| Automation Support for Third-Party Vendors | Fully controls over 300 different instruments from more than 30 manufacturers, including GC, HPLC, and MS |

| System Software | |
|---|---|
| 3D Software for PDA, MS, and ED | Optional feature |
| Customizable System ePanels | Standard feature |
| System Status Virtual Channels | Standard feature |
| Power Failure Protection | Standard feature |
| Sequential Injection | Standard feature |
| System Trigger Commands and Conditionals | Standard feature |
| Daily Audit Trail | Standard feature |
| Sample Audit Trail | Standard feature |
| Multiple Network Control and Network Failure Protection | Optional feature |
| Storage of System Calibration Settings | Factory, current, and previous calibration values are stored; the user can reset current values to factory or previous values |
| Customized Reporting | Standard feature; unlimited report workbooks |
| Automated System Qualification | Detailed, comprehensive qualification reports |

TTL and Relay Control

Contents

- [TTL and Relay Connections](#)
- [Controlling TTL and Relay Outputs](#)

TTL and Relay Connections

A 12-pin connector strip for TTL/relay control is on the Dionex Aquion rear panel. The connector provides two relay outputs, two TTL outputs, and four TTL inputs (see [Figure 52](#)).

Figure 52. TTL and relay connector on rear panel

| Pin Function | Connector Position | Description |
|--------------|--------------------|--|
| RELAY OUT | 1 | Solid State Relay Contacts Output |
| | 2 | |
| TTL OUT (+) | 5 | TTL Output 1 (1 k Ω pull up to +5, 100 mA sink) |
| | 6 | TTL Output 2 (1 k Ω pull up to +5, 100 mA sink) |
| TTL IN (+) | 7 | TTL Input 1 — Inject/Load |
| | 8 | TTL Input 2 — Autozero |
| | 9 | TTL Input 3 — Pump/Suppressor On |
| | 10 | TTL Input 4 — Mark |
| TTL GND (-) | 11 | Ground |
| | 12 | Ground |

Note: The TTL input functions can be reassigned to different inputs.

IMPORTANT Relay loads in excess of 200 mA, or with included power supplies over 60 V, may damage the relay drivers on the CPU.

Note TTL 1 Input — Inject/Load applies only to the injection valve (not to the auxiliary valve, if installed).

The outputs can be used to control functions in external devices such as an autosampler or another Dionex module. When connected to a controlling device, the inputs can be programmed to perform the following Dionex Aquion functions:

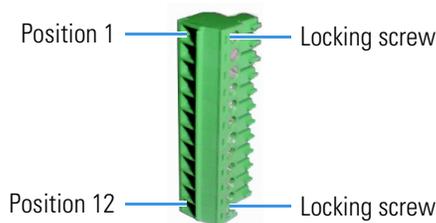
- Switch the injection valve position (load/inject).
- Perform an autozero command (set the conductivity to zero).
- Turn the pump on and off (also turns the suppressor on and off).
- Send a chart mark signal to the analog output. The mark is 10% of the full-scale voltage, and the duration is 0.5 second. A mark can be used, for example, to indicate the injection.

Relay outputs 1 and 2 can be programmed to switch any low-voltage control. Switched current must be less than 200 mA and 42 V peak.

❖ **To connect a TTL or relay**

1. Locate the twisted pair of wires (P/N 043598) and the 12-position connector plug (P/N 923686) (see [Figure 53](#)) in the Dionex Aquion Ship Kit (P/N 057905).

Figure 53. 12-position connector plug



2. To connect the TTL or relays:
 - a. For each relay or TTL, connect an active wire (red) and a ground wire (black) to the 12-position connector plug at the appropriate pin locations. See [Figure 52](#) or the label on the Dionex Aquion rear panel for the connector pin assignments.

To attach a wire to the plug, strip the end of the wire, insert it into the plug, and use a screwdriver to tighten the locking screw. If necessary, multiple ground wires can be attached to a single TTL input/output ground pin.

IMPORTANT When attaching wires to the connector plug, do not allow stray strands of wire to short to the adjoining position on the connector.

- b. Plug the connector into the 12-pin connector on the Dionex Aquion rear panel.
- c. Connect the wires from the Dionex Aquion connector plug to the TTL or relay connector pins on the other module(s). Additional connector plugs are provided with other Dionex modules.

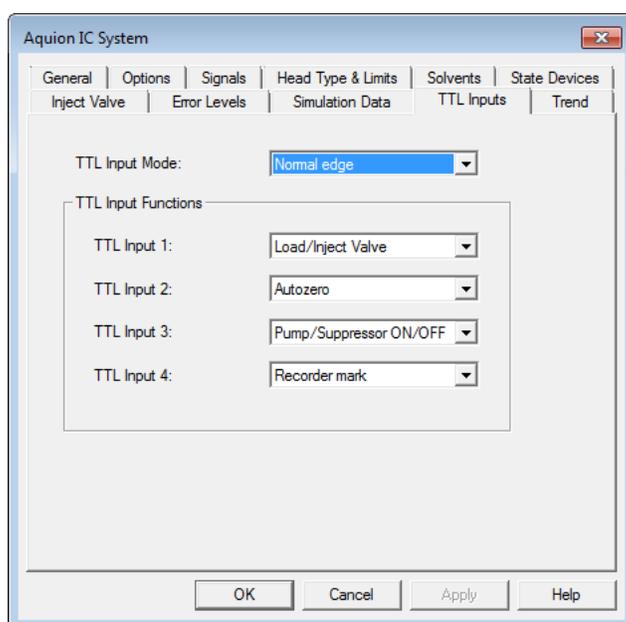
Note Verify the polarity of each connection. Connect signal wires to signal (+) pins and ground wires to ground (-) pins.

3. If you connected a TTL input, verify that the correct function is assigned to the input and that the correct input control type is selected. Select different settings, if necessary. Input functions and control types are assigned from Chromeleon (see “To select TTL input functions and control types” on page 97).

❖ **To select TTL input functions and control types**

1. Open the Chromeleon Instrument Configuration Manager.
2. Under the instrument, right-click the Dionex Aquion, and click **Properties**.
3. Click the **TTL Inputs** tab (see Figure 54).

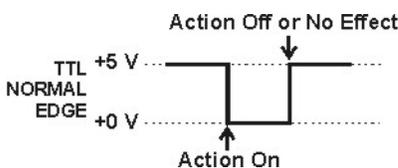
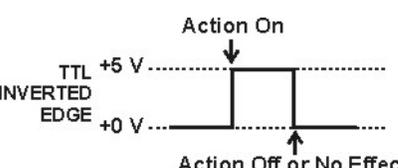
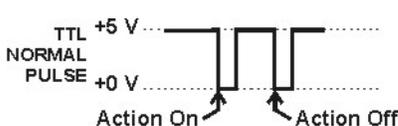
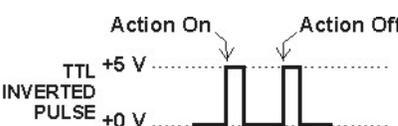
Figure 54. Dionex Aquion Properties dialog box: TTL Inputs tab page



TTL Input Control Types

The Dionex Aquion TTL inputs respond to four types of signals to accommodate different controlling devices. The default control type, **Normal Edge**, is compatible with the output signals provided by the Dionex modules.

If the device connected to the Dionex Aquion does not send a normal edge signal, select the appropriate control type. Refer to the documentation provided with the controlling device and the information below to select the correct type.

| Control Type | Schematic |
|---|---|
| <p>Normal Edge: In normal edge operation, the negative (falling) edge of a signal turns on the function. For example, for the Load/Inject function, the negative edge switches the injection valve position to Load.</p> <p>The action of the positive (rising) edge depends on the function:</p> <ul style="list-style-type: none"> • Load/Inject switches the injection valve to the Inject position. • Pump On turns off the pump (and suppressor). • Autozero and Mark have no effect. |  |
| <p>Inverted Edge: The inverted edge mode works identically to the normal edge mode except that the positive and negative edges are reversed in function.</p> |  |
| <p>Normal Pulse: In normal pulse operation, the negative (falling) edge of the TTL signal is the active edge and the positive (rising) edge is ignored.</p> <p>A pulse width of 50 ms or more is guaranteed to be detected. A pulse width of 4 ms or less is guaranteed to be ignored. The action for pulse widths that are greater than 4 ms and less than 50 ms is undefined.</p> |  |
| <p>Inverted Pulse: The inverted pulse mode operates identically to the normal pulse mode except that the positive and negative edges are reversed in function.</p> |  |

Controlling TTL and Relay Outputs

The Dionex Aquion provides two TTL outputs and two relay contacts for control of functions in external devices, such as an integrator or autosampler. The relay outputs can be used to switch any low-voltage control. Switched current must be less than 200 mA and 60 V peak blocking. The relay-contact closures are normally open. When the relay is closed, current flows to the connected device.

IMPORTANT Relay loads in excess of 200 mA or with included power supplies over 60 V may damage the relay drivers on the CPU.

The TTL outputs are normally at 5 V. Setting a TTL output to 0 V turns on the action in the connected device.

The TTL and relay output states can be controlled by issuing direct control commands from the Chromeleon ePanel or by including the commands in an instrument method.

B TTL and Relay Control

Controlling TTL and Relay Outputs

Reordering

| Part Number | Item |
|--|---|
| Reservoirs | |
| 046548 | 2-L plastic reservoir assembly (includes stopper and cap) |
| 039164 | 4-L plastic reservoir assembly (includes stopper and cap) |
| 060054 | Air regulator accessory |
| Pump | |
| 057937 | Primary pump head assembly |
| 055733 | Secondary pump head assembly |
| 045721 | Outlet check valve assembly, 10-32 |
| 045722 | Inlet check valve assembly, 1/4-28 |
| 045994 | Check valve cartridges |
| 052840 | Piston |
| 055870 | Piston seal |
| 048722 | Piston rinse seal |
| 055752 | O-ring for waste valve or priming valve |
| 057945 | Eluent valve |
| 079803 | 10 mL syringe (for priming eluent lines) |
| Sample Loop and Injection Valve | |
| 042857 | 25- μ L sample loop |
| 057968 | Injection valve |
| 024305 | Luer adapter fitting, 1/4-28 (for manual injections) |
| 016388 | 1-mL syringe (for manual injections) |
| 075973 | Injection Valve Rebuild Kit |

| Part Number | Item |
|---|---|
| Auxiliary Valve | |
| 075973 | Injection Valve Rebuild Kit (for use with auxiliary valve, also) |
| 061947 | Auxiliary valve pod assembly (6-port valve) |
| 061948 | Auxiliary valve pod assembly (10-port valve, 0.010-in or 0.020-in ports) |
| Suppressors, Cell, and Column Heater | |
| 082540 | Dionex AERS 500 (4 mm) Suppressor |
| 082541 | Dionex AERS 500 (2 mm) Suppressor |
| 082542 | Dionex CERS 500 (4 mm) Suppressor |
| 082543 | Dionex CERS 500 (2 mm) Suppressor |
| 069565 | Dionex DS6 heated conductivity cell |
| 069564 | Column heater assembly |
| 059979 | Column heater heat exchanger, 0.25-mm (0.010-in) ID tubing |
| 060943 | Column heater heat exchanger, 0.125-mm (0.005-in) ID tubing (for use with 2-mm columns) |
| 079910 | Column heater cover assembly |
| 052324 | Microbore tubing kit |
| Relay/TTL | |
| 923686 | 12-position connector plug |
| 043598 | Twisted pair of wires |
| Miscellaneous | |
| 954745 | IEC 127 fast-blow fuses, rated 3.15 amps |
| 960779 | USB cable, 5 m (16 ft) |
| 060392 | External USB hub |
| Preventive Maintenance Kits | |
| 057954 | Dionex Aquion Preventive Maintenance Kit |

FAQ

How do I hook up an autosampler?

To connect the Dionex Aquion to an autosampler, refer to the Dionex Aquion installation instructions. Also refer to the autosampler operator's manuals, which are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

How do I print?

Click **Print** on the Instrument toolbar above the Chromeleon ePanel Set.

Why are the retention times moving?

Retention times can shift if the pump flow is erratic, or if the column or eluent is contaminated. See [“Erratic Flow/Pressure Reading”](#) on [page 55](#) for pump flow rate troubleshooting. If a contaminated column is suspected, clean the column as instructed in the column manual. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

How do I adjust retention times?

Retention times are calculated during calibration. The **Use Recently Detected Retention Time** parameter in the Chromeleon Processing Method Editor can be used to compensate for some types of retention time drift, such as evaporation of volatile components in pre-mixed solvents or an aging column. Refer to the Chromeleon Help or user's manual for details.

When should I remake standards?

Standards are used only for calibration and should always be made fresh (they have a lifetime of only one week).

When should I remake eluents?

Eluents should be remade every two or three weeks.

How do I start Chromeleon?

1. Click **Start** on the Windows taskbar.
2. Select **All Programs > Thermo Chromeleon 7 > Chromeleon 7**.

How do I delete data?

1. In the Console, on the Navigation Pane, click the **Data** Category Bar.
2. In the data tree, right-click the sequence and click **Delete**.

How do I back up data?

Refer to *Backup Procedure and Data File Locations* topic in the Chromeleon Help.

How do I shut off the system?

On the instrument, turn off the power switch on the rear panel (see [Figure 6](#)).

How do I store columns?

Columns should be stored in eluent. Refer to the column manual for complete instructions. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

How do I know when a column is dirty?

Refer to the troubleshooting section of the column manual. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

How do I clean a column?

Refer to the troubleshooting section of the column manual. Column manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).

Why is the conductivity high?

Possible reasons for high conductivity include:

- The suppressor is not on. Turn on the suppressor from the Chromeleon ePanel.
- The suppressor needs regeneration. Refer to the suppressor manual for troubleshooting information. Suppressor manuals are provided on the Thermo Scientific Reference Library DVD (P/N 60-053891).
- See [“High Cell Output”](#) on [page 58](#) for additional troubleshooting information.

How do I configure and operate the auxiliary valve?

The auxiliary valve must be installed on-site by Thermo Fisher Scientific field service personnel. See [“Auxiliary Valve \(Optional\)”](#) on [page 21](#) for details about valve operation.

Glossary

Analytical Column

Synonymous with **Separator Column**.

Band Spreading

The broadening of the sample band as it travels through the column. Band spreading can also occur in the injection valve, detector cell, and interconnecting tubing.

Calibration Curve

A graph showing detector response in peak height or area versus analyte concentration.

Capacity Factor (k')

The number of column volumes of eluent, pumped through the column, required to elute an analyte. Capacity factor is a dimensionless measure of retention which is independent of column length or eluent flow rate. It is calculated as follows:

$$k' = \frac{t_r - t_o}{t_o}$$

Where: t_r = retention time

t_o = retention time of unretained solute (column void volume)

Cell Constant (k)

A factor determined experimentally by measuring the conductance (G) of a standard solution of known equivalent conductivity (κ).

$$k = \kappa / G$$

The value of k depends upon the surface area of, and distance between, the electrode faces in the conductivity detector cell.

$$k = l/A$$

Where: l = length

A = area of one electrode (the other electrode is equal to the first)

Channeling

The preferential flow of liquid along more open, less resistant paths through the column packing. This causes **Band Spreading**.

Column Efficiency (N)

A measure of the *narrowness* of analyte bands as they elute from the column. High efficiency is desirable because resolution between closely spaced bands improves with greater efficiency.

For a symmetrical (Gaussian) peak, column efficiency can be determined by:

$$N = 5.54(t_1/W_{1/2})^2$$

Where: t_1 = the peak retention time (in seconds)

$W_{1/2}$ = the peak width at 1/2 height (in seconds)

Column efficiency is proportional to column length: for a given resin and column diameter, increasing the column length increases the column efficiency. Synonymous with **Theoretical Plates**.

Column Selectivity (a)

Describes the relative separation of the band maxima between two adjacent peaks. Selectivity can be determined by the following:

$$a = (t_2 - t_0)/(t_1 - t_0)$$

Where: t_1 and t_2 = retention time of components 1 and 2, respectively

t_0 = retention time of unretained components (void volume)

Concentrator Column

A short column used to retain and concentrate analytes from a measured volume of relatively clean sample. This allows large volumes of sample to be injected, lowering concentration detection limits.

Conductivity

A measure of the ease with which electrical current flows through a liquid contained between two opposite charged electrodes. Conductivity is a characteristic of ions in solution. Units are siemens.

Counterion

Ions carrying a charge opposite that of the sample ions (for example, Na⁺) may be the counterion of a Cl⁻ analyte. These ions preserve electrical neutrality in solution.

% Crosslink

Divinylbenzene content in a polystyrene/divinylbenzene (PS-DVB) resin; this contributes to the mechanical strength of the resin and determines chromatographic properties.

Equivalent Conductivity (λ)

The contribution of an ionic species to the total conductivity of a solution as measured in a standard cell having electrodes 1 cm² in area and exactly 1 cm apart.

Guard Column

A small column that prevents poisoning of the separator column by sorbing organic contaminants and removing particulates. It is filled with the same packing as the separator column. Synonymous with **Pre-Column**.

HETP (H)

Height **E**quivalent to a **T**heoretical **P**late. A measure of column efficiency which allows comparison between columns of different lengths.

$$\text{HETP} = H = L/N$$

Where: L = the column length (in mm)

N = the number of theoretical plates

Ion-Exchange Capacity

The number of active ion exchange sites in a given weight or volume of resin; this is usually expressed in meq/g or meq/mL.

Ion-Exchange Resin

An insoluble polymer matrix containing fixed-charge exchange sites (anionic or cationic). IC resins are formed into small spherical particles (beads).

Packing

The material that fills a chromatographic column; usually a resin or silica-based material.

Pellicular Resin

A resin with a solid, nonporous core coated with a thin layer of more porous material. The exchange sites of pellicular ion exchange resins are located only on the surface layer of the bead. These resins have a low ion-exchange capacity.

Pre-Column

Synonymous with **Guard Column**.

Regenerant

A dilute acid or base that converts ion exchange sites in an Electrolytically Regenerated Suppressor or Chemically Regenerated Suppressor back to the form that suppresses the eluent conductivity.

Resin

See **Ion-Exchange Resin**.

Resolution (R)

A measure of the separation between two sample components. This is expressed as the ratio of the distance between the two peak maxima to the mean value of the peak width at the baseline.

$$R = 2(t_2 - t_1)/(W_2 + W_1)$$

Where: t_1 and t_2 = the retention times of components 1 and 2, respectively

W_1 and W_2 = the baseline width of peaks 1 and 2, respectively (measured in the same units as the retention time)

R is proportional to the square root of efficiency (N). A value of $R = 1.5$ represents “baseline separation” of the two peaks.

Retention Time

The time from injection to peak maximum; the basis for identification of a species in chromatographic analysis.

Separator Column

The column used to perform a chromatographic separation; also called an analytical column.

Siemens (S)

Unit measure of conductance; the reciprocal of the electrical resistance of a solution.

Suppressor

A device used to minimize eluent conductivity and convert sample species to a common form, thus increasing detection sensitivity.

Temperature Coefficient

The percent of change in the conductivity of a solution with a 1 °C change in temperature. Every solution has a characteristic temperature coefficient which is determined experimentally.

Theoretical Plates (N)

See Column Efficiency.

Void Volume (V_0)

The volume occupied by the eluent in a packed column. This volume includes the volume between the injection valve and the column and between the column and the detector cell. Unretained components are eluted in the void volume.



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