

Dionex AS-AP Autosampler Operator's Manual

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1.1 Overview of the Thermo Scientific Dionex AS-AP Autosampler

The Thermo Scientific Dionex™ AS-AP Autosampler is designed for high-precision, reliability, ruggedness, and ease of use. The Dionex AS-AP can be used with the entire ICS product family and provides high-performance, automated sample processing for ion chromatography applications.

The Dionex AS-AP is controlled with a PC configured with Thermo Scientific Dionex Chromeleon™ 7 Chromatography Data System (release 7.1 DU0a or later) or Chromeleon 6.8 Chromatography Data System (release 6.80 DU10c or later). The Dionex AS-AP connects to the Chromeleon PC with a USB cable.

Key Features:

- Excellent reproducibility with RSDs less than 0.3% for full-loop injections
- All-PEEK™ flow paths, compatible with aqueous and reversed-phase eluents, safe from metal contamination
- Carousel and moving-needle design to guarantee reliable sampling from a variety of vial sizes and well plates
- 10 mL polystyrene sample vials with wide openings for large-volume injections and trace analysis
- High sample capacity, from 81 (10 mL vials) to 1152 (three 384-position well plates)
- Sample preparation function to automate sample and standard preparations, saving time and labor
- Optional sample tray temperature control for thermally-sensitive samples that offers precise, reliable control over a temperature range of 4 °C to 60 °C. The sample tray temperature control option must be ordered at the same time as the Dionex AS-AP module and installed at the factory
- Optional simultaneous injections

- Optional sample conductivity and pH measurement with conditional dilutions
- Optional fraction collection and reinjection
- Optional 6-port or 10-port valves (up to two) for sample injection, sequential injections, sample preparation, or fraction collection
- Optional chemistry switching to provide fully-automated switching between two independent applications on the same dual channel IC system

1.2 The Dionex AS-AP Operator's Manual

The electronic version (i.e., PDF file) of the Dionex AS-AP operator's manual contains numerous links that you can click to go to other locations within the manual. These links include:

- Table of contents entries
- Index entries
- Cross-references (underlined in blue) to sections, figures, tables, etc.

If you are not familiar with how to navigate PDF files, refer to the Help system for Adobe® Acrobat® or Adobe Reader® for assistance.

Chapter 1 Introduction	Introduces the Dionex AS-AP; explains the conventions used in this manual, including safety-related information.
Chapter 2 Description	Describes Dionex AS-AP operating features and the software required for Dionex AS-AP control.
Chapter 3 Operation and Maintenance	Provides operating instructions for the Dionex AS-AP and describes routine preventive maintenance procedures.
Chapter 4 Troubleshooting	Lists problems and presents step-by-step procedures for how to isolate and eliminate the cause of each problem.
Chapter 5 Service	Provides step-by-step instructions for routine service and parts replacement procedures that the user can perform.

Appendix A Specifications	Contains the Dionex AS-AP specifications and facility requirements.
Appendix B Installation	Provides installation instructions for the Dionex AS-AP.
Appendix C Installation of Optional Valves	Provides installation instructions for high-pressure valve options.
Appendix D Sample Conductivity and pH Accessory	Provides installation, configuration, and operating instructions for the Dionex AS-AP Sample Conductivity and pH Accessory option.
Appendix E Fraction Collection	Provides installation, configuration, and operating instructions for the fraction collection option.
Appendix F Reducing Contamination	Lists steps for reducing ionic contamination in the autosampler.
Appendix G Reordering Information	Lists part numbers of sample vials and other supplies for convenience when reordering.

1.3 Safety and Regulatory Information

The Thermo Scientific Dionex AS-AP Autosampler was manufactured by Thermo Fisher Scientific at the following location: 527 Lakeside Drive, Sunnyvale, CA 94088-3603 U.S.A. The Dionex AS-AP is designed for IC (ion chromatography) and HPLC (high-performance liquid chromatography) applications and should not be used for any other purpose. Operation of a Dionex AS-AP 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 1-800-346-6390. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

1.3.1 Safety Messages and Notes

This manual contains warnings and precautionary statements that can prevent personal injury and/or damage to the Dionex AS-AP when properly followed.

Safety messages appear in bold type and are accompanied by icons, as shown below.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Also used to identify a situation or practice that may seriously damage the instrument, but will not cause injury.



Indicates that the function or process of the instrument may be impaired. Operation does not constitute a hazard.

Messages d'avertissement en français



Signale une situation de danger immédiat qui, si elle n'est pas évitée, entraînera des blessures graves à mortelles.



Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures graves à mortelles.



Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures à modérées. Également utilisé pour signaler une situation ou une pratique qui pourrait gravement endommager l'instrument mais qui n'entraînera pas de blessures.

Warnhinweise in Deutsch



Bedeutet unmittelbare Gefahr. Mißachtung kann zum Tod oder schwerwiegenden Verletzungen führen.



Bedeutet eine mögliche Gefährdung. Mißachtung kann zum Tod oder schwerwiegenden Verletzungen führen.



Bedeutet eine mögliche Gefährdung. Mißachtung kann zu kleineren oder mittelschweren Verletzungen führen. Wird auch verwendet, wenn eine Situation zu schweren Schäden am Gerät führen kann, jedoch keine Verletzungsgefahr besteht.

Notes

Informational messages also appear throughout this manual. These are labeled NOTE and are in bold type:

NOTE NOTES call attention to certain information. They alert you to an unexpected result of an action, suggest how to optimize instrument performance, etc.

1.3.2 Safety Symbols

These symbols appear on the Dionex AS-AP or on labels affixed to the module:



Alternating current



Primary protective conductor terminal



Secondary protective conductor terminal



Power supply is on



Power supply is off



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

1.3.3 Declaration of Conformity

The cETLus or cTUVus and CE marks on the model/data labels on the Dionex AS-AP indicate that the module is in compliance with the following standards.



MANUFACTURERS DECLARATION OF CONFORMITY

Product Identification

Product: Autosampler
Brand: Dionex
Model: AS-AP

Manufacturer

Dionex Corporation
1228 Titan Way
Sunnyvale, California 94088
USA

Representative

Larry McNary
Dionex Corporation
1228 Titan Way
Sunnyvale, CA, USA 94085

Function:

Director, Engineering

Means of conformity

The product(s) listed above are in conformity to the following listed directives and standards. All products were tested and evaluated to the corresponding current standard based on the date this document was signed.

Low Voltage/Safety Directive: 2006/95/EC
EMC Directive: 2004/108/EC

Safety Standards: EN 61010-1
UL 61010-1
CAN/CSA-C22.2 No. 61010-1

EMC Standards: EN 61326 -1

Signature of Representative: _____

A handwritten signature in black ink that reads "Larry McNary".

Name: Larry McNary
Place: Sunnyvale, CA, USA
Date: 20 April, 2011

1.4 Deionized Water Requirements for IC

For autosampler wash liquid, 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 1-1](#).

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	

Table 1-1. ASTM Filtered, Type I Deionized Water Specifications for Ion Chromatography

2 • Description

2.1 Operating Features

[Figure 2-2](#) illustrates the front features of the Thermo Scientific Dionex AS-AP Autosampler.



Figure 2-1. *Dionex AS-AP Front View (Front Panel Closed)*

[Figure 2-2](#) illustrates the main operating features of the Thermo Scientific Dionex AS-AP Autosampler.



Figure 2-2. Dionex AS-AP Front View (Front Panel Lifted)

[Table 2-1](#) describes the standard components included with the Dionex AS-AP.

Component	Description
Wash liquid line	Transports wash liquid from the wash liquid reservoir. Wash liquid is used to rinse the inside and outside of the needle and to remove sample and eluent from the buffer and sample transfer lines.
Syringe valve and syringe	Controls the movement of fluid (wash liquid, sample, waste) between Dionex AS-AP components.
Sampling needle	Draws fluid from a vial or well plate well, dispenses fluid to a vial or well plate well, dispenses fluid to the injection port.
Syringe waste line	Transports waste fluid from the syringe to waste.
Buffer line (push mode injections)	Provides a fluid connection between the syringe and the needle.
Buffer line (pull mode injections)	Provides a fluid connection between the syringe and the sample loop or the injection valve.
Wash port	Rinses the outside of the needle with wash liquid.
Waste port	Directs fluid from the needle to waste.
Injection port	(For push mode injections only) Accepts sample from the sampling needle and delivers it through the sample transfer line to the injection valve.
Sample transfer line (push mode injections)	Transports sample from the injection port to the injection valve.
Sample transfer line (pull mode injections)	Transports sample from the needle to the injection valve.
Sample carousel	Holds the sample vial trays or well plate trays.

Table 2-1. *Dionex AS-AP Standard Components*

[Table 2-1](#) describes the optional components available for the Dionex AS-AP

Component	Description
Sample Conductivity and pH Accessory	Measures the pH and conductivity of samples loaded into the Dionex AS-AP. The accessory can be ordered at the same time as the Dionex AS-AP or at a later time.
Temperature control	Provides heating and cooling of samples loaded into the Dionex AS-AP. The temperature control option must be ordered at the same time as the Dionex AS-AP module and installed at the factory.
Valves	One or two high-pressure valves can be installed. Depending on the Dionex AS-AP injection mode, the valves can be configured as injection, fraction collection, diverter, or auxiliary valves. Valves can be ordered at the same time as the Dionex AS-AP or at a later time.

Table 2-2. Dionex AS-AP Optional Components

2.1.1 Status Bar

The status bar on the front of the Dionex AS-AP (see [Figure 2-3](#)) provides LEDs that indicate the status of several autosampler functions.

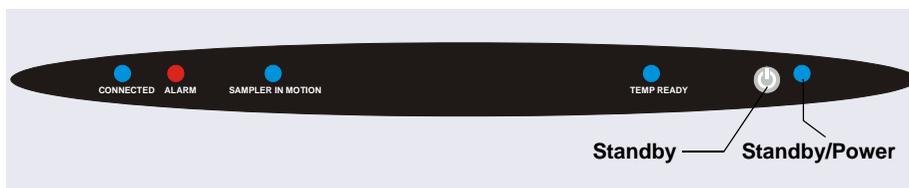


Figure 2-3. Dionex AS-AP Status Bar

Button/LED Label	Function
Connected	This LED is on when the Dionex AS-AP is connected to Chromeleon.
Alarm	This LED is on when an error condition exists (for example, the leak sensor is wet). Check the Chromeleon Audit Trail for the cause.

Button/LED Label	Function
Sampler in Motion	This LED is on when the syringe, needle, or carousel is in motion and it is not safe to access the carousel.
Temp Ready	This LED is on when the carousel temperature is at the setpoint temperature.
 Standby	Press this button to put the Dionex AS-AP into standby mode. This stops all autosampler motion and temperature control and disconnects the Dionex AS-AP from Chromeleon. The fan for the power supply slows and all front panel LEDs turn off. Use the Standby button for routine on/off control of the Dionex AS-AP. Note: The main power switch is on the Dionex AS-AP rear panel.
Standby / Power	This LED is on when the Dionex AS-AP is operational (the main power is on and the Dionex AS-AP is not in standby mode).

IMPORTANT

The main power switch is on the Dionex AS-AP rear panel. Use the main power switch to turn off all power to the autosampler (for example, when performing a service procedure).

Other status information and alarm messages are displayed in the Audit Trail in Chromeleon. For a description of these messages, see [Section 4.1](#).

2.1.2 Carousel, Sample Trays, Vials, and Well Plates

The carousel has three color-coded sections (red, green, and blue) that can hold three sample trays in any combination of tray types.

[Figure 2-4](#) shows an example rack preview from the Chromeleon 6.8 Sequence Wizard. The red section contains a 1.5 mL vial tray, the blue section contains a well plate, and the green section contains a 10 mL vial tray.

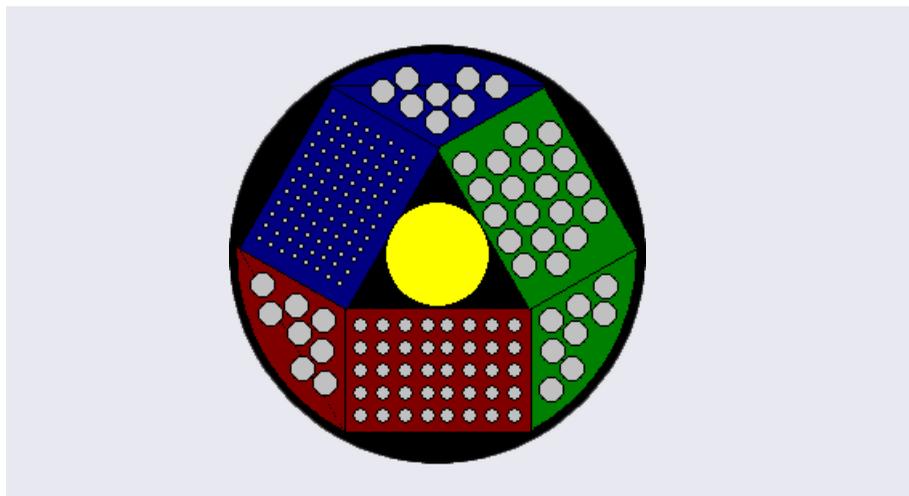


Figure 2-4. Example Rack Preview in the Chromeleon 6.8 Sequence Wizard

Each color-coded section also accommodates a wedge-shaped vial holder (P/N 069877) that holds eight 10 mL vials. You can reserve these positions for special purposes (for example, for reagent or diluent vials) or use them for regular sample positions.

The available tray types are listed below.

Sample Tray for	Capacity	Part Number
Tray for 0.3 mL or 1.5 mL vials	40 vials	074936
Tray for micro well plates	96 wells	
Tray for 10 mL vials	19 vials	074938
Tray for deep well plates	96	074939

The following vials and well plates are available from Thermo Fisher Scientific:

Vial or Well Plate Type	Quantity	Part Number
10 mL polystyrene vials with caps and septa	Package of 100	055058
10 mL polystyrene vials with caps and septa for capillary systems or trace analysis applications	Package of 100	074228
1.5 mL glass vials with caps and septa	Package of 100	055427
1.5 mL polypropylene vials with caps and septa	Package of 100	079812
0.3 mL polypropylene vials with caps and septa	Package of 100	055428
96 micro well plates, 0.5 mL round (U-shaped) wells (<i>not suitable for IC applications</i>)	Package of 10	066332
96 micro well plates, 0.45 mL conical (V-shaped) wells (<i>not suitable for IC applications</i>)	Package of 20	066333
96 deep well plates, 2 mL wells (<i>suitable for IC applications where ion concentration is above 1 ppm</i>)	Package of 5	066334

NOTE Well plates with 384 well capacity are available from third-party suppliers.

2.1.3 Syringe and Syringe Valve

The syringe moves fluid through the autosampler components (needle, buffer line, sample transfer line, etc.). The syringe also moves fluid to the injection valve to load a sample loop or concentrator column. [Figure 2-5](#) shows the tubing connections to the syringe valve.

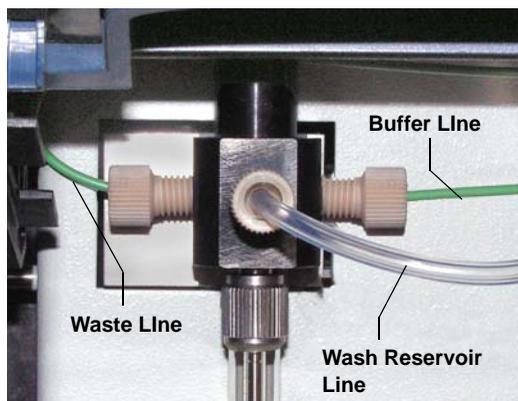


Figure 2-5. Syringe Valve Connections

The following syringe volumes are available:

Syringe Volume	Part Number
100 μ L	074305
250 μ L	074306
1000 μ L	074307
5000 μ L	074308

For correct operation, the syringe size must be the right volume for the installed buffer line and sample loop. For the recommended syringe, buffer line, and sample loop combinations, see [Section B.4](#).

IMPORTANT

Do not install a syringe from a thermo Scientific Dionex AS Autosampler or a third-party autosampler in the Dionex AS-AP. Although the syringes for the autosamplers are similar, they are not the same length and the AS (or third-party) syringe will break if you attempt to use it with the Dionex AS-AP. For identification, Dionex AS-AP syringes are labeled on the bottom of the glass barrel.

IMPORTANT

Do not install a syringe from a thermo Scientific Dionex WPS-3000 Autosampler in the Dionex AS-AP, as there might be slight contamination when used for trace IC applications.

2.1.4 Sampling Needle and Needle Arm

The sampling needle performs the following functions:

- Draws sample from vials or well plates and delivers it to the injection port (if the Dionex AS-AP is configured for push mode) or directly to the injection valve (if the Dionex AS-AP is configured for pull mode)
- Dispenses fluid into vials (for example, when diluting a sample or collecting fractions)
- Pipettes fluid between vials
- Delivers wash liquid to the wash port

The needle arm (see [Figure 2-6](#)) moves the needle in two directions: horizontally to position the needle over a vial, wash port, or injection port; and vertically to move the needle into and out of the vial or port.

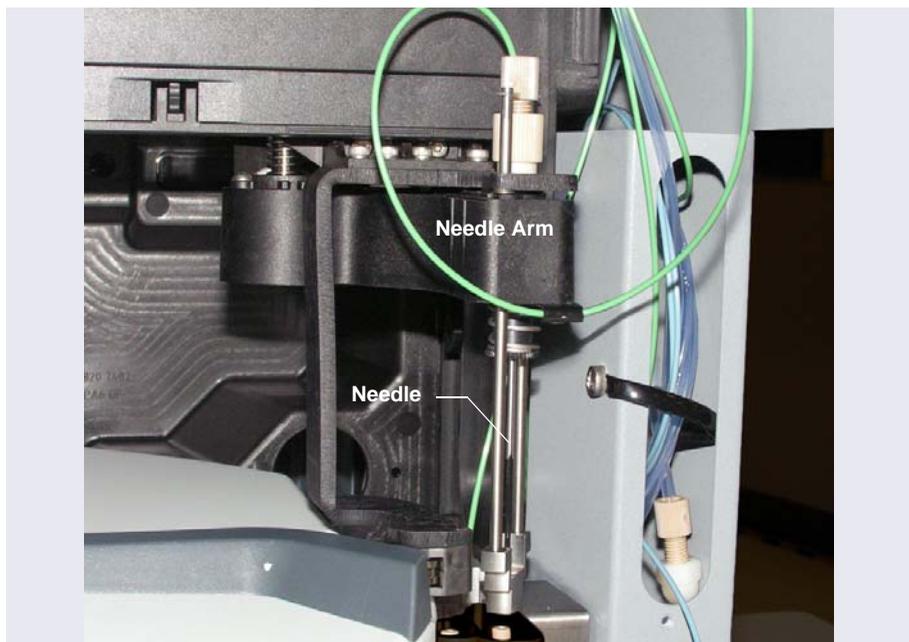


Figure 2-6. Sampling Needle and Needle Arm

2.1.5 Wash, Waste, Injection, and Leak Ports

To wash the outside of the sampling needle, the needle enters the wash port (see [Figure 2-7](#)) and fluid from the wash reservoir is dispensed into the port.

The waste port directs excess fluid from the needle and the injection valve waste line to the waste tray. The syringe waste line drains directly into the waste tray (see [Figure 2-8](#)).

The injection port is used for push mode injections. It accepts the sample from the sampling needle and delivers it through the sample transfer line to the injection valve. If any overflow occurs, it is directed through the leak port to the drip tray and leak sensor.

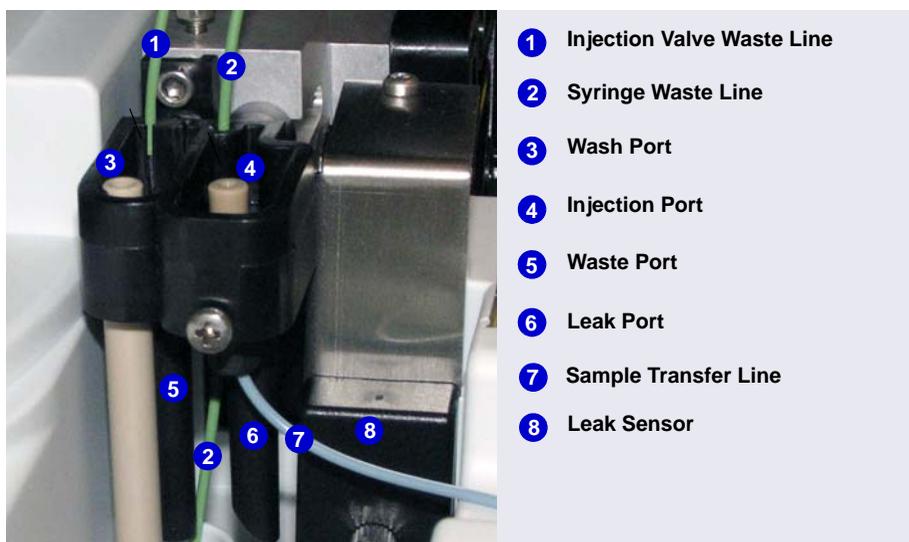


Figure 2-7. Wash, Waste, Injection, and Leak Ports

2.1.6 Leak Sensor

A leak sensor is installed above the drip tray inside the autosampler (see [Figure 2-8](#)). If liquid collects in the drip tray, the leak sensor reports the leak to Chromeleon, and an error message is displayed in the Audit Trail. In addition, the **Alarm** LED on the Dionex AS-AP status bar lights.

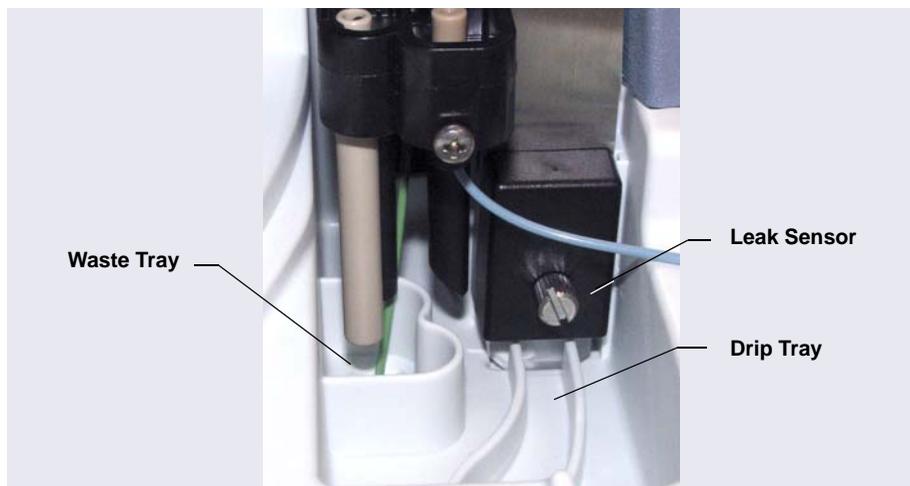


Figure 2-8. Waste Tray, Drip Tray, and Leak Sensor

2.1.7 Compartment Lights

Two LEDs are installed on the inside front panel to illuminate the sample compartment during autosampler operation. To signal needle arm movement, the lights turn off and on again before the needle arms moves to a different position.



To avoid personal injury, do not reach inside the autosampler during a running analysis.



Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.



Um Verletzungen zu vermeiden, greifen Sie bitte niemals während einer laufenden Analyse in den Probenraum.

2.2 Rear Panel Features

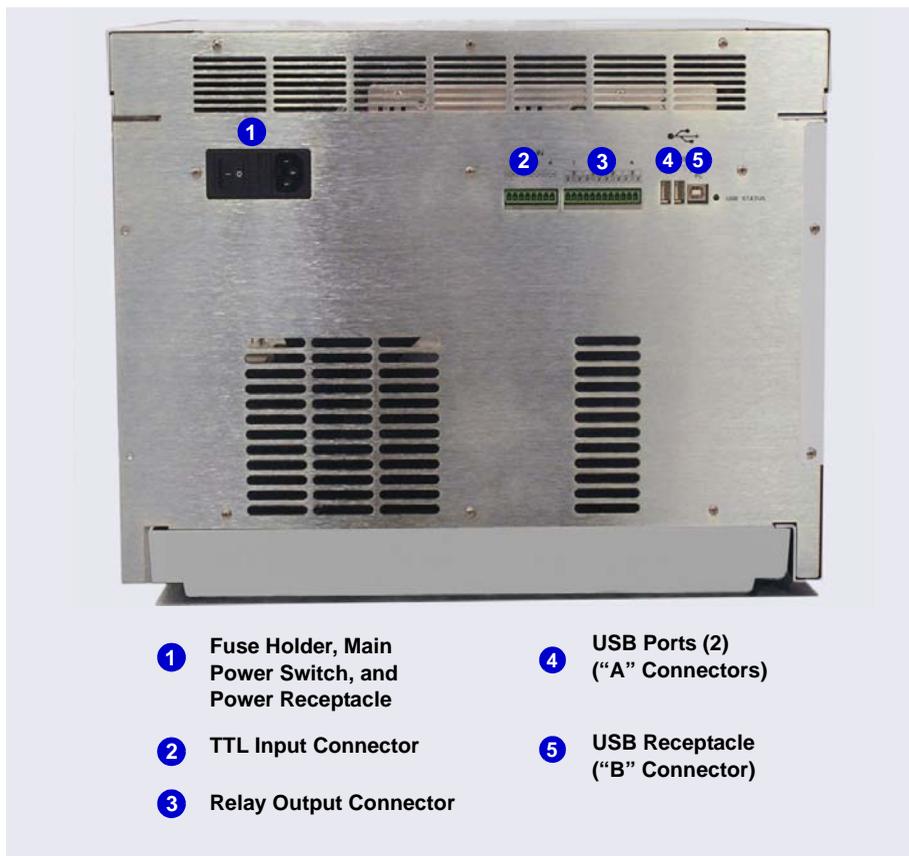


Figure 2-9. Dionex AS-AP Rear Panel

2.2.1 Fuse Holder, Main Power Switch, and Power Receptacle

The fuse holder contains two 4 A IEC 60127-2 fast-blow fuses (P/N 954763). For instructions on how to change the fuses, see [Section 5.12](#).

The power switch on the rear panel is the main power switch for the Dionex AS-AP. Turn on the main power switch before initial operation. For routine on/off control, use the **Standby** button on the front of the Dionex AS-AP (see [Figure 2-3](#)). Turn off the main power switch before performing a service procedure or when the autosampler will not be used for one week or more.

The power cord plugs into the IEC 320 three-prong receptacle.



The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the Dionex AS-AP and is easily accessible.



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.



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

2.2.2 TTL Input and Relay Output Connectors

The 8-pin connector (see [Figure 2-10](#)) provides four TTL inputs and the 12-pin connector provides four relay outputs.

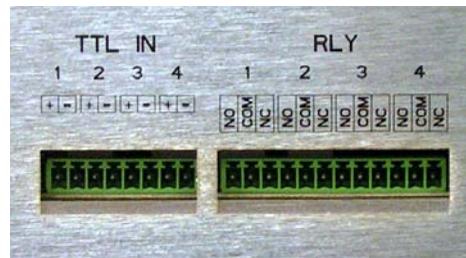


Figure 2-10. TTL Input and Relay Output on Rear Panel

When connected to a controlling device, the TTL inputs are used to start functions or triggers in a Chromeleon instrument method or program. The relay outputs are used to control functions in other relay- or TTL-controllable devices. For TTL and relay connection instructions, see [Section B.14](#).

Depending on which pins are connected, a relay connection can be either normally open (NO) or normally closed (NC) (see [Figure 2-11](#)). Choose NO or NC based on what you want the state of the connected device to be when the Dionex AS-AP power is turned off. A normally open relay is open when the relay is turned off and closed when the relay is turned on. A normally closed relay is closed when the relay is off and is open when the relay is on.

The relays can be programmed to switch any low-voltage device. Switched current must be no more than 2 A at 24 VDC. Refer to [Section B.14](#) and the documentation for the external device for connection instructions.

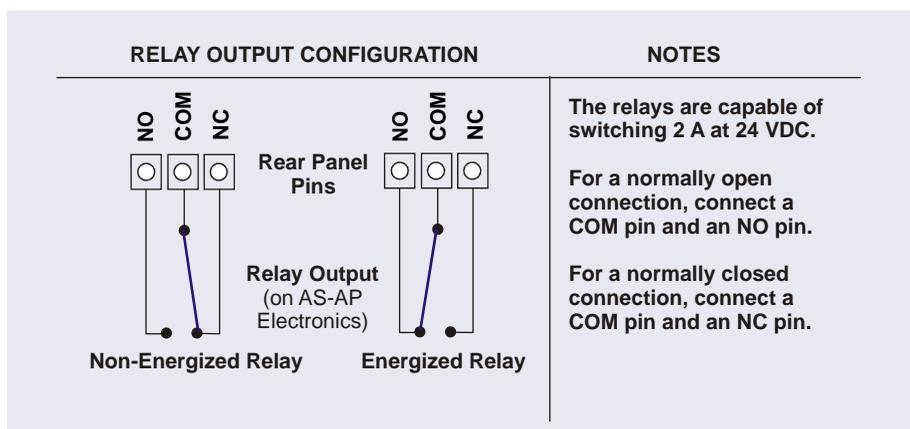


Figure 2-11. Relay Output Configuration

2.2.3 USB Connections

The USB (Universal Serial Bus) receptacle (labeled **FROM PC**) (see [Figure 2-12](#)) allows connection to the PC on which Chromeleon software is installed.

An internal USB 1.1 hub provides two USB ports (labeled **TO MODULE(S)**) that allow connection to other USB devices in the system (for example, a pump and detector).

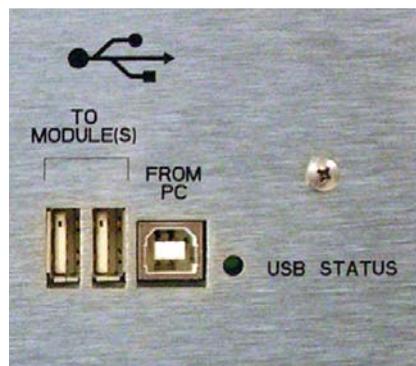


Figure 2-12. USB Connectors on Rear Panel

The **USB STATUS** LED is on when the autosampler is connected to the PC and the LED flashes when information is being transferred.

A 1.8 m (6 ft) USB cable (P/N 960777) is included in the Dionex AS-AP Ship Kit (P/N 074929).

2.3 Autosampler Options

2.3.1 Sample Temperature Control Option

The sample temperature control option provides heating and cooling of the sample carousel. You can program the temperature set point from 4 °C to 60 °C. Samples in the carousel are uniformly heated or cooled to the programmed set point (to a minimum of 20 °C below ambient temperature and a maximum of 35 °C above ambient temperature). The absolute range is 4 °C to 60 °C.

The sample temperature control option must be ordered at the same time as the Dionex AS-AP module and installed at the factory. The option consists of the following components:

- A heating/cooling carousel with fluid channels built into the base
- A pump that circulates the fluid through the carousel channels
- A thermoelectric device that heats or cools the fluid as required to achieve the correct temperature

2.3.2 Simultaneous Injection Option

When the Dionex AS-AP is configured for simultaneous injections, a single Dionex AS-AP can deliver sample to two independent chromatography systems. The sample is injected simultaneously in both systems (one injection valve in each system is required). Dual analyses can be performed with only one sample, thus increasing sample throughput and eliminating the need to label, fill, and track two sample vials.

In Chromeleon, the two chromatography systems and the Dionex AS-AP are configured into a single instrument (Chromeleon 7) or timebase (Chromeleon 6.8). Each system is assigned a unique device name and channel. This lets you monitor and control both systems from one Dionex AS-AP ePanel (in

Chromeleon 7) or Control panel (in Chromeleon 6.8) and run all samples in one sequence.

To prevent contamination of the syringe, syringe, valve, and wash tubing simultaneous injections require either a 1000 μL syringe and a 1200 μL buffer line or a 5000 μL syringe and an 8500 μL buffer line. Full-loop injections are required with this option.

NOTE To perform simultaneous injections, the Dionex AS-AP Simultaneous Injection Kit (P/N 075008) must be installed.

2.3.3 Sequential Injection Option

When the Dionex AS-AP is configured for sequential injections, a single Dionex AS-AP can deliver sample to two independent chromatography systems. With sequential injections, sample is delivered to the first system, flow is rerouted (diverted), and sample is then delivered to the second system. Sequential injection allows different samples to be injected into each system.

Sequential injections require two injection valves and a diverter valve (for switching sample flow between the two systems). The diverter valve is installed in the Dionex AS-AP. The injection valves must be installed in the chromatography systems. For additional information about the diverter valve, see [“Operation as a Diverter Valve” on page 29](#).

2.3.4 Concentrator Injection Option

The Dionex AS-AP can deliver sample and reagent to a Dionex ultra-low pressure concentrator column. With this option, a concentrator column is installed on the injection valve instead of a sample loop. A 5000 μL syringe can be installed to allow larger sample loading volumes. If the 5000 μL syringe is installed, an 8500 μL buffer line must also be installed.

The Dionex AS-AP is capable of delivering at a maximum pressure of 690 kPa (100 psi). When setting up concentrator injections, always select syringe speeds that will keep the backpressure below 690 kPa (100 psi), taking into account the pressure from the installed tubing and the concentrator column. A dispense speed of 5 to 10 $\mu\text{L}/\text{sec}$ is required. Specify the dispense speed in the Chromeleon 7 instrument method or Chromeleon 6.8 program (see [Section 3.4.1](#)). Recommended syringe speeds are provided in the Chromeleon 7 Instrument Method Wizard or Chromeleon 6.8 Program

Wizard. For additional guidelines for selecting syringe speeds, see [Section 3.5](#).

2.3.5 Sample Conductivity and pH Accessory Option

The Dionex AS-AP Sample Conductivity and pH Accessory (P/N 074923) measures the conductivity and pH of a sample before it is loaded into the injection valve. Conditional steps programmed into Chromeleon specify actions to be taken if the conductivity and/or pH is not within a specified range. The Dionex AS-AP Sample Conductivity and pH Accessory mounts in the upper right corner of the autosampler. It connects to the Dionex AS-AP and Chromeleon through a USB cable installed inside the Dionex AS-AP.

For details about the accessory, refer to the *Dionex AS-AP Sample Conductivity and pH Accessory Setup and Operation Guide* (Document No. 065470). The guide is shipped with the accessory and also included on the Thermo Scientific Reference Library DVD (P/N 053891).

2.3.6 Fraction Collection Option

When configured for fraction collection, the Dionex AS-AP is connected to two high-pressure valves installed in the Dionex AS-AP: an injection valve and a fraction collection valve. To operate the Dionex AS-AP with fraction collection, a fraction collection license for Chromeleon 6.8 is required, and a fraction collection driver must be configured in the Chromeleon 6.8 timebase. Installation of the injection valve, fraction collection valve, license, and driver allows automation of injection, fraction collection, and reinjection in one system.

For details about high-pressure valves, see [Section 2.3.7](#). For details about the fraction collection option, see [Appendix D](#).

NOTE Support for fraction collection is not available with Chromeleon 7.

2.3.7 High-Pressure Valve Options

Up to two optional high-pressure valves can be installed in the Dionex AS-AP. A 6-port valve and a 10-port valve are available. Valves can be ordered at the same time as the Dionex AS-AP module and installed at the factory, or

ordered at a later time and installed at the installation site. For part numbers for the valve options, see [Appendix F](#). For installation instructions, see [Appendix C](#).

A high-pressure valve can function as an injection valve, a diverter valve, a fraction collection valve, or an auxiliary valve. The functions available for a particular valve depend on the injection mode selected in the Chromeleon configuration (see [Table 2-3](#)).

Injection Mode	Available Valve Function
Pull	Injection Fraction collection
Push	Injection Fraction collection Auxiliary
Push Simultaneous	Injection Auxiliary
Push Sequential	Injection Diverter Auxiliary

Table 2-3. High-Pressure Valve Functions

Each valve has two operating positions. The selected operating position determines the flow path through the valve ports. [Figure 2-13](#) and [Figure 2-14](#) show the flow schematics for the 6-port and 10-port valves, respectively.

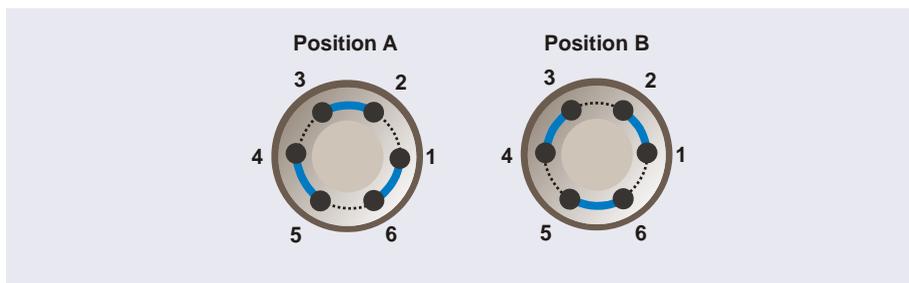


Figure 2-13. 6-Port High-Pressure Valve Flow Schematics

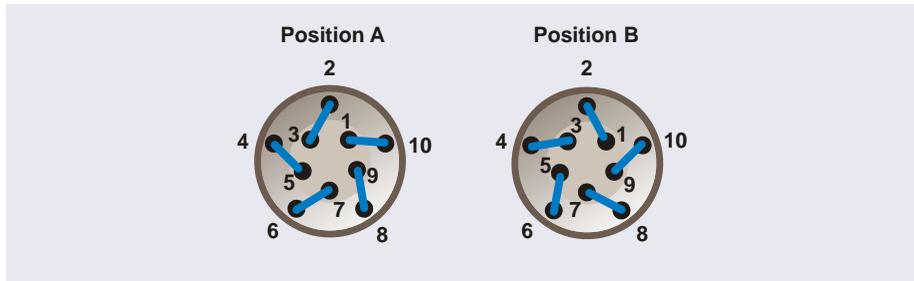


Figure 2-14. 10-Port High-Pressure Valve Flow Schematics

A valve's intended function (for example, injection valve or diverter valve) determines how the valve ports are plumbed. The following sections provide overviews of the valve plumbing and the theory of operation for each valve function.

Operation as an Injection Valve (Push Mode)

When an optional high-pressure valve is configured as an injection valve for push mode injections, the two valve operating positions are used to load and inject sample (see [Figure 2-15](#)).

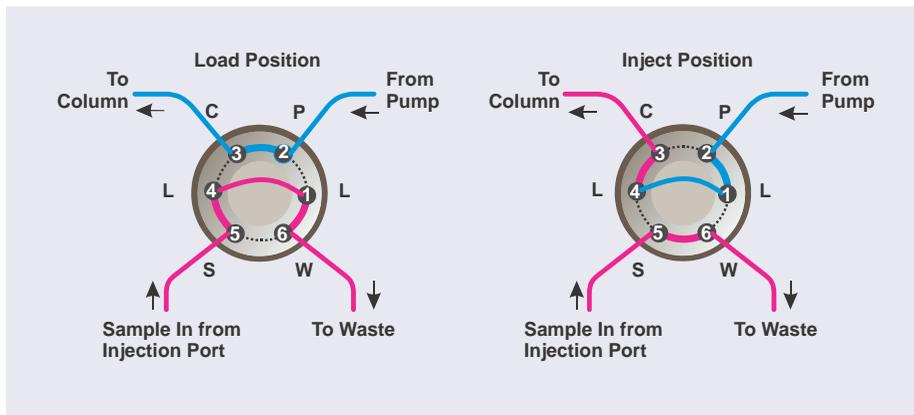


Figure 2-15. Injection Valve Flow Schematics for Push Mode Injections (6-Port Valve Connections Shown)

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

- In the Load position, the syringe pushes sample from the needle through the Dionex AS-AP injection port, through the valve, and into the sample loop, where it is held until injection. Any excess sample flows out to waste. Eluent flows from the pump, through the valve, and to the column, bypassing the sample loop.
- In the 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.

Operation as an Injection Valve (Pull Mode)

When an optional high-pressure valve is configured as an injection valve for pull mode injections, the two valve operating positions are used to load and inject sample (see [Figure 2-16](#)).

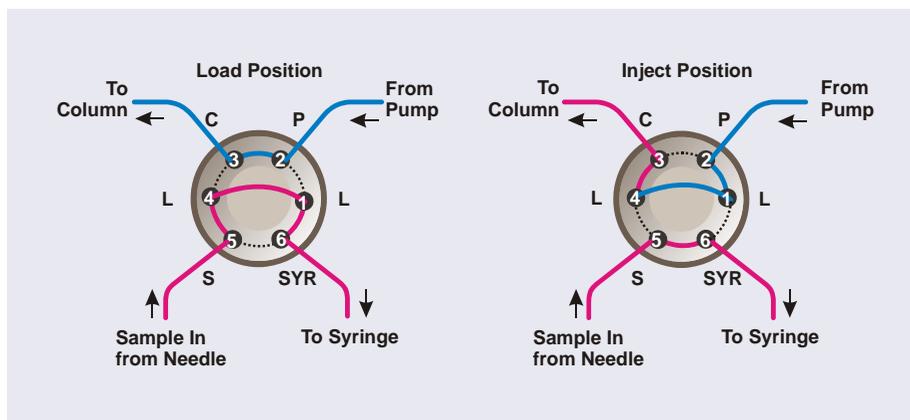


Figure 2-16. Injection Valve Flow Schematics for Pull Mode Injections (6-Port Valve Connections Shown)

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

- In the Load position, the syringe pulls sample from the needle, through the valve, and 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.

- In the 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.

Operation as a Diverter Valve

When the Dionex AS-AP is configured for push mode injections, an optional high-pressure valve can be configured as a diverter valve. In this configuration, the valve's two operating positions are used to sequentially route sample to the injection valves of two independent chromatography systems (see [Figure 2-17](#)).

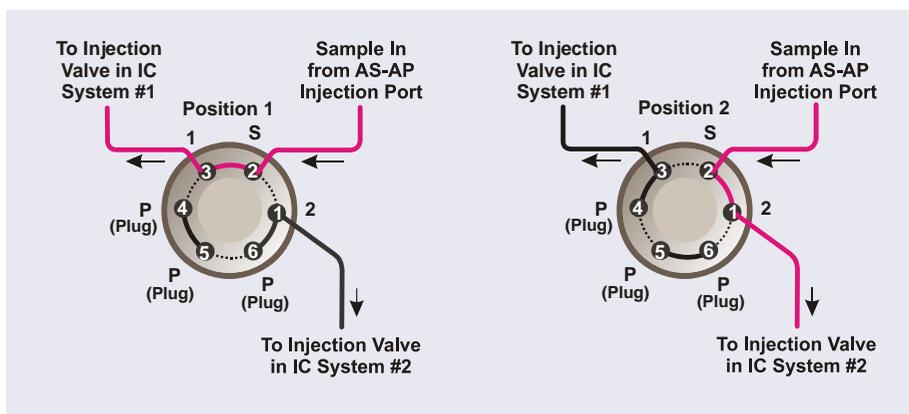


Figure 2-17. Diverter Valve Flow Schematics for Sequential Injections (6-Port Valve Connections Shown)

- In position 1, the syringe pushes sample from the needle through the Dionex AS-AP injection port, through the valve, and into the sample in port of the injection valve in IC system #1.
- In position 2, the syringe pushes sample from the needle through the Dionex AS-AP injection port, through the valve, and into the sample in port of the injection valve in IC system #2.

Operation as a Fraction Collection Valve

When an optional high-pressure valve is configured as a fraction collection valve, the valve's two operating positions are used to either collect fractions from the detector outlet flow or to route the detector outlet flow to waste. The fraction collection valve can be configured for push mode injections (see [Figure 2-18](#)) or pull mode injections (see [Figure 2-19](#)).

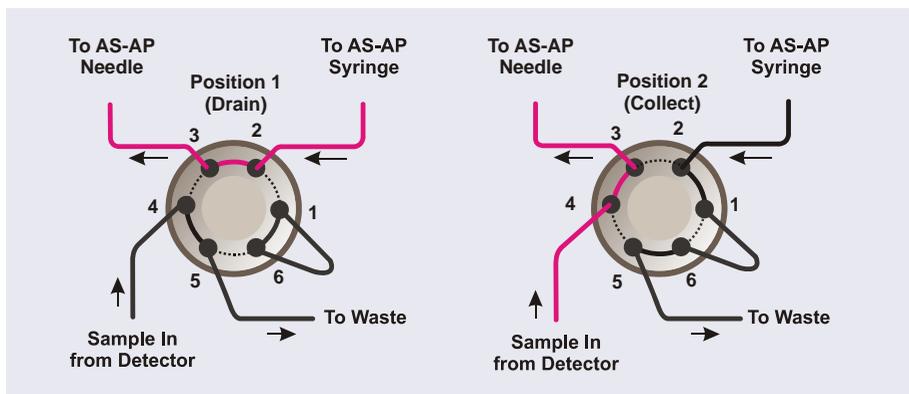


Figure 2-18. Fraction Collection Valve Flow Schematics for Push Mode (6-Port Valve Connections Shown)

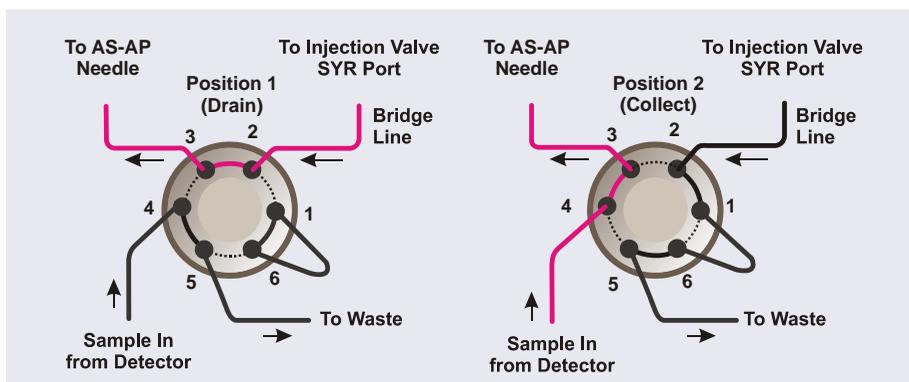


Figure 2-19. Fraction Collection Valve Flow Schematics for Pull Mode (6-Port Valve Connections Shown)

- In position 1 (Drain), flow from the detector outlet line is routed to waste. This position is used during loading of the injection valve sample loop and during injection of the sample onto the column.

- In position 2 (Collect), flow from the detector outlet line is routed through the needle and into vials for fraction collection.

For details about the fraction collection option, see [Appendix D](#).

Operation as an Auxiliary Valve

When the Dionex AS-AP is configured for push mode injections, the optional high-pressure valves can be configured as auxiliary valves and used for various application functions (for example, concentrator column loading or matrix elimination).

Plumbing configurations for the valves depend on the components to be connected and the application to be run. Refer to the appropriate Thermo Scientific Application Note for more information.

2.4 Operating Principles

2.4.1 Overview of Injection Modes

The injection mode specifies the method the Dionex AS-AP will use to load sample to the injection valve (or valves). The two main types of injection modes are:

- Push mode (sample is pushed into the sample loop) (see [Section 2.4.2](#))
- Pull mode (sample is pulled into the sample loop) (see [Section 2.4.3](#))

In general, push mode is recommended for high accuracy, minimizing sample use, injecting viscous samples, and loading a concentrator column. Pull mode is recommended for high precision, minimizing carryover and contamination, and minimizing cycle time.

In addition to specifying pull or push mode, the injection mode also specifies other parameters that determine how samples are injected (for example, full-loop or partial-loop injections, simultaneous or sequential loading of two valves, loading of a concentrator column, or loading to a capillary system).

The setting selected in the Chromeleon configuration determines the available injection modes for a particular Dionex AS-AP. The configuration injection mode is set once and does not change unless the autosampler plumbing is changed. [Table 2-4](#) describes the modes selected in the configuration. For

instructions on how to configure the Dionex AS-AP in Chromeleon, see [Section B.11.3](#).

Configuration Injection Mode	Description
Pull	Sample is pulled from the sampling needle assembly into the sample loop.
Push	Sample is pushed from the sampling needle assembly into a sample loop or concentrator column.
Push Simultaneous	Sample is pushed from the sampling needle assembly into the sample loops of two systems simultaneously. To perform simultaneous injections, the Dionex AS-AP Simultaneous Injection Kit (P/N 075008) must be installed.
Push Sequential	Sample is pushed from the sampling needle assembly into the sample loops of two systems alternately. To perform sequential injections, the Dionex AS-AP must be equipped with a 6-port high-pressure valve configured as a diverter valve.

Table 2-4. Injection Modes Selected in the Configuration

NOTE The Dionex AS-AP is shipped from the factory with the plumbing required for push mode injections. To perform other injection modes, the autosampler must be replumbed. For plumbing instructions, see [Section B.7.4](#).

[Table 2-5](#) describes all of the possible injection modes supported by the Dionex AS-AP. The modes available for your Dionex AS-AP depend on the selected Chromeleon configuration injection mode described in [Table 2-4](#).

Dionex AS-AP Injection Mode	Description	Configuration Mode Required
PullFull	Using the pull mode, perform a full-loop injection to one system.	Pull
PullPartial	Using the pull mode, perform a partial-loop injection to one system.	Pull
PushFull	Using the push mode, perform a full-loop injection to one system.	Push
PushPartial	Using the push mode, perform a partial-loop injection to one system.	Push
PushPartial_Is	Using the push mode, perform a partial-loop, limited-sample injection to one system. Limited-sample specifies that no extra sample is drawn.	Push
PushConcentrate	Using the push mode, perform a concentrate injection to one system.	Push
PushCap	Using the push mode, perform an injection to a capillary system.	Push
PushSimultaneous	Using the push mode, perform full-loop injections to two systems simultaneously.	Push Simultaneous
PushSeqFull	Using the push mode, perform full-loop injections to two systems alternately.	Push Sequential
PushSeqPartial	Using the push mode, perform partial-loop injections to two systems alternately.	Push Sequential

Table 2-5. Summary of Dionex AS-AP Injection Modes

Dionex AS-AP Injection Mode	Description	Configuration Mode Required
PushSeqPartial_Is	Using the push mode, perform partial-loop, limited-sample injections to two systems alternately. Limited-sample specifies that no extra sample is drawn.	Push Sequential
PushSeqConcentrate	Using the push mode, perform a concentrate injection to two systems alternately.	Push Sequential
PushSeqCap	Using the push mode, perform injections to two capillary systems alternately.	Push Sequential

Table 2-5. Summary of Dionex AS-AP Injection Modes (Continued)

For information about selecting an injection mode, see [Section 3.4.1](#).

2.4.2 Push Mode Sampling Principle

Figure 2-20 illustrates the Dionex AS-AP plumbing schematic for push mode.

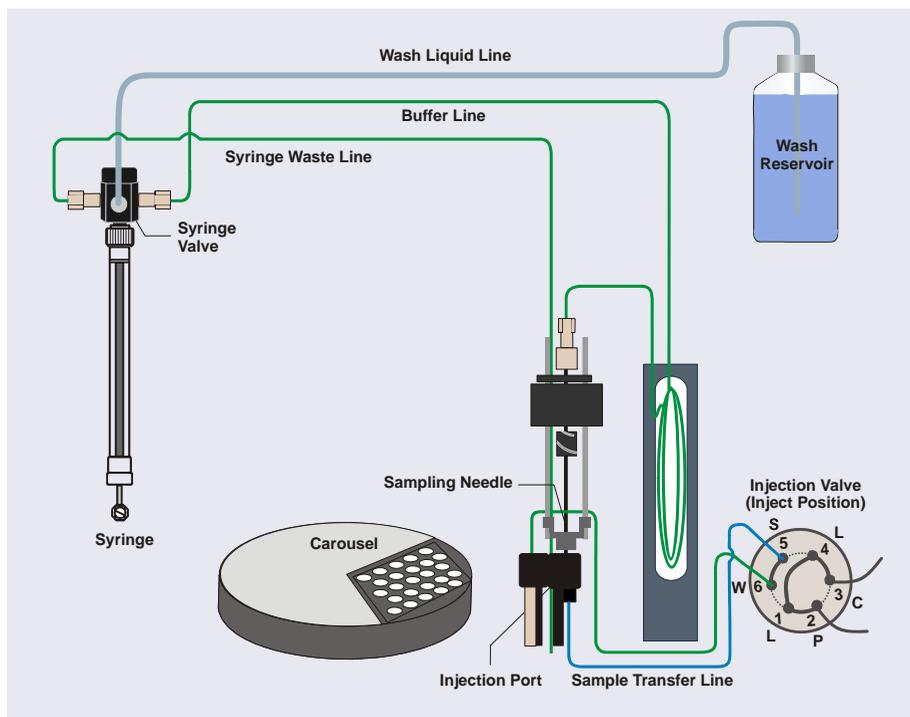
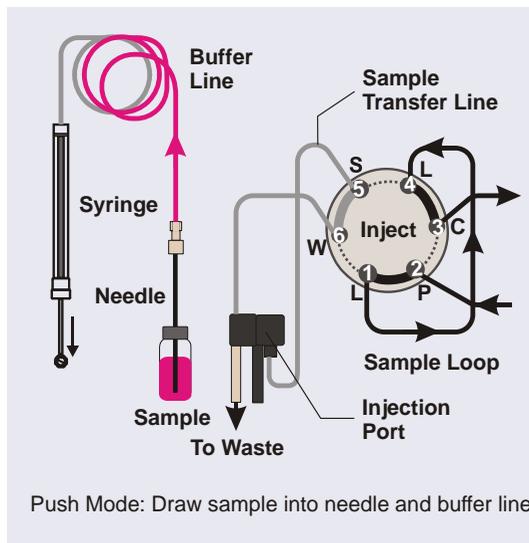


Figure 2-20. Sampling Principle: Push Mode Configuration

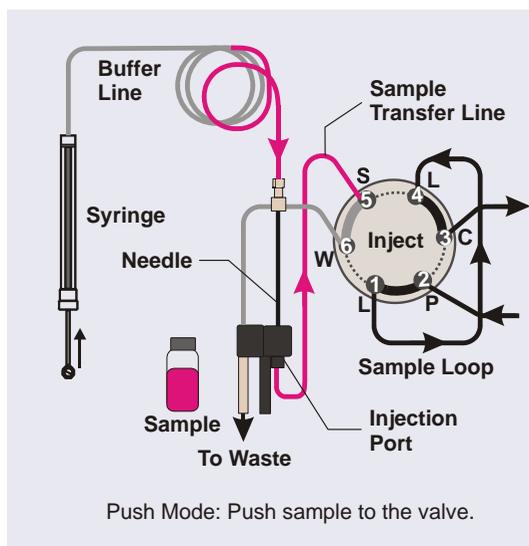
When configured for push mode, the Dionex AS-AP performs the following operations to sample from a vial:

1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.

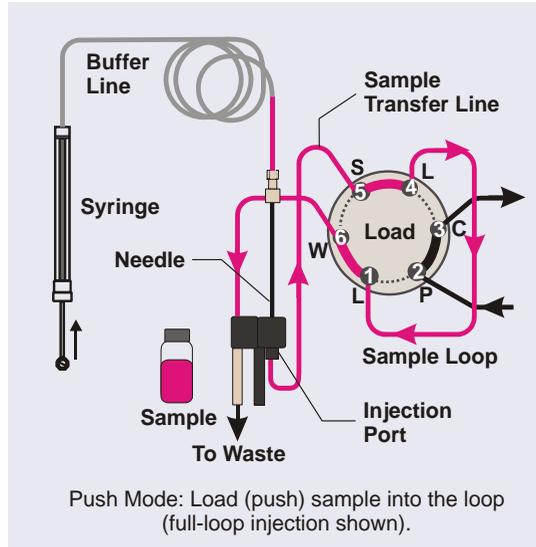
3. With the injection valve in the Inject position, lowers the needle into the vial and then draws the sample into the needle and buffer line.
4. Moves the needle to the injection port.



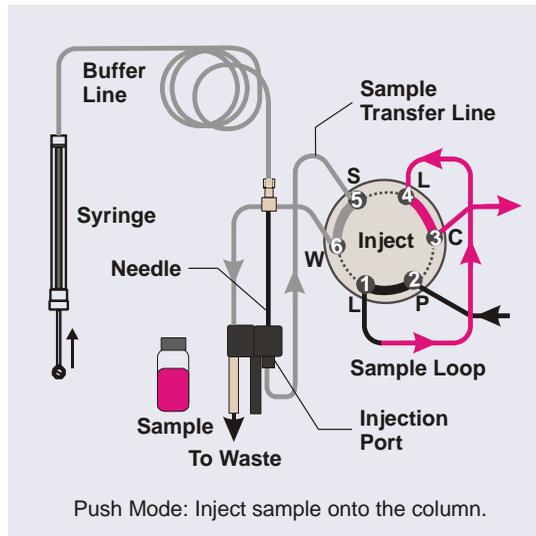
5. With the injection valve still in the Inject position, pushes the sample out of the buffer line and needle, through the sample transfer line, and to the valve.



- When the injection valve is switched to the Load position, pushes the sample into the sample loop.



- When the injection valve is switched to the Inject position, sample is swept out of the loop and delivered to the column.



2.4.3 Pull Mode Sampling Principle

[Figure 2-21](#) illustrates the Dionex AS-AP plumbing schematic for pull mode.

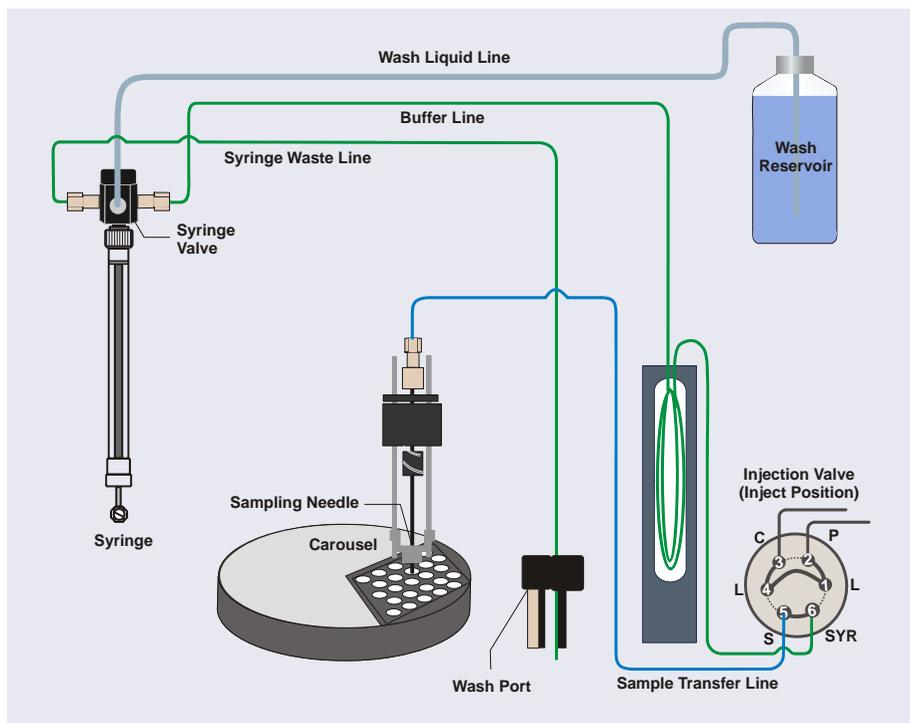
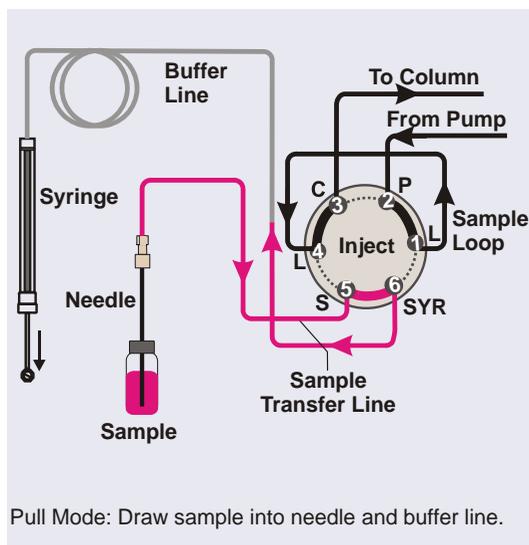


Figure 2-21. Plumbing Schematic: Pull Mode Configuration

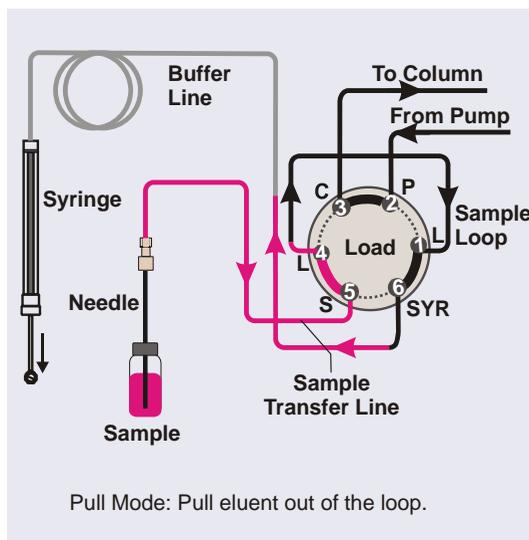
When configured for pull mode, the Dionex AS-AP performs the following operations to sample from a vial:

1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.
3. Lowers the needle into the vial (see [Figure 2-21](#)).

4. With the injection valve in the Inject position, the syringe draws sample from the vial into the needle, sample transfer line, and buffer line. This flushes the needle and sample transfer line of any residual wash fluid and fills them with sample.
5. The injection valve is then switched to the Load position.

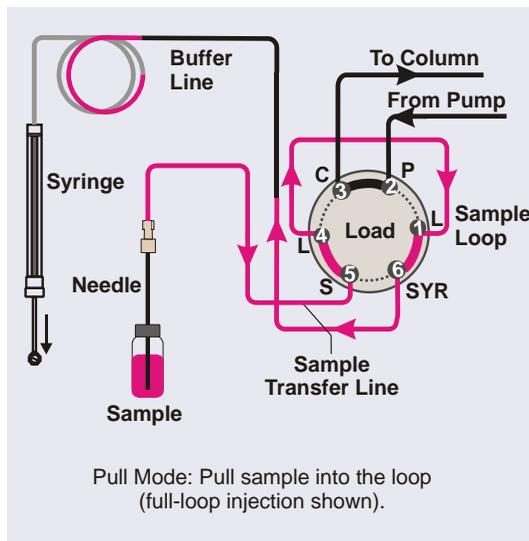


6. With the injection valve in the Load position, the syringe pulls sample through the needle and the sample transfer line. The eluent previously in the sample loop is washed into the buffer line.

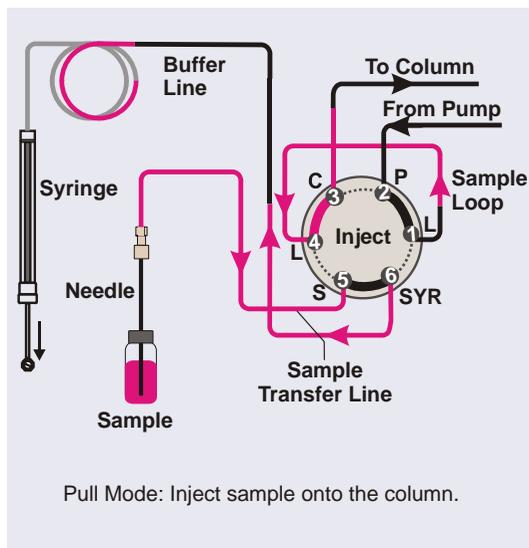


NOTE In pull-partial mode, when the injection valve is switched from inject to load (in [Step 5](#)), a small amount of sample can be pushed back toward the needle. This can cause a slight off-set in an injector linearity run.

7. Sample is then pulled into the sample loop and buffer line.



8. When the injection valve is switched to the Inject position, sample is swept out of the loop and delivered to the column.



2.4.4 Sequential Mode Sampling Principle

[Figure 2-22](#) illustrates the Dionex AS-AP plumbing schematic for sequential injections.

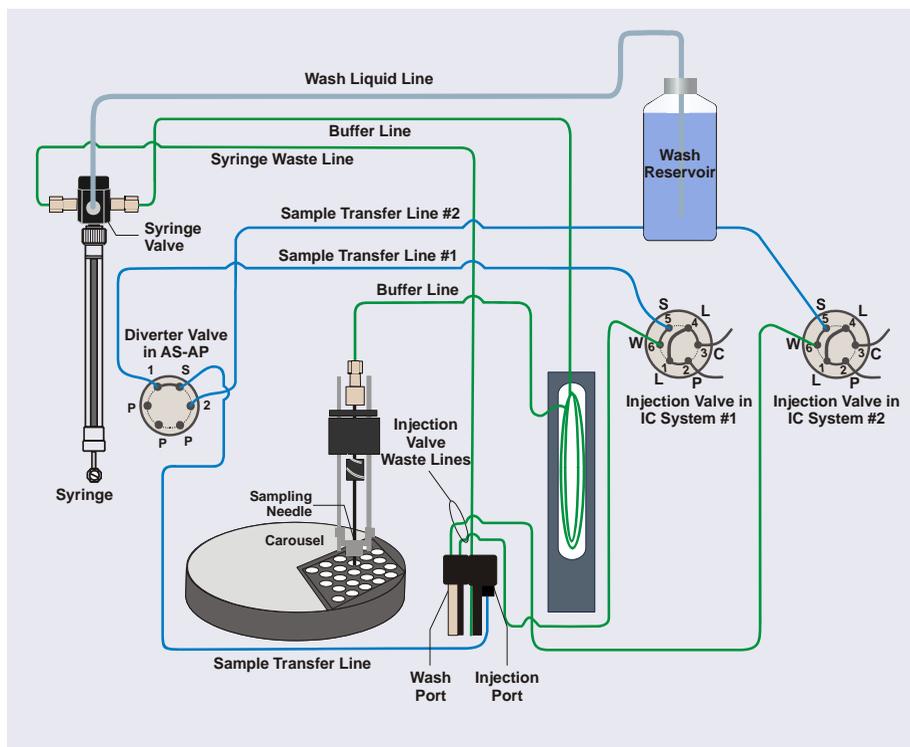


Figure 2-22. Plumbing Schematic: Sequential Mode Configuration

When configured for sequential mode, the Dionex AS-AP performs the following operations to sample from a vial:

1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.
3. With the injection valve in the Inject position, lowers the needle into the vial (see [Figure 2-22](#)) and then draws the sample into the needle and buffer line.
4. Moves the needle to the injection port.

5. With the injection valve still in the Inject position, pushes the sample out of the buffer line and needle, through the sample transfer line to the diverter valve, where it is then routed to the injection valve of either IC system #1 or IC system #2 (depending on the selected diverter valve position).
6. With the injection valve in the Load position, pushes the sample into the sample loop.
7. When the injection valve is switched to the Inject position, sample is swept out of the loop and delivered to the column.
8. To load sample to the other IC system injection valve, the diverter valve position is switched and then the sampling process described above is repeated.

2.4.5 Simultaneous Mode Sampling Principle

Figure 2-23 illustrates the Dionex AS-AP plumbing schematic for simultaneous injections.

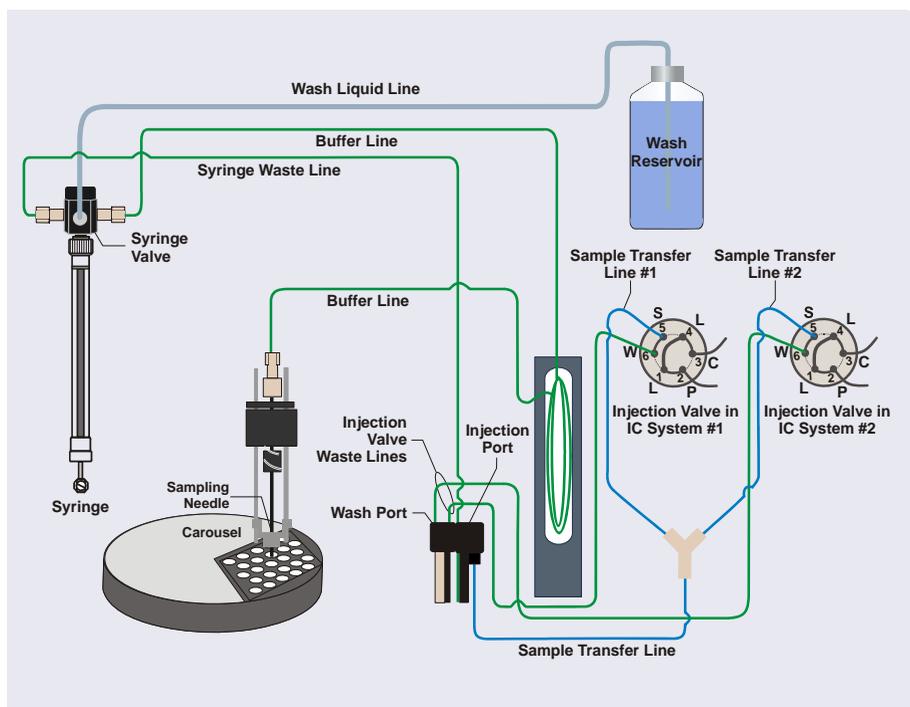


Figure 2-23. Plumbing Schematic: Simultaneous Mode Configuration

When configured for simultaneous mode, the Dionex AS-AP performs the following operations to sample from a vial:

1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.
3. With the injection valve in the Inject position, lowers the needle into the vial and then draws the sample into the needle and buffer line.
4. Moves the needle to the injection port.
5. With the injection valve still in the Inject position, pushes the sample out of the buffer line and needle, through the sample transfer line, and into the

Y-connector. The Y-connector splits the sample evenly and routes half of the sample to the injection valve in IC system #1 and the other half to the injection valve in IC system #2.

6. With the injection valve in the Load position, pushes the sample into the sample loops in both systems.
7. When the injection valves are switched to the Inject position, sample is swept out of the loops and delivered to the columns.

NOTE To ensure that sample is delivered to both systems evenly in simultaneous mode, flow after the Y-connector must be the same. Make sure that the backpressure after the Y-connector is the same in both systems. For details, see [page 191](#)).

2.5 Chromeleon Software

The Dionex AS-AP is controlled by a PC running Chromeleon 7 Chromatography Data System (release 7.1 DU0a or later) or Chromeleon 6.8 Chromatography Data System (release 6.80 DU10c or later).

2.5.1 Software Control Modes

Two modes of software control are available:

- *Direct Control*
With direct control, you select operating commands and parameters from the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8). Direct control commands can also be issued from the Command window (in Chromeleon 7) or the Commands dialog box in

(Chromeleon 6.8). Direct control commands are executed immediately. [Figure 2-24](#) shows the Dionex AS-AP Control panel in Chromeleon 7.

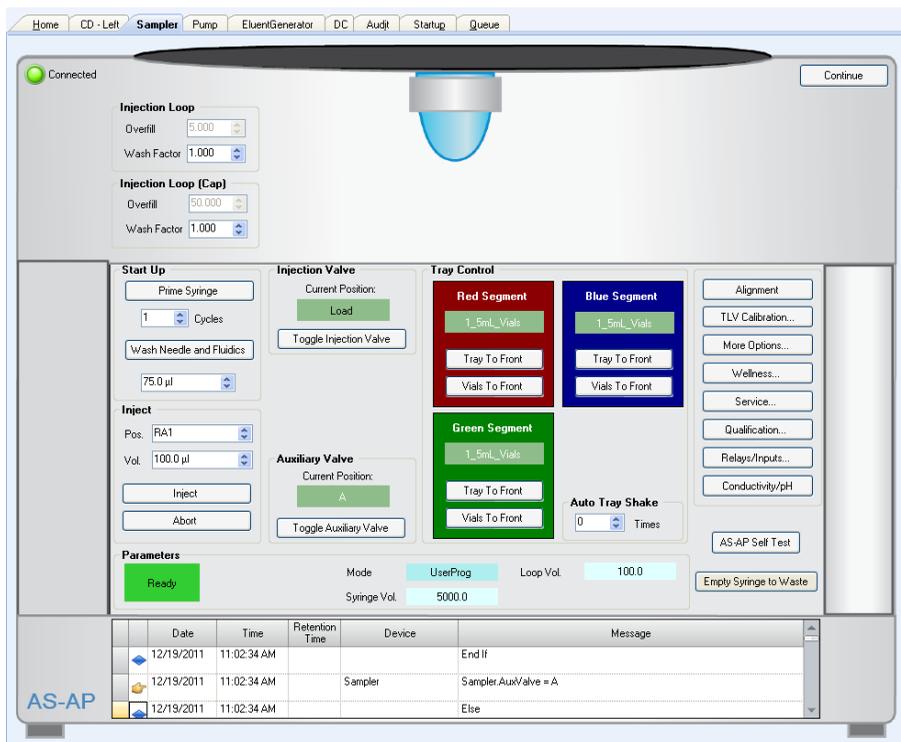


Figure 2-24. Dionex AS-AP Control panel in Chromeleon 7

- Automated Control**
 With automated control, you create a list of injections (a sequence) to be processed automatically. For each injection, the sequence specifies the vial or well to be sampled, as well as other injection parameters (name, type, volume, and so on). Each injection is also assigned an instrument method (in Chromeleon 7) or program (in Chromeleon 6.8) that specifies operating commands for controlling the Dionex AS-AP. The commands in the instrument method or program are executed in chronological order.

2.5.2 System Wellness and Predictive Performance

Use the Dionex AS-AP Wellness panel (see [Figure 2-25](#)) to perform the following tasks:

- Monitor autosampler lifetime counters (operating hours, standby hours, and total injections).
- Monitor how many times or hours a replaceable part has been used since it was last replaced. Chromeleon monitors usage of the syringe, needle, injection port, drain pump, and injection valve rotor seal.
- Set usage warnings and limits for monitored parts. A warning message appears in the Chromeleon Audit Trail when a monitored part reaches the warning limit. A message appears and the autosampler cannot be operated if the usage limit is reached.
- Reset the usage counter after a part has been replaced.

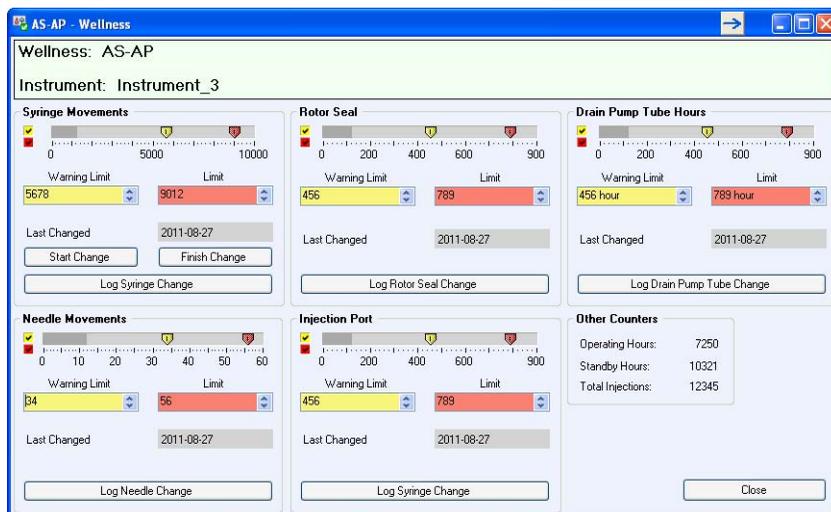


Figure 2-25. Wellness Panel (Chromeleon 7 Version Shown)

3 • Operation and Maintenance

This chapter describes routine operating and maintenance procedures for the Thermo Scientific Dionex AS-AP Autosampler.

3.1 Operation Checklist

- Install and fill the wash liquid reservoir (see [Section 3.2.1](#))
- Check the fluid connections to the syringe valve (see [Section 3.2.2](#))
- Check the fluid connections to the injection valve and to any other valves configured in your system (second injection valve, diverter valve, auxiliary valve, and/or fraction collection valve) (see [Section 3.2.2](#))
- Check the drain line connections (see [Section 3.2.3](#))
- Turn on the autosampler power (see [Section 3.3.1](#))
- Connect to Chromeleon (see [Section 3.3.2](#))
- Prime the syringe (see [Section 3.3.3](#))
- Run a manual wash cycle (see [Section 3.3.4](#))
- Fill the vials or well plates (see [Section 3.3.5](#)) and load the trays into the carousel (see [Section 3.3.6](#))
- Turn on the sample temperature control option (if installed) (see [Section 3.3.8](#)) and equilibrate the chromatography system (see [Section 3.3.9](#))
- Create and run a Chromeleon sequence (see [Section 3.3.10](#))

3.2 Preparing to Run

3.2.1 Setting Up the Wash Liquid Reservoir

1. Rinse the wash liquid reservoir with ASTM Type 1 (18 megohm-cm) filtered and deionized water.
2. If the reservoir is connected to an online degasser, fill the reservoir with ASTM Type 1 (18 megohm-cm) filtered and deionized water.
If the reservoir is not connected to an online degasser, degas the deionized water offline.
3. Install the reservoir cap. Make sure that the end of the wash liquid line extends to the bottom of the reservoir. Hand-tighten the cap.
4. Place the reservoir in the system's reservoir holder or in appropriate secondary containment.
5. Verify that the wash liquid line from the Dionex AS-AP is connected. The connection depends on whether the wash liquid is degassed offline or online. For connection instructions, see [Section B.6](#).

NOTE Replace the wash liquid in the reservoir weekly to prevent microbial growth and gas absorption buildup. Clean the reservoir if needed.

3.2.2 Checking the Syringe Valve Connections

1. Verify that all liquid lines to the syringe valve are connected (see [Figure 3-1](#)). Check for fluid around the fittings, indicating leaking. If needed, finger-tighten the fittings a little further.

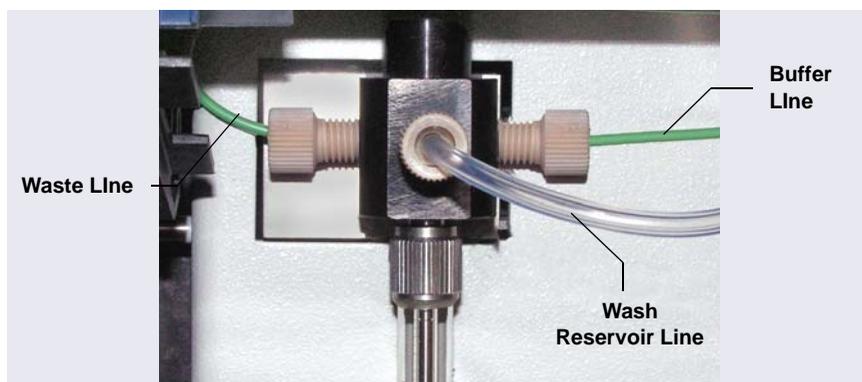


Figure 3-1. Syringe Valve Connections

2. Verify that all liquid lines to the injection valve and other configured valves are connected. For connection instructions, see [Section B.7](#).

3.2.3 Checking the Drain Lines

Verify that the drain lines that extend from the bottom right side of the autosampler are properly connected and the lines are routed to waste. For connection instructions, see [Section B.8](#).

IMPORTANT

For correct drainage, make sure the tubing is not bent, pinched, or elevated at any point. Make sure the end of the waste line is not submerged in waste liquid.



Neutralize acidic and caustic wastes before disposal. Dispose of all wastes in accordance with local regulations.



Neutralisez les déchets acides ou caustiques avant de les jeter. Jetez les déchets aux règlements locaux.



Neutralisieren Sie säurehaltige und ätzende Abfälle vor ihrer Entsorgung. Entsorgen Sie alle Abfälle entsprechend den lokalen Bestimmungen.

3.3 Operating the Dionex AS-AP

3.3.1 Turning On the Power

To start the autosampler for the first time, turn on the main power switch on the rear panel of the autosampler (see [Figure 2-9](#)). For routine on/off control, leave the main power switch on and use the **Standby** button on the front panel status bar (see [Figure 2-3](#)).

When the power is turned on, the autosampler runs a series of tests. During these self-tests, all of the main components are checked.

If an error is detected, the **Alarm** LED on the front panel lights and a message is logged in the Chromeleon Audit Trail. For troubleshooting information, see [Section 4.1](#).

NOTE When the Dionex AS-AP is powered up for the first time, the J-clip is installed on the needle arm, which causes an error during the self test. When this happens, ignore the error and go on to checking the needle alignment (see [Section 5.3](#)).

3.3.2 Connecting to Chromeleon

Configuring the Dionex AS-AP in Chromeleon

Before operating the autosampler for the first time, configure the Dionex AS-AP in the Chromeleon 7 Instrument Configuration Manager or the Chromeleon 6.8 Server Configuration program. In addition, update the configuration whenever a configured option changes. For example, update the configuration if you change the injection mode plumbing, the sample loop size, or the vials or well plates assigned to each color section in the carousel. For details about configuring the Dionex AS-AP in Chromeleon, see [Section B.11.3](#). Also, refer to the Chromeleon Help.

Connecting to Chromeleon 7

1. Turn on the PC.
2. Check the Chromeleon 7 Instrument Controller Service icon on the Windows taskbar and start the service, if it is not already running.
 - If the icon is gray , the Instrument Controller Service is running (idle).
 - If the icon is crossed out in red , the Instrument Controller Service is not running. Right-click the icon and click **Start Chromeleon Instrument Controller**. The icon changes to gold  to indicate that the Instrument Controller Service is starting.
3. To start the Chromeleon 7 client, click **Start > All Programs > Chromeleon 7 > Chromeleon 7**.
4. To display the Dionex AS-AP ePanel, click the **Instruments** category bar on the Console. In the Navigation Pane, click your instrument. Chromeleon 7 connects to the instrument and displays the ePanel Set. Click the **Sampler** tab (see [Figure 3-2](#)).

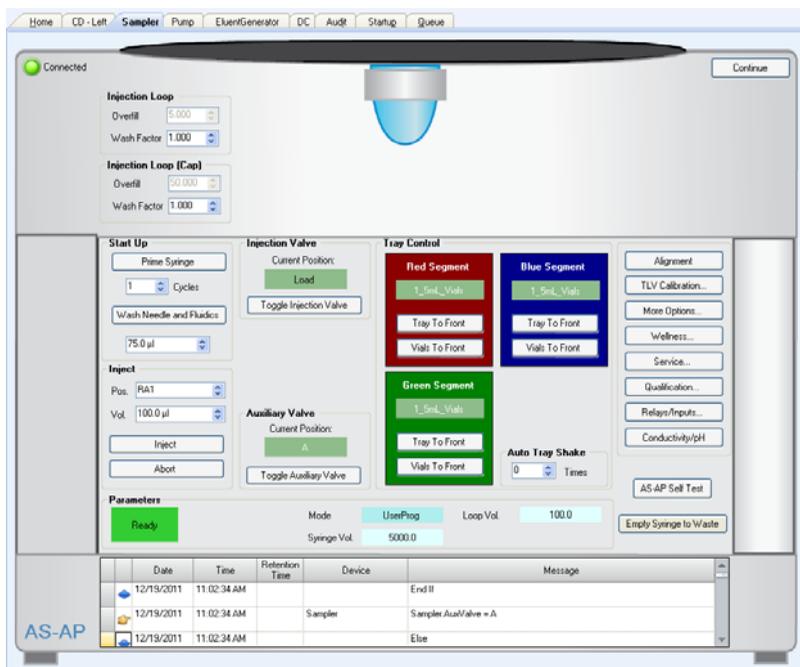


Figure 3-2. Example Chromeleon 7 ePanel Set: Dionex AS-AP ePanel

Connecting to Chromeleon 6.8

1. Turn on the PC.
2. Check the Chromeleon 6.8 Server Monitor icon on the Windows taskbar and start the server, if it is not already running:
 - If the icon is gray , the server is already running (idle).
 - If the icon is crossed out in red , the server is stopped. To start the server, right-click the icon and select **Start Server**. The icon changes to gold  to indicate that the Chromeleon 6.8 Server is starting.
3. To start the Chromeleon client, click **Start** and select **All Programs > Chromeleon > Chromeleon**.
4. To display the panel tabset, select **View > Default Panel Tabset** or click the **Default Panel Tabset** toolbar button.
5. To display the Dionex AS-AP Control panel, click the **Autosampler** tab

3.3.3 Priming the Syringe

During priming, the syringe and the buffer are flushed with wash liquid. This removes air bubbles from the syringe and tubing. Prime the syringe at startup or after a period of inactivity, before running a sequence, or if an air bubble is present in the syringe.

1. Open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) (see [Section 3.3.2](#)).
2. In the **Cycles** box under **Prime Syringe**, enter the number of times the syringe should empty and fill during priming. The number required depends on the size of the syringe and the length of the wash liquid line.
3. Click **Start**. The syringe empties and fills the specified number of cycle times, and then priming stops. Repeat as required until no more bubbles are seen in the wash liquid line.
4. If bubbles still remain in the syringe, prime for an additional two cycles.
5. If bubbles still remain after priming, follow the steps in [Section 5.4.1](#) to remove the syringe. Then, follow the steps in [Section 5.4.2](#) to remove the bubbles from the syringe and reinstall the syringe. When the bubbles are gone, perform a manual wash operation (see [Section 3.3.4](#)).

3.3.4 Running a Manual Wash Cycle

During the wash cycle, the buffer line and sample transfer line are flushed with wash liquid, and then the outside of the needle is washed.

Perform a manual wash after priming the syringe and after filling the wash reservoir.

1. Open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8).
2. Under **Wash Needle and Fluidics**, enter a **Volume**. Click **Wash Needle and Fluidics** (in Chromeleon 7) or **Start** (Chromeleon 6.8).

The volume required for a manual wash depends on the status of the buffer line.

- If the buffer line is dry (for example, after changing the line), enter a wash volume that is 1.5 times the buffer line tubing.
- If the buffer line contains sample or other liquid that you want to flush out, enter a volume large enough to flush the sample or other liquid from the line.

3.3.5 Filling the Vials or Wells

Filling Vials

1. Fill the vials to the vial shoulder or lower (see [Figure 3-3](#)). **Do not fill to the top.**

During sampling, make sure the needle's vent is not immersed in liquid.

For 10 mL vials only: If necessary, raise the needle height inside the vial to position the vent above the liquid. You can set the height in a Chromeleon 7 instrument method or Chromeleon 6.8 program (see [Section 3.4.3](#)).

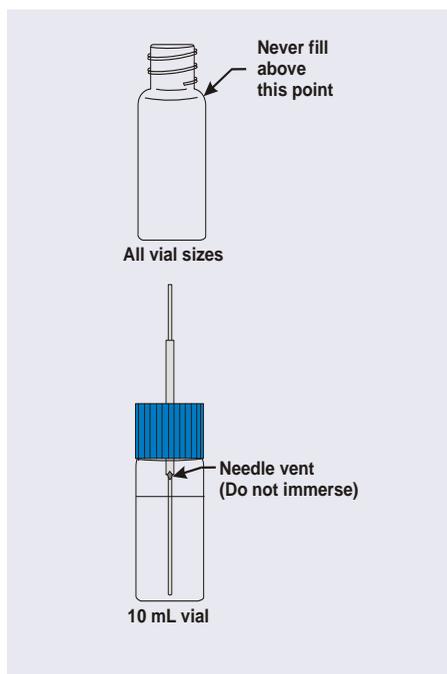


Figure 3-3. Maximum Level to Fill Vials

2. Screw a cap onto each vial and tighten. To prevent septa from falling into the vials when they are pierced by the sampling needle, make sure the cap septa are pushed fully into the caps and the caps are securely tightened.
3. Place the vials in a vial tray.

Filling Well Plates

1. Put on powder-free latex gloves before handling well plates and covers to minimize sample contamination.
2. Rinse the well plates and covers thoroughly with deionized water before use to remove any contaminants.
3. Air dry the well plates completely to prevent any changes in sample concentration. You can use 690 kPa (100 psi) nitrogen gas to assist in drying.

4. Use a pipet to fill the wells in the well plate. In general, pipet the amount of sample to be drawn plus 70 μL . See [Section 3.4.5](#) for details about the sample volumes drawn for each type of injection.

The table below lists the maximum fluid volumes for each well size and the maximum sample volumes available when the well is filled:

Well Plate Type	Maximum Volume per well (μL)	Sample Available (μL) ^a
0.45 mL micro-well with conical (V-shaped) wells	320	250
0.5 mL micro-well with round (U-shaped) wells	320	250
2.0 mL deep-well	1800	1700

a. Assumes the well contains the maximum volume and the needle height is 2 mm (the default).

NOTE Changing the needle height is not recommended when sampling from a micro well plate, because the well depth is shallow. You can adjust the needle height in a deep well plate as required, provided the needle remains submerged in sample. This ensures accurate sample draw.

5. Place a cover over the well plate and firmly press the indentations on the cover into each well. This creates a tight seal and prevents sample evaporation.

NOTE Replace covers after each use to prevent contamination and sample evaporation. Well plates can be reused.

6. Install a micro well plate on a 40-vial sample tray (P/N 074936). Install a deep well plate on the tray made specifically for deep well plates (P/N 074939). Align position A1 on the well plate with position A1 on the

tray, as shown in [Figure 3-4](#). Press the well plate onto the tray until it locks into position.



Figure 3-4. Well Plate Installed on a Sample Tray

3.3.6 Installing a Sample Tray

Follow the steps below to install a sample tray. The installation procedure is similar for all tray types.



To avoid personal injury, do not reach inside the autosampler during a running analysis.



Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.



Um Verletzungen zu vermeiden, greifen Sie bitte niemals während einer laufenden Analyse in den Probenraum.



After installing sample trays, verify that the correct tray types are specified for each color section of the carousel. For details, see [Step 7](#) of this section. If the configured types and the installed types do not match, the autosampler will not operate correctly.

1. Slide the carousel cover to the left until it stops.

2. Rotate the carousel until the section that you want to load (red, green, or blue) is in front. Use one of the following methods:
 - On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), under **Tray Control**, click the **Tray To Front** button for the section.
 - Manually turn the carousel until the section is in front.
3. Install the sample tray in the carousel as follows:
 - a. Note the positioning pins on the carousel (see [Figure 3-5](#)) and the corresponding indentations on the bottom of the tray.
 - b. Align the sample tray's positioning brackets with the section color disk in the center of the carousel. Slide the tray into place and lower it over the positioning pins on the carousel. It will click in place.

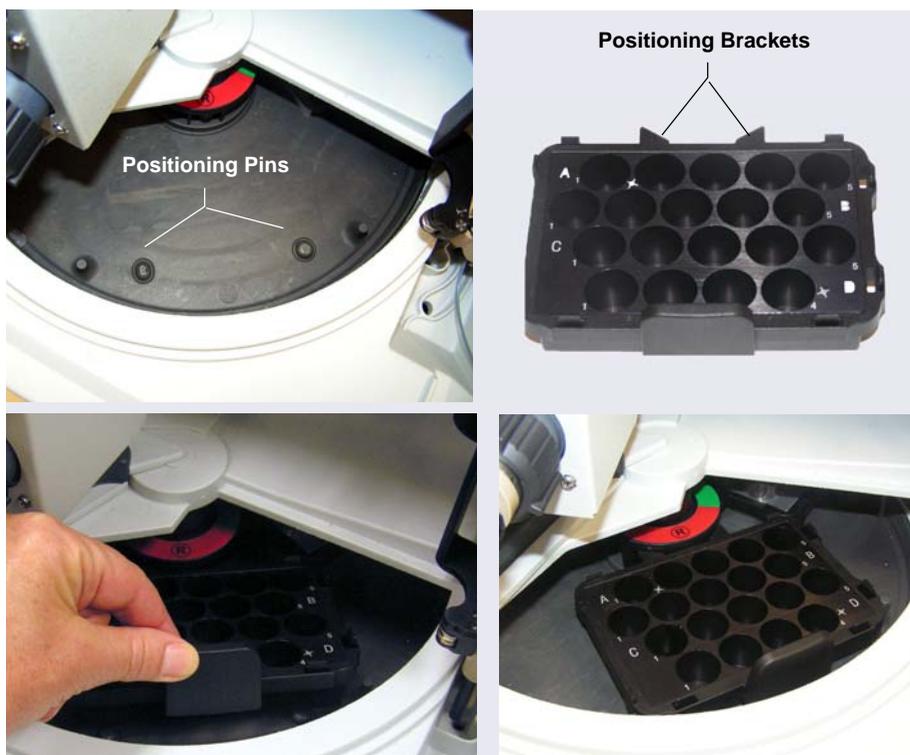


Figure 3-5. Installing a Sample Tray in the Carousel
(10 mL Vial Tray Shown)

4. If you have not done so already, load the vials into the tray.
5. If you are going to use an 8-position vial holder, install it in the carousel and load the vials into it (for instructions, see [Section 3.3.7](#)).
6. Close the carousel cover by sliding it to the right until the cover is captured by the magnet on the needle arm.
7. On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), under **Tray Control**, verify that the tray type specified for each color section matches the tray type installed in the corresponding color section of the carousel (see [Figure 3-6](#)).

IMPORTANT

For correct operation, the configured tray types and the installed tray types must match.

If the tray types shown on the panel do not match the types installed in the carousel, change the tray type settings in the Chromeleon configuration (see [Section B.11.3](#)).

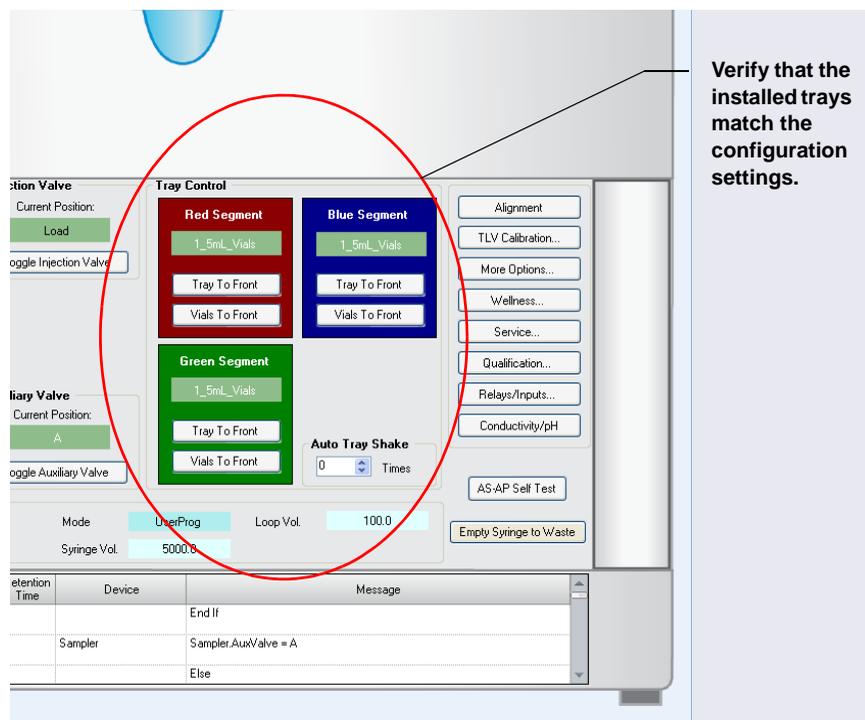


Figure 3-6. Tray Type Configuration Shown on a Chromeleon 7 ePanel

3.3.7 Loading the 8-Position Vial Holders

The carousel includes three wedge-shaped, 10 mL vial holders with a capacity of eight vials each.

Before sampling from vials in these holders, set the **TransLiquidHeight** parameter in the Chromeleon 7 Command window or Chromeleon 6.8 Commands dialog box (press **F8** to open the window or dialog box). This parameter specifies the sample height for the vial holders. Sample height (also called needle height) is the distance (in mm) from the bottom of the vial to the tip of the needle. For details about sample height, see [Section 3.4.3](#).



CAUTION

To avoid personal injury, do not reach inside the autosampler during a running analysis.



MISE EN GARDE

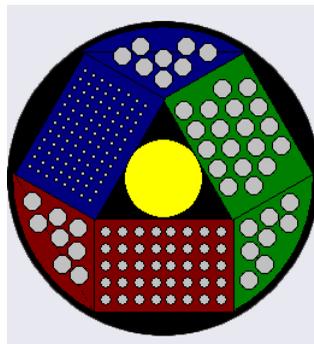
Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.



VORSICHT

Um Verletzungen zu vermeiden, greifen Sie bitte niemals während einer laufenden Analyse in den Probenraum.

1. Slide the carousel cover to the left until it stops.
2. Rotate the carousel until the vial holder section that you want to load (red, green, or blue) is in front. Use one of the following methods:
 - On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), under **Tray Control**, click the **Vials To Front** button for the section (red, green, or blue) in which the holder is installed.
 - Manually turn the carousel until the vial holder section is in front. The vial holder section is to the left of the vial tray position of the same color.



3. To install the vial holder in the carousel:
 - a. Note the positioning pins on the carousel (see [Figure 3-7](#)) and the corresponding holes in the holder.
 - b. Align the holder over the pins and lower it into place.

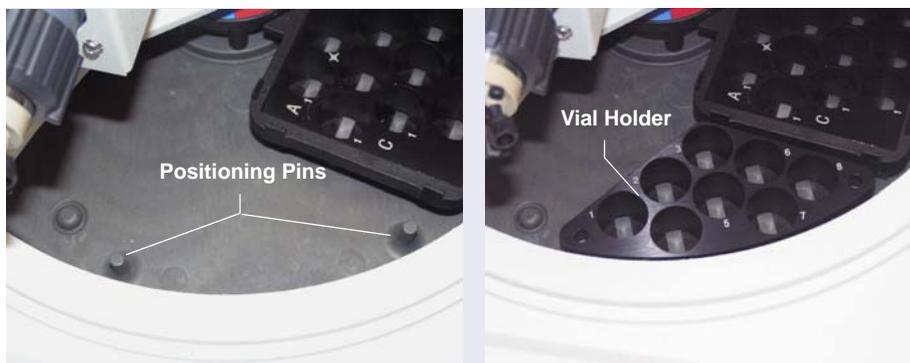


Figure 3-7. *Installing an 8-Position Vial Holder in the Carousel*

4. Load 10 mL vials into the holder.
5. Close the carousel cover by sliding it to the right until the cover is captured by the magnet on the needle arm.

3.3.8 Turning On the Sample Temperature Control Option

Before starting an analysis, turn on the temperature control option (if installed), enter the temperature set point, and allow the temperature to equilibrate. Use one of the following methods to turn on sample temperature control:

- Turn on the sample temperature control and set the temperature on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8). To use the temperature currently selected in the **Nominal Temp** box, select **On** in the **Temp. Control** box and press **Enter**. To select a different temperature set point, select a temperature in the **Nominal Temp** box and press **Enter**. Entering a new set point automatically turns on the temperature control mode.
- In an equilibration instrument method or program, enter commands to select the temperature and turn on the temperature control mode.

3.3.9 Equilibrating the System

Before starting an analysis, equilibrate the chromatography system (flush the system, turn on all temperature-controlled devices, monitor the pump pressure and detector signal, and so on). For details about the steps required to equilibrate a particular system, refer to the operator's manual for the system.

Select one of the following methods to perform equilibration:

- Select operating commands and parameters directly from the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8).
- Create and run an equilibration instrument method or program to automate the process.
- If available for your system, you can use the Chromeleon Smart Startup feature to automate system startup and equilibration. Smart Startup is supported for the Dionex AS-AP. To verify whether other devices in the system are supported, refer to the Chromeleon Help.

3.3.10 Running a Sequence of Injections

This section provides a brief description of the steps required to create and run a sequence of injections in Chromeleon. For detailed instructions, refer to the Chromeleon Help.

1. Create an *instrument method* (in Chromeleon 7) or *program* (in Chromeleon 6.8) that specifies the functions the autosampler (and other system devices) should perform at a specific time. Instrument methods or programs can be created automatically (with the help of a software wizard).

In the instrument method or program, specify operating commands and parameters for the Dionex AS-AP, including the injection mode (see [Section 3.4.1](#)), syringe speeds (see [Section 3.4.2](#)), sample height (see [Section 3.4.3](#)), inject wash mode, (see [Section 3.4.4](#)), and sample preparation operations (pipetting, mixing, diluting) (see [Section 3.4.6](#)).

2. Create a *sequence* (a list of injections). For each injection, specify the vial or well position (see [Section 3.4.7](#)), the injection volume (see [Section 3.4.9](#)), the instrument method or program to run, and other parameters. Sequences can be created automatically (with the help of a software wizard).

3. Load the sequence into a queue (in Chromeleon 7) or batch (in Chromeleon 6.8).
4. Start the queue or batch.

3.4 Selecting Operating Parameters

3.4.1 Selecting the Injection Mode

The injection mode specifies the method the Dionex AS-AP will use to load sample to the injection valve (or valves). For an overview of all of the injection modes the Dionex AS-AP can perform, refer to [Section 2.4](#).

Answers to the following questions will determine the injection mode to select for a particular injection:

- What type of plumbing configuration does the Dionex AS-AP have (push mode, pull mode, simultaneous injection, sequential injection)?
- Is a concentrator column installed on the injection valve (instead of a sample loop)?
- Is the Dionex AS-AP connected to an analytical system or to a capillary system?
- Is the available sample volume plentiful or limited?

You select the injection mode on the first sampler options page in the Instrument Method Wizard or Program Wizard (see [Figure 3-8](#)).

Instrument Method Wizard - Sampler (AS-AP: Sampler): Injection Mode

Injection Mode

Inject Mode:

	Actual	Recommended	
Flush Volume:	<input type="text"/>	<input type="text" value="N/A"/>	
Flush Volume 2:	<input type="text"/>	<input type="text" value="N/A"/>	
Loop Overfill:	<input type="text" value="5.000"/>	<input type="text" value="5.000"/>	[1.000...10.000]
Capillary Overfill:	<input type="text" value="50.000"/>	<input type="text" value="N/A"/>	[20.000...200.000]
Partial Out Volume:	<input type="text" value="10.0"/>	<input type="text" value="N/A"/>	[2.0...100.0 µl]

Accept recommended values

Diverter Valve Position

Position 1

Position 2

Cycle Time: [0...999 min]

Sample Prep Overlap

Temperature Control

Temperature: [4.0...60.0 °C]

Deviation: [None...10.0 °C]

Wait for Temperature

Reagent Flush

Source Vial:

Source Volume: [1.0...10000.0 µl]

< Back Next > Cancel Help

Figure 3-8. Dionex AS-AP Sampler Options (First Page): Injection Mode (Chromeleon 7 Instrument Method Wizard Shown)

When you select an injection mode, the operating parameters required for the mode are enabled. For details about selecting injection mode parameters, click **Help** on the page.

The injection mode selected in the Chromeleon configuration determines the modes available in the wizard (see [Table 3-1](#)). For configuration instructions, see [Section B.11.3](#).

Selected Configuration Injection Mode	Injection Modes Available in the Instrument Method or Program
Pull	PullFull, PullPartial
Push	PushFull, PushPartial, PushPartial_Is, PushConcentrate, PushCap
Push Simultaneous	PushSimultaneous
Push Sequential	PushSeqFull, PushSeqPartial, PushSeqPartial_Is, PushSeqConcentrate, PushSeqCap

Table 3-1. Injection Modes per Mode Selected in the Configuration

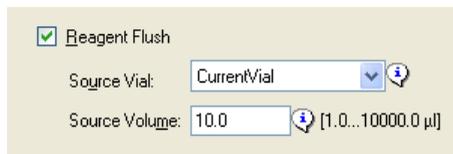
Options for Reagent Flushing in Concentrate Mode Injections

The Dionex AS-AP provides the following options for configuring a reagent flush operation in concentrate mode injections.

- Option 1 (the most typical)—the sample is loaded onto the concentrator column, the reagent flush is performed, and then the sample is injected.
- Option 2—the reagent flush is performed first, and then the sample is loaded onto the concentrator column and injected.

To set up option #1 (perform reagent flush after sample loading):

1. In the Instrument Method Wizard or Program Wizard, on the first sampler options page (see [Figure 3-8](#)), select the **PushConcentrate** or **PushSeqConcentrate** injection mode.
2. Select the **Reagent Flush** check box, and specify the **Source Vial** (the reservoir from which to pick up the reagent) and **Source Volume** (the volume (µL) of reagent to be flushed through the concentrator column).



NOTE If the total of the sample injection volume and reagent flush volumes is less 80% of the buffer line size, the autosampler delivers the injection and reagent flush volumes to the injection port in one operation, before the needle moves to the injection port. If the injection and reagent flush volumes exceed 80% of the buffer line size, the volumes are delivered in separate operations.

To set up option #2 (perform reagent flush before sample loading):

1. In the Instrument Method Wizard or Program Wizard, on the first sampler options page (see [Figure 3-8](#)), select the **PushConcentrate** or **PushSeqConcentrate** injection mode.
2. On the third sampler options page (see [Figure 3-11](#)), insert a **Reagent Flush** operation and specify the **Source Vial** (the reservoir from which to pick up the reagent) and **Source Volume** (the volume (μL) of reagent to be flushed through the concentrator column).

3.4.2 Specifying Syringe Speeds

In the Instrument Method Wizard or Program Wizard, the second sampler options page (see [Figure 3-9](#)) provides options for controlling the speed of the syringe for various operations (drawing, dispensing, washing, etc.). Chromeleon lists recommended speeds based on the selected injection mode, syringe size, and loop size. In most cases, you can click **Accept**

recommended values. For a description of each option, click the **Help** button on the page.

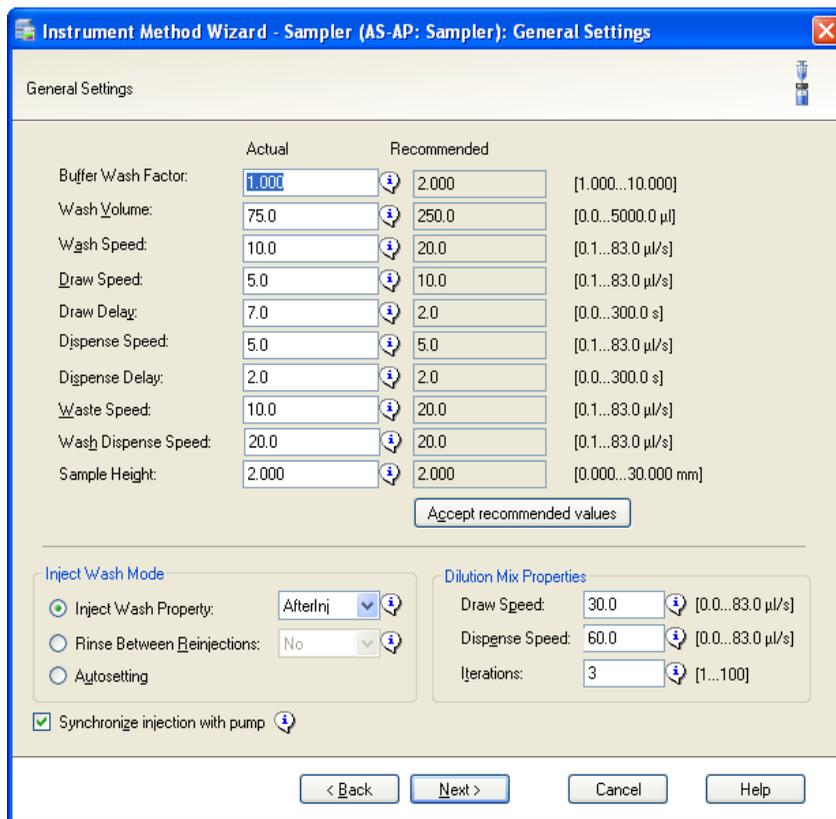


Figure 3-9. Dionex AS-AP Sampler Options (Second Page): General Settings (Chromeleon 7 Instrument Wizard Shown)

NOTE For injections that are run after a viscous sample, select a larger **Buffer Wash Factor** (1.5 to 3.0) to ensure the previous viscous sample is completely washed out of the buffer line.

3.4.3 Specifying Sample (Needle) Heights

The **Sample Height** parameter on the second sampler options page of the Instrument Method or Program Wizard (see [Figure 3-9](#)) specifies the distance (in mm) from the bottom of the sample container (vial, well plate, or deep well plate) and the tip of the needle (see [Figure 3-10](#)). This distance is also referred to as the needle height.

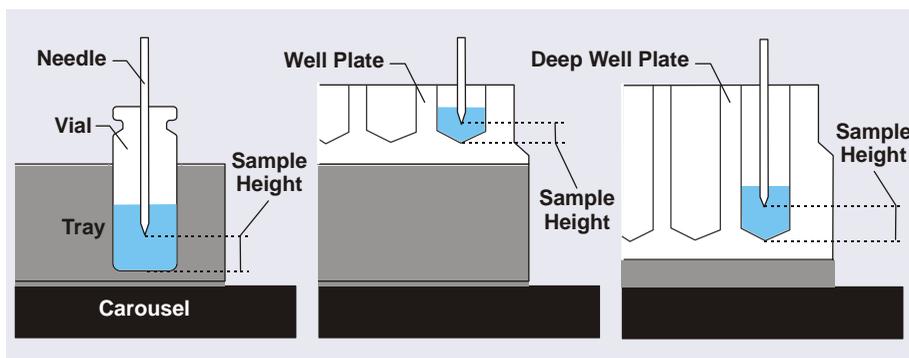


Figure 3-10. Determining the Sample Height Parameter
(Distance from the Bottom of the Vial or Well to the Needle Tip)

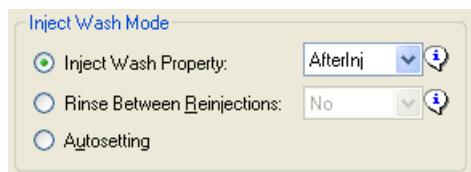
Sample Height Notes:

- For most analyses, set the **Sample Height** to 2.0 mm.
- Do not set the **Sample Height** parameter to 0. When the parameter is set to 0, the needle touches the bottom of the container. The tip of the needle is fragile and may be easily damaged.
- If you want to sample only once from a container, select a **Sample Height** that lowers the needle into the container only as far as required, thus, minimizing sample carryover.
- If you want to sample several times from the same container, select a **Sample Height** that lowers the needle as far as possible into the container (but without touching the container bottom). This lets you withdraw the maximum possible volume from the container.
- The **Sample Height** parameter does not apply to the vials in the 8-position vial holder. Instead, use the **TransLiquidHeight** parameter to set the height for these vials. The parameter is available in the Chromeleon 7

Command window or Chromeleon 6.8 Commands dialog box (press **F8** to open the window or dialog box).

3.4.4 Selecting the Inject Wash Mode

To determine when the autosampler performs a wash cycle, select an **Inject Wash Mode** on the second sampler options page of the Instrument Method or Program Wizard (see [Figure 3-9](#)).



General Recommendations

- For push mode injections, select **Inject Wash Property** and select either **BeforeInj**, **AfterInj**, or **Both** (before and after injection). **AfterInj** provides the fastest cycle times between injections. **Both** is recommended if you are performing trace analyses.
- For pull mode injections, select **Rinse Between Reinjections** and select the **No** option.

Inject Wash Mode Details

Inject Wash Property: Select this mode to specify when the autosampler will perform a wash cycle. Automatic washes will not be performed. This mode adds an **InjectWash** command with the selected parameter (described below) to the Chromeleon 7 instrument method or Chromeleon 6.8 program.

- **NoWash:** The autosampler does not perform a wash cycle (either before or after the injection). This option is recommended only if you are taking sample injections from a single vial or well.
- **BeforeInj:** The autosampler performs a wash cycle before drawing sample into the needle for the injection. This option helps to reduce any contamination of the needle that may occur between injections. However, with this option, the cycle time between injections is longer than if the wash cycle is performed after the injection.
- **AfterInj:** The autosampler performs a wash cycle after the injection (while the current analysis is running). This decreases the cycle time between injections.

- **Both:** The autosampler performs a wash cycle before the injection and then again after the injection is completed. This option reduces contamination and is recommended if you are performing trace analyses. This is the slowest option. For additional steps for reducing contamination, refer to [Appendix E](#).

Rinse Between Rejections: Select this option to specify whether to perform a wash cycle between consecutive injections from the same vial or well.

- **Yes:** The autosampler performs a wash cycle after each injection (even if the next injection is from the same vial or well).
- **No:** The autosampler does *not* perform a wash cycle after the current injection if the next injection will be taken from the same vial or well. If the next injection will be from a *different* vial or well, a wash cycle is performed after the current injection and again after the last injection in the sequence. This option is recommended for pull mode injections.

In addition, when the **Rinse Between Rejections** mode is selected (with either the **Yes** or **No** option), Chromeleon determines whether the autosampler automatically performs a wash *before* the current injection, based on factors such as the contamination level of the loop, whether the current injection is from the same vial as the one before, and the position of the sample in the sequence.

Autosetting: Select this mode to have Chromeleon always determine when a wash cycle is performed. An **InjectWash** command is not added to the Chromeleon 7 instrument method or Chromeleon 6.8 program.

Chromeleon determines whether to perform a wash cycle *before* the current injection, based on factors such as the contamination level of the loop, whether the current injection is from the same vial as the one before, and the position of the sample in the sequence.

If the next injection will be from a different vial or well, the autosampler performs a wash cycle *after* the current injection.

3.4.5 Determining Sample Volumes Used for Each Injection Mode

PushFull Injection Mode

A portion of sample is first flushed through the sample transfer line. The Dionex AS-AP draws a volume of sample from the sample vial or well plate well. A portion of the sample is then flushed through the loop, the loop is filled, and an additional portion remains before the loop. The sample in the loop is injected onto the column. For details about the injection sequence for push mode, see [Section 2.4.2](#).

The volume of sample drawn for a **PushFull** injection is:

$$\text{LoopVolume} \times \text{LoopOverfill} + 30 \mu\text{L}$$

Where:

- *LoopVolume* is the size of the loop installed on the injection valve. Enter the loop volume on the **Options** page in the Chromeleon configuration (see [page 208](#)).
- *LoopOverfill* is a volume of sample to push through the loop before injection. The default factor is 5, which means that the loop is flushed four times and then filled. Enter the loop overfill factor in the instrument method or program (see [Figure 3-8](#)).
- 30 μL is the volume of sample initially flushed through the sample transfer line, plus the volume remaining before the loop.

Example:

- Loop volume = 10 μL
- Loop overfill factor = 5.000

$$10 \mu\text{L} \times 5.000 + 30 \mu\text{L} = 80 \mu\text{L}$$

PushPartial Injection Mode

The Dionex AS-AP draws a volume of sample from the sample vial or well plate well. A portion of the sample is first flushed through the sample transfer line. The sample to be injected is then loaded into the loop. An additional portion of sample remains before the loop. The sample in the loop is then injected onto the column. The injection volume entered in the sequence determines the volume injected. You do not need to install a different sample loop to change the injection volume.

The amount of sample required for a **PushPartial** injection is:

$$\textit{InjectionVolume} + (2 \times \textit{PartialCutVolume})$$

Where:

- *InjectionVolume* must be less than one-half of the sample loop volume. Enter the injection volume in the sequence (see [Section 3.4.9](#)).
- *PartialCutVolume* is the volume of sample to be “cut” (or omitted) from each side of the sample during the injection process. The middle portion of the sample is positioned in the loop and injected. Enter the partial cut volume in the instrument method or program (see [Figure 3-8](#)). Using a smaller partial cut volume minimizes the amount of total sample drawn from the vial or well. However, better precision is achieved with a larger partial cut volume.

Example:

- Injection volume = 4 μL (the sample loop volume is 10 μL)
- Partial cut volume = 5

$$4 \mu\text{L} + (2 \times 5 \mu\text{L}) = 14 \mu\text{L}$$

PushPartial_Is (limited-sample) Injection Mode

A partial loop is injected onto the column and no extra sample is taken from the vial or well. The injection volume entered in the sequence determines the volume injected. You do not need to install a different sample loop to change the injection volume.

The amount of sample required for a **PushPartial_Is** injection is:

$$\textit{InjectionVolume}$$

Where:

InjectionVolume is less than one-half of the sample loop volume. Enter the injection volume in the sequence (see [Section 3.4.9](#)).

PushConcentrate Injection Mode

The Dionex AS-AP draws the volume to be injected from the sample vial and delivers it to a concentrator column.

The amount of sample required for a **PushConcentrate** injection is:

InjectionVolume

Where:

InjectionVolume is entered in the sequence (see [Section 3.4.9](#)).

PushCap Injection Mode

A full loop is injected onto the column in a capillary system. The injection sequence is the same as for the **PushFull** injection mode.

The amount of sample required for a **PushCap** injection is:

$$\text{LoopVolume} \times \text{CapillaryOverfill} + 10 \mu\text{L}$$

Where:

- *LoopVolume* is the size of the loop in the injection valve. Enter the loop volume on the **Options** page in the Chromeleon configuration (see [page 208](#)). In a capillary system, the injection valve has a fixed internal loop volume of 0.4 μL .
- Enter the *CapillaryOverfill* volume in the instrument method or program (see [Figure 3-8](#)).
- 10 μL is the volume of sample initially flushed through the sample transfer line, plus the volume remaining before the loop.

Example:

- Loop volume = 0.4 μL
- Loop overfill factor = 50.000

$$0.4 \mu\text{L} \times 50.000 + 10 \mu\text{L} = 30 \mu\text{L}$$

PushSequential Injection Modes

When configured for push sequential mode, the Dionex AS-AP delivers sample to two separate chromatography systems. Each system is operated independently and can have different samples and sample volumes injected. All of the injection modes available for push mode (full, partial, partial limited-sample, concentrate, and capillary) are also available for push sequential mode. Refer to the previous sections for details.

NOTE When performing partial injections in push sequential mode, a larger partial cut volume is recommended. This will help to achieve comparable precision to that of partial injections in push (non-sequential) mode.

PushSimultaneous Injection Mode

The Dionex AS-AP draws the injection volume specified in the sequence from the sample vial and delivers equal volumes of sample to the injection valves in two systems. A full loop is injected onto the column in both systems simultaneously. The flow through both systems must be the same. For details about balancing the flow to the two systems, see [page 191](#).

Use the following formula to calculate the amount of sample needed for a **PushSimultaneous** injection and then enter this volume for the injection volume in the sequence:

$$\text{Connector Tubing Volume} + ((\text{Loop Volume \#1} + \text{Loop Volume \#2}) \times 5) + 50 \mu\text{L}$$

Where:

- *Connector Tubing Volume* is the volume of the tubing from the injection port to each injection valve. This includes the tubing from the injection port to the Y-connector and then to each system. Use the following formula to estimate the connector tubing volume:

(line length from injection port to Y-connector in mm + line length to injection valve #1 in mm + line length to injection valve #2 in mm) x ((Tubing ID in mm /2)²) x 3.14159
- *Loop Volume #1* and *Loop Volume #2* are the sizes of the loops installed on each injection valve. Enter the loop volumes on the **Options** page in the Chromeleon configuration (see [page 208](#)).
- 50 μL is the volume of sample initially flushed through the sample transfer line, plus the volume remaining before the loop.

Example:

- Tubing volume from injection port to Y-connector: 250 mm of 0.33 mm (0.013 in) ID PEEK tubing = 21 μL
- Tubing from Y-connector to injection valve for both systems: 762 mm of 0.33 mm (0.013 in) ID PEEK tubing x 2 = 66 μL x 2 = 131 μL

NOTE To estimate the volume of 0.33 mm (0.013 in) ID PEEK tubing (blue), you can use a conversion factor of 0.86 $\mu\text{L}/\text{cm}$ (2.2 $\mu\text{L}/\text{in}$).

- Loop volume #1 = 10 μL
- Loop volume #2 = 25 μL

$$152 \mu\text{L} + ((10 \mu\text{L} + 25 \mu\text{L}) \times 5) + 50 \mu\text{L} = 377 \mu\text{L}$$

In this example, the Dionex AS-AP draws 377 μL from the vial and delivers it approximately equally to the two sample loops, depending on the backpressure of the two systems.

PullFull Injection Mode

A full loop is injected onto the column. Pull mode generally requires more sample than push mode, but is faster than push mode. The amount of sample required for a **PullFull** injection is:

$$\text{FlushVolume} + (\text{LoopVolume} \times \text{LoopOverfill})$$

Where:

- *FlushVolume* is the volume of sample to flush through the needle and sample transfer line tubing. The recommended volume is $2 \times (\text{Needle Volume} + \text{Sample Transfer Line Volume})$. Enter the flush volume in the instrument method or program (see [Figure 3-8](#)).
- *LoopVolume* is the size of the loop installed on the injection valve. Enter the loop volume on the **Options** page in the Chromeleon configuration (see [page 208](#)).
- *LoopOverfill* is a volume of sample to pull through the loop before injection. The default factor is 5, which means that the loop is flushed four times and then filled. Enter the loop overfill factor in the instrument method or program (see [Figure 3-8](#)).

Example:

- Needle volume = 30 μL
- Sample transfer line volume = 22 μL (254 mm of 0.33 mm (0.013 in) ID PEEK tubing)

NOTE To estimate the volume of 0.33 mm (0.013 in) ID blue PEEK tubing, use a conversion factor of 0.86 $\mu\text{L}/\text{cm}$ (2.2 $\mu\text{L}/\text{in}$).

- Loop volume = 10 μL
- Loop overfill factor = 5

$$(2 \times (30 \mu\text{L} + 22 \mu\text{L})) + (10 \mu\text{L} \times 5) = 154 \mu\text{L}$$

For additional **PullFull** injections from the same sample container, the amount of sample required is:

$$\text{Flush Volume 2} + \text{Loop Volume} \times \text{Loop Overfill}$$

Flush Volume 2 can be less than the flush volume for the first injection (assuming no wash cycle between injections). A volume equal to or greater than the needle volume is recommended (for example, 30 to 40 μL). Enter *Flush Volume 2* in the instrument method or program (see [Figure 3-8](#)).

PullPartial Injection Mode

A partial loop is injected. The injection volume specified in the sequence determines the volume injected. You do not need to install a different sample loop to change the injection volume. The amount of sample required for a **PullPartial** injection is:

$$\text{Flush Volume} + \text{Injection Volume}$$

Where:

- *Flush Volume* is the volume of sample to flush through the needle and sample transfer line tubing. The recommended volume is $2 \times (\text{Needle Volume} + \text{Sample Transfer Line Volume})$. Enter the flush volume in the instrument method or program (see [Figure 3-8](#)).
- *InjectionVolume* is entered in the sequence (see [Section 3.4.9](#)).

3.4.6 Defining Sample Preparation Operations

In the Instrument Method Wizard or Program Wizard, the third sampler options page (see [Figure 3-11](#)) provides commands and parameters for preparing samples before injection. When multiple sample preparation steps are required (for example, pipetting into a vial and then mixing the vial contents), list the operations in the order in which they should be performed.

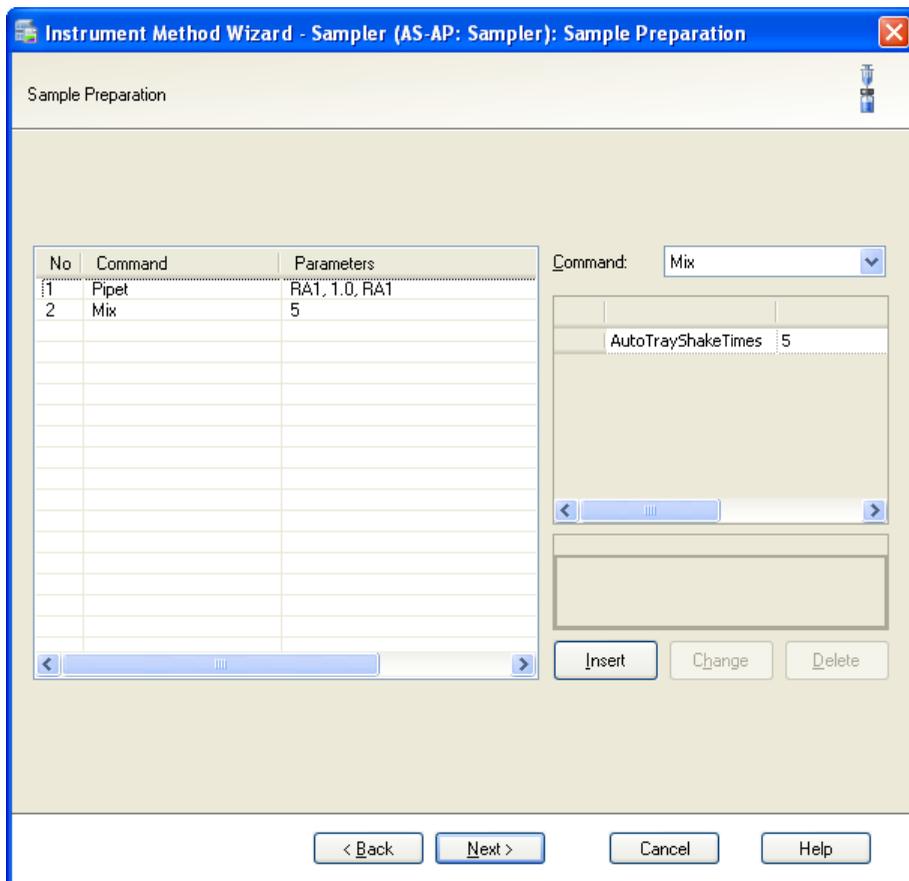


Figure 3-11. Dionex AS-AP Sampler Options (Third Page): Sample Preparation (Chromeleon 7 Instrument Method Wizard Shown)

[Table 3-2](#) describes the available sample preparation operations.

Sample Preparation Operation	Description and Parameters
Dilute	<p>Move a volume of diluent from a vial to a destination vial and then move a volume of sample (or other concentrate) to the destination vial. The total volume of sample and diluent should be 1000 μL, if possible.</p> <p>SourceVial: The vial from which to pick up the sample. SourceVol: The volume (μL) of sample to be pipetted. DestVial: The vial in which to add the sample and diluent. Diluent: The vial that contains the diluent. ReagentVolume: The volume (μL) of diluent to use.</p> <p>After moving the diluent and sample to the destination vial, the autosampler mixes the contents. The DilutionMixMode determines the type of mixing performed after a dilution. With the recommended default setting of Auto, a draw-and-dispense operation is used to mix 0.3 mL and 1.5 mL vials and a carousel shake operation is used to mix 10 mL vials. For details, see Section 3.4.7.</p>
DiluteWithWash	<p>Dispense a volume of wash liquid to a destination vial and then move a volume of sample (or other concentrate) to the destination vial. The total volume of sample and diluent should be 1000 μL, if possible.</p> <p>SourceVial: The vial from which to pick up the sample. SourceVol: The volume (μL) of sample to be pipetted. DestVial: The vial in which to add the sample and wash liquid. ReagentVolume: The volume (μL) of wash liquid to use.</p> <p>After moving the wash liquid and sample to the destination vial, the autosampler mixes the contents. The DilutionMixMode determines the type of mixing performed after a dilution. With the recommended default setting of Auto, a draw-and-dispense operation is used to mix 0.3 mL and 1.5 mL vials and a carousel shake operation is used to mix 10 mL vials. For details, see Section 3.4.7.</p>

Table 3-2. Sample Preparation Operations

Sample Preparation Operation	Description and Parameters
Mix	<p>Mix the contents of a vial by shaking the carousel.</p> <p>AutoTrayShakeTimes: The number of times to shake the carousel.</p> <p>NOTE Use Mix when using 10 mL vials.</p>
Mix_DrawDispense	<p>Mix the contents of a vial by repeatedly drawing and dispensing a volume of the contents.</p> <p>SourceVial: The vial to be mixed.</p> <p>Volume: The volume (μL) of the vial contents to draw and dispense. The Mix_DrawDispense volume must be the lesser of these two values: 70% of the volume in the vial or 70% of the buffer line volume.</p> <p>NOTE</p> <ul style="list-style-type: none"> • Use Mix_DrawDispense when using 0.3 mL and 1.5 mL vials. • Properties for specifying the number of mixing iterations, the speed of the syringe, and the needle height during drawing and dispensing are available. For details, see Section 3.4.7.
Pipet	<p>Move a volume of fluid from one vial to another.</p> <p>SourceVial: The vial from which to pick up the fluid.</p> <p>SourceVol: The volume (μL) of fluid to be pipetted.</p> <p>DestVial: The vial in which to add the fluid.</p>
ReagentFlush	<p>Transfer a volume of reagent from a vial to the injection port. This operation is typically used to flush reagent onto a concentrator column.</p> <p>SourceVial: The reservoir from which to pick up reagent.</p> <p>SourceVol: The volume (μL) of reagent to be pipetted.</p> <p>Note: The ReagentFlush command is performed before sample is drawn and delivered for the injection procedure. For details, see “Options for Reagent Flushing in Concentrate Mode Injections” on page 64.</p>

Table 3-2. Sample Preparation Operations

3.4.7 Selecting Mixing Properties

The autosampler automatically mixes vials after performing a **Dilute** or **DiluteWithWash** sample preparation operation. You can also add a separate mix operation to the sample preparation steps. For details about the sample preparation operations, see [Section 3.4.6](#).

Two mixing methods are available. The autosampler can:

- Mix vials by shaking the carousel.
- Mix a vial by drawing and dispensing a volume of the vial contents.

After a dilution, the **DilutionMixMode** (described below) determines the method used. When you add a separate mix operation, you can select either **Mix** (to mix by shaking the carousel) or **Mix_DrawDispense**.

Mixing Mode for Dilutions

The **DilutionMixMode** determines the type of mixing performed after a dilution. With the recommended default setting of **Auto**, the autosampler selects the type of mixing, based on the vial size:

- For 10 mL vials, the autosampler mixes by shaking the carousel.
- For 0.3 mL and 1.5 mL vials, the autosampler mixes by drawing and dispensing.

To change the mode, open the autosampler ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and press **F8**. Under **Sampler**, select a **DilutionMixMode**.

NOTE If the **DilutionMixMode** property is not visible in Chromeleon, right-click in the list of devices and select **Expert**.

Properties for Draw-and-Dispense Dilution Mixing

The properties used for controlling mixing by drawing and dispensing are listed below. Values selected for these properties are used for all draw-and-dispense mixing. This includes mixing after dilution operations and the **Mix_DrawDispense** operation specified in the sample preparation steps.

- **DilutionMixSpeed** is the speed at which the sample is drawn into the needle when using the draw-and-dispense mixing method. The speed

should not be set so fast that cavitation occurs. 30 $\mu\text{L/s}$ is a good maximum value.

- **DilutionMixDispenseSpeed** is the speed at which the sample is dispensed into the needle when using the draw-and-dispense mixing method. The dispense can be set faster than the draw speed to increase mixing. 60 $\mu\text{L/s}$ is a good starting value.
- **DilutionMixDrawHeight** is the distance from the bottom of the sample container to the needle tip when drawing using the draw-and-dispense mixing method. The height should be set so that the needle remains submerged at all times during the draw operation. 2 mm is a good starting value.
- **DilutionMixDispenseHeight** is the distance from the bottom of the sample container to the needle tip when dispensing using the draw-and-dispense mixing method. The height should be set so that the needle is submerged at the end of the dispense operation. This prevents leaving a drop on the end of the needle, which can lead to inaccurate results. For a 1000 μL total volume in a 1.5 mL vial, 12 mm is a good starting value.
- **Iterations** is the number of times the draw-and-dispense operation is repeated.

You can select the syringe speeds and the iterations in the Instrument Method or Program Wizard on the Sampler Options (General Settings) page (see [Figure 3-9](#)).

Dilution Mix Properties		
Draw Speed:	<input type="text" value="30.0"/>	[0.0...83.0 $\mu\text{L/s}$]
Dispense Speed:	<input type="text" value="60.0"/>	[0.0...83.0 $\mu\text{L/s}$]
Iterations:	<input type="text" value="3"/>	[1...100]

To select the **DilutionMixDrawHeight** and **DilutionMixDispenseHeight**, manually enter the properties in the Chromeleon 7 Instrument Method Editor or the Chromeleon 6.8 Program Editor, or enter values for these properties in the Chromeleon 7 Commands window or the Chromeleon 6.8 Command dialog box.

3.4.8 Specifying Vial Positions

Follow the guidelines below to specify a vial or well position in a sequence, direct control command, or sample preparation operation.

Specifying Vial or Well Positions in a Vial Tray or Well Plate Tray

Positions in a vial tray or well plate consist of a three-character identifier code (for example, **RC5**):

- The first character indicates the carousel color section in which the tray is installed (R for red, G for green, or B for blue).
- The second character indicates the row in which the vial or well is located (A, B, C, etc.). Rows are lettered starting with A in the upper left corner and continuing down.
- The third character indicates the column in which the vial or well is located (1, 2, 3, etc.). Columns are numbered starting with 1 in the upper left corner and continuing across.

For example, to sample from the tray installed in the red section, and from the vial in the third row down from the top and the fifth column across, specify **RC5** (see [Figure 3-12](#)).

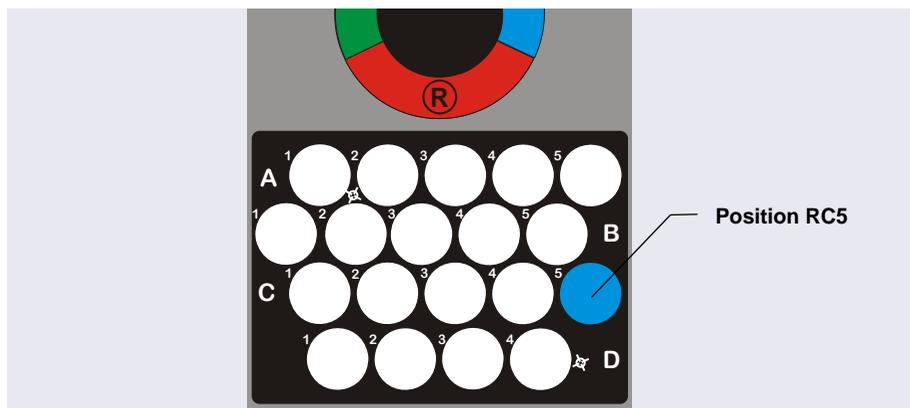


Figure 3-12. Sample Position Example
(10 mL Vial Tray Installed in the Red Section)

Specifying Vial Positions in an 8-Position Vial Holder

Vial positions in an 8-position vial holder consist of a two-character identifier code (for example, **R3**). The first character indicates the carousel color section in which the holder is installed (R, G, or B). The second character is the numbered position in which the vial is installed. The color section of the 8-position vial holder is the color section of the tray on its right (see [Figure 3-13](#)).

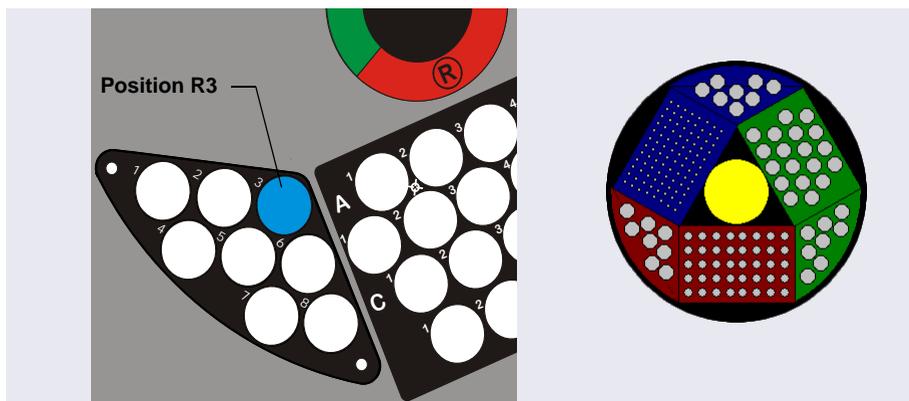


Figure 3-13. *Sample Position Example
(8-Position Vial Holder Installed in the Red Section)*

Specifying Vial Positions in Sample Preparation Operations

When you specify a vial position in a sample preparation operation (for example, the source vial for a pipet operation), you can enter a fixed position in a sample tray or 8-position vial holder as described in the previous sections. You can also enter a position relative to the current vial (for example, **CurrentVial + 1**).

For example, to pipet from the current vial into the next vial in the tray, specify **CurrentVial** for the source vial and **CurrentVial + 1** for the destination vial.

3.4.9 Specifying Injection Volumes

Specify the volume of sample to inject in the Chromeleon sequence (see [Figure 3-14](#) and [Figure 3-15](#)).

- For full-loop injections, specify the volume of the loop installed on the injection valve.
- For partial-loop and concentrate injections, specify the volume of sample to be injected onto the column or loaded to the concentrator column.

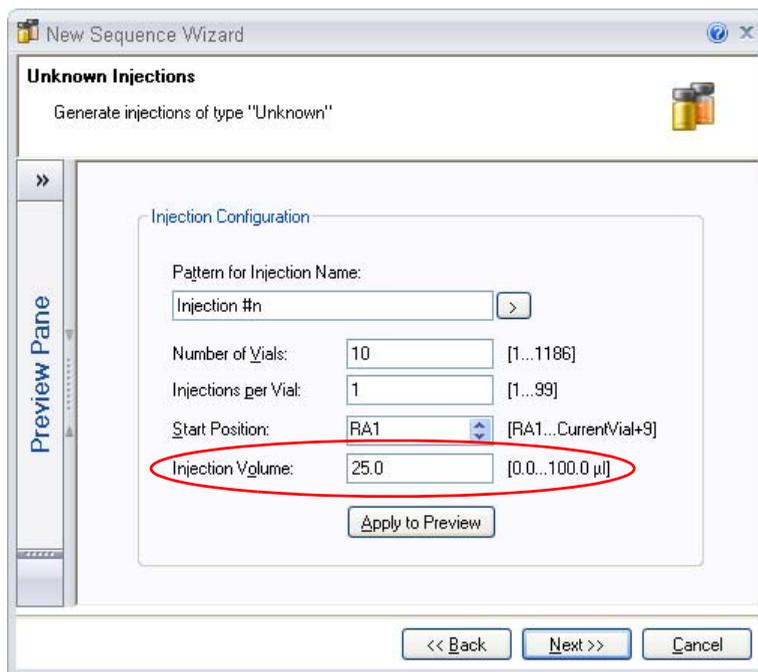


Figure 3-14. Specifying the Injection Volume in the Sequence Wizard (Chromeleon 7 Version Shown)

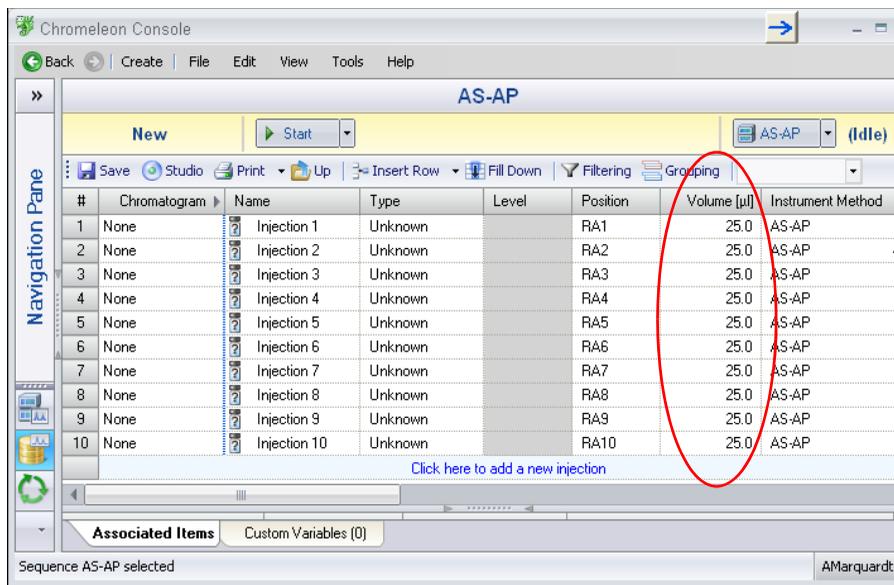


Figure 3-15. Injection Volume in the Chromeleon Sequence (Chromeleon 7 Version Shown)

3.4.10 Determining Maximum Injection and Reagent Flush Volumes

Table 3-3 shows the formulas used to calculate the maximum injection and reagent flush volumes for each injection mode and reagent flush operation.

Injection Mode or Reagent Flush Operation	Maximum Injection Volume or Reagent Flush Volume (in µL)
PullFull	Injection Volume $\leq ((0.883 * \text{Buffer Size}) - \text{Flush Volume}) / \text{LoopOverflow}$
PullPartial	Injection Volume $\leq (0.883 * \text{Buffer Size}) - \text{FlushVolume}$
PushFull PushSeqFull	Injection Volume $\leq ((0.883 * \text{Buffer Size}) - 30) / \text{LoopOverflow}$
PushPartial PushSeqPartial	Injection Volume $\leq (0.883 * \text{Buffer Size}) - (2 * \text{PartialCutVolume})$

Table 3-3. Maximum Injection and Reagent Flush Volumes

Injection Mode or Reagent Flush Operation	Maximum Injection Volume or Reagent Flush Volume (in μL)
PushPartial_Is PushSeqPartial_Is PushSimultaneous PushConc (no Reagent Flush) PushSeqConc (no Reagent Flush)	Injection Volume $\leq 0.883 * \text{Buffer Size}$
PushCap PushSeqCap	Normally fixed at 0.4 μL Injection Volume $\leq ((0.883 * \text{Buffer Size}) - 10) / \text{CapillaryOverfill}$
PushConc with Reagent Flush PushSeqConc with Reagent Flush When (Injection Volume + Reagent Volume) $< 0.8 * \text{Buffer Size}^{\text{a}}$	(Injection Volume + Reagent Volume) $\leq (0.8 * \text{Buffer Size})$
PushConc with Reagent Flush PushSeqConc with Reagent Flush When (Injection Volume + Reagent Volume) $> 0.8 * \text{Buffer Size}^{\text{b}}$	Injection Volume $\leq 0.883 * \text{Buffer Size}$ Reagent Volume $\leq 0.883 * \text{Buffer Size}$
SpReagentVolume property ^c	SpReagentVolume $\leq 0.883 * \text{Buffer Size}$

Table 3-3. Maximum Injection and Reagent Flush Volumes (Continued)

- a. When the injection volume plus the reagent volume is less than 80% of the buffer size, the autosampler performs a single syringe draw operation to load the two volumes in the buffer line.
- b. When the injection volume plus the reagent volume is greater than 80% of the buffer size, the autosampler first loads the injection volume and performs the injection. After injection, the reagent volume is loaded with separate syringe operations.
- c. The SpReagentVolume property is selected on the third sampler options page in the Instrument Method Wizard or Program Wizard (see [Figure 3-11](#)).

3.5 Syringe Speed and Tubing Size Guidelines

The Dionex AS-AP is capable of delivering sample at a **maximum pressure of 690 kPa (100 psi)**. Several factors affect the backpressure, including the syringe speed, the tubing ID and length of the sample loop, and the ID and length of the tubing used to connect the injection port and the injection valve.

Use the following formula to determine the backpressure produced by these factors:

$$\text{backpressure} = \text{cm of tubing} \times \text{kPa (psi)/mL/min/cm (from Table 3-4)} \times \text{mL/min (from Table 3-5)}$$

Example: 30 cm of 0.254 mm ID tubing x 1.6 kPa/mL/min/cm x 2.40 $\mu\text{L/s}$ = 115 kPa

Tube ID	Backpressure in kPa (psi) per mL/min per cm of tubing	Volume in μL per cm of tubing
0.127 mm (0.005 in)	25 kPa (3.6 psi)	0.13
0.178 mm (0.007 in)	6.5 kPa (0.94 psi)	0.25
0.254 mm (0.010 in)	1.6 kPa (0.23 psi)	0.51
0.330 mm (0.013 in)	0.55 kPa (0.079 psi)	0.86
0.508 mm (0.020 in)	0.10 kPa (0.014 psi)	2.03

Table 3-4. Tubing Volume and Backpressure

Syringe Size (μL)	Syringe Speed Range ($\mu\text{L/s}$)
100	0.1 to 33
250	0.1 to 83
1000	0.1 to 100
5000	0.1 to 100

Table 3-5. Flow Rates Provided by the Sample Syringe

3.6 System Shutdown

No special shutdown procedure is required for the Dionex AS-AP. To automatically shut down the system, you can run a shutdown instrument method or program at the end of a sequence. The shutdown instrument method or program turns off the pump flow, the suppressor current (if installed), the Dionex AS-AP sample temperature control option (if installed), and other system devices.

You can use the Smart Shutdown feature to assist you in creating and running a shutdown instrument method or program. Refer to the Chromeleon Help for details.

Before moving or shipping the autosampler, follow the steps below:

1. Press the **Standby** button on the front panel. This moves the needle arm and needle to the positions required for moving the module.
2. Turn off the main power switch on the rear panel and disconnect the power cable.
3. Disconnect the drain hose.
4. Remove the sample racks and 8-position vial holders from the carousel.
5. Disconnect the wash reservoir and remove it from the autosampler.
6. Disconnect any liquid lines connected to other modules in the system.
7. Locate the foam insert that was installed inside the autosampler when it was shipped from the factory and follow the instructions below to install it:
 - a. Open the carousel cover to the position shown in [Figure 3-16](#).



Figure 3-16. *Carousel Cover in Correct Position for Installing Foam Insert*

- b. Align the groove in the bottom of the insert with the carousel cover handle and align the right side of the insert with the left side of the needle.
- c. Push the insert into the Dionex AS-AP body (see [Figure 3-17](#)).

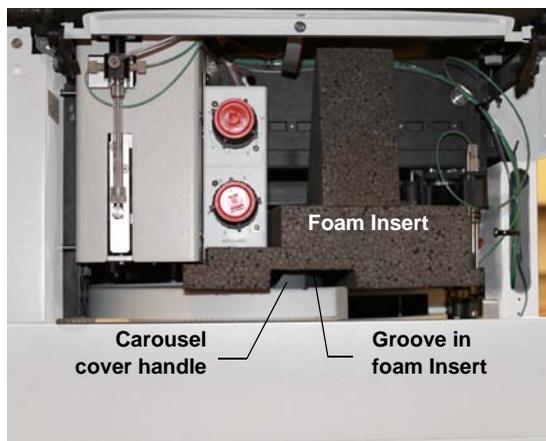


Figure 3-17. *Foam Insert Installed for Moving or Shipping the Dionex AS-AP*

8. If you are going to ship the autosampler, install the J-clip on the vial pusher (see [Section 5.3.1](#)), and repack the autosampler in its original shipping container, using the foam pads and polyethylene bag. For details, refer to the unpacking instructions in [Section B.2](#).

3.7 Routine Maintenance

This section describes routine maintenance procedures that the user can perform. Any other maintenance procedures must be performed by Thermo Fisher Scientific personnel.

3.7.1 Daily

- Check for air bubbles in the syringe and remove them if they appear (see [Section 3.3.3](#)).
- Check the volume of liquid in the wash liquid reservoir and refill when needed. After refilling the reservoir, run a manual wash cycle (see [Section 3.3.4](#)).
- Check the volume of liquid in the waste container and empty when needed.



Neutralize acidic and caustic wastes before disposal. Dispose of all wastes in accordance with local regulations.



Neutralisez les déchets acides ou caustiques avant de les jeter. Jetez les déchets aux règlements locaux.



Neutralisieren Sie säurehaltige und ätzende Abfälle vor ihrer Entsorgung. Entsorgen Sie alle Abfälle entsprechend den lokalen Bestimmungen.



For correct drainage, make sure the end of the waste line is not submerged in waste liquid.

3.7.2 Weekly

- Replace the wash liquid in the reservoir to prevent microbial growth and gas absorption buildup. Clean the reservoir if needed.

3.7.3 Periodically

- Check the alignment of the sampling needle. If the needle is not centered in the wash port or injection port opening when it enters the port, realign the needle. For instructions, see [Section 5.3](#).
- Check for leaks from the injection port, the syringe, the syringe valve, and the liquid lines. If leaks occur, see [Section 4.2](#).
- Monitor the usage of replaceable parts. The Chromeleon Wellness panel displays the usage counters for the various parts. Replace or service parts when recommended and reset the usage counter afterwards.

3.7.4 Annually

Perform the Dionex AS-AP preventive maintenance procedure. A Dionex AS-AP Preventive Maintenance Kit (P/N 075000) is available for this purpose. The kit provides parts and instructions for performing the procedure.

4 • Troubleshooting

This chapter is a guide to troubleshooting issues that may arise during operation of the Thermo Scientific Dionex AS-AP Autosampler.

- [Section 4.1](#) describes error messages displayed in the Chromeleon Audit Trail and how to troubleshoot them.
- [Section 4.2](#) describes how to troubleshoot liquid leaks.
- [Section 4.3](#) describes how to eliminate condensation if it occurs on vial tops or well plate covers.

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 1-800-346-6390. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

4.1 Audit Trail Error Messages

Each error message displayed in the Audit Trail is preceded by an icon that identifies the seriousness of the underlying problem (see the table below).

Icon	Default 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), but the current injection is not interrupted. If a missing vial error occurs, the autosampler continues to the next vial in the queue or batch. If an error occurs during the Ready Check, the queue or batch will not be started until the error is resolved.
	Abort	A message is displayed in the Audit Trail, and the running queue or batch is aborted.

4.1.1 General Troubleshooting Information

Many error messages include troubleshooting tips (for example, the message may say to perform a self-test or call service). Unless additional troubleshooting information is required, these errors are not listed separately in this manual.

1. Check [Table 4-1](#) for the error you are troubleshooting. If the error is listed, go to the page indicated in the table for specific troubleshooting information.
2. If the error message is not included in [Table 4-1](#), perform the troubleshooting steps included in the error message (if any) or follow the general troubleshooting steps below:
 - a. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
 - b. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
 - c. If the error recurs, contact Thermo Fisher Scientific for assistance.

4.1.2 Error Messages

[Table 4-1](#) lists error messages related to the Dionex AS-AP for which specific troubleshooting information is provided. For troubleshooting assistance, refer to the page indicated in the table.

NOTE The troubleshooting steps under each error in this section are listed in the order they should be performed. If a step does not resolve the problem, continue to the next step.

Dionex AS-AP Audit Trail Error Message	Default Severity Level	See
A self test is required.	Abort	page 94
Access denied.	Abort	page 94
Alignment positions not precise.	Abort	page 94
(The) buffer loop is not empty.	Error	page 95

Table 4-1. Dionex AS-AP Error Messages

Dionex AS-AP Audit Trail Error Message	Default Severity Level	See
Buffer loop is too full.	Error	page 95
Cooling system overheated.	Error	page 95
(The) device is busy.	Error	page 96
xxEnd point not reached. Dest:xx Realxx.	Abort	page 96
Illegal syringe speed.	Error	page 96
Inject port is not aligned.	Abort	page 96
Inject port missed.	Abort	page 97
Inject volume must be equal to loop volume.	Error	page 97
Invalid mix target.	Error	page 98
Leak detected.	Warning	page 98
Motor switching valve malfunction.	Error	page 99
Motor switching valve timeout.	Abort	page 100
Reagent vial not found.	Abort	page 100
Sample height out of reach.	Error	page 100
Syringe is too empty.	Error	page 101
(The) syringe size is too small or fluid volume in the syringe is not enough for TLV calibration.	Warning	page 101
Syringe valve malfunction.	Abort	page 101
Transport liquid vial not found.	Error	page 102
Unknown vial position.	Error	page 102
Vial not found.	Error	page 103
Wash port is not aligned.	Abort	page 104
Wash port missed.	Abort	page 104
Wrong tray type detected.	Abort	page 104
Wrong vial height.	Abort	page 105

Table 4-1. Dionex AS-AP Error Messages (Continued)



A self test is required. The autosampler will not be ready for operation until the self test is successful. Turn the autosampler off and on again or perform a self test. If a fault or mechanical failure is detected during the self test, a message appears.

To troubleshoot:

1. Check the Audit Trail for previous error messages, which may indicate why a self-test is required. Correct the error condition, if possible.
2. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
3. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
4. If the error recurs, contact Thermo Fisher Scientific for assistance.



Access denied.

The requested command requires service-level access. Contact Thermo Fisher Scientific for assistance.



Alignment positions not precise.

This error can occur during the needle alignment procedure, when aligning the needle in the tray (see [Section 5.3.4](#)). This message occurs when the difference between the first alignment position and the second alignment position is too large.

To troubleshoot:

1. If this error occurs after you accept the first alignment position, continue on to the next step of the procedure (aligning the second position).
2. If the error occurs after you accept the second alignment position, repeat the alignment procedure.
3. If the error recurs, contact Thermo Fisher Scientific for assistance.

 **(The) buffer loop is not empty. Perform a Wash operation.**

To troubleshoot:

1. For instructions on performing a wash, see [Section 3.3.4](#).
2. Check the commands in the instrument method (in Chromeleon 7) or program (in Chromeleon 6.8) to verify that they do not specify incorrect volumes and that the order of commands is correct.

 **Buffer loop is too full. Perform a wash.**

This error occurs if the command would cause the buffer loop to draw more sample than it can hold, causing contamination of the syringe.

To troubleshoot:

1. Perform a wash cycle (see [Section 3.3.4](#)).
2. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.

 **Cooling system overheated. Verify that the ventilation slots are not obstructed. Turn the autosampler off and on again or perform a self test.**

To troubleshoot:

1. Check the ventilation slots on the sides of the autosampler and remove any obstruction.
2. Make sure there is at least 6 cm (2.4 in) of clearance behind and to the sides of the autosampler for ventilation.
3. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
4. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.

 **(The) device is busy.**

To troubleshoot:

The autosampler is busy performing another command. Wait until the current command has been completed and then try again.

 **xxEnd point not reached. Dest:xx Realxx. Turn the autosampler off and on again or perform a self test.**

To troubleshoot:

1. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
2. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
3. Align the needle. See [Section 5.3](#) for instructions.
4. If the error recurs, contact Thermo Fisher Scientific for assistance.

 **Illegal syringe speed. Change the syringe speed.**

This error occurs if the specified syringe speed is greater than one-third syringe vol/s.

To troubleshoot:

Enter a syringe speed within the allowed range for your syringe. Recommended syringe speeds are displayed in the Instrument Method Wizard or Program Wizard (see [Section 3.4.2](#)). Chromeleon provides recommended speeds based on the selected injection mode, syringe size, and loop size.

 **Inject port is not aligned.**

To troubleshoot:

Align the needle. See [Section 5.3.2](#) for instructions.



Inject port missed. Verify that the needle is installed and intact. Replace the needle if necessary. Turn the autosampler off and on again or perform a self test.

To troubleshoot:

1. If the needle is not installed or is damaged, replace the needle. See [Section 5.2](#) for instructions.
2. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
3. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
4. Align the needle. See [Section 5.3.2](#) for instructions.
5. If the error recurs, contact Thermo Fisher Scientific for assistance.



Inject volume must be equal to loop volume. Change the injection volume.

This error occurs if a full loop injection is specified and the injection volume entered does not match the loop volume.

To troubleshoot:

1. Change the injection volume in the sequence or on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) (if you are performing a manual injection).
2. Check the Chromeleon configuration to verify that the selected loop size matches the loop size installed on the injection valve. To configure the Dionex AS-AP in Chromeleon, see [Section B.11.3](#).

 **Invalid mix target. Check the program.**

This error occurs if there is an attempt to draw from the injection port, waste port or wash port, or to dispense into air or the wash bottle.

To troubleshoot:

Check the commands in the instrument method (in Chromeleon 7) or program (in Chromeleon 6.8) to verify that the order of commands is correct and that you have entered the correct parameters for the draw and dispense commands. To ensure the correct order of commands and that valid parameters are entered, use the Chromeleon 7 Instrument Method Wizard or Chromeleon 6.8 Program Wizard to create an instrument method or program.

 **Leak detected. Find and eliminate the leak. Dry the leak sensor and tray.**

To troubleshoot:

1. Inspect the autosampler to determine the source of the leak. See [Section 4.2](#) for possible causes of leaks and the corrective actions to take.
2. Press the main power switch on the rear panel to turn off the autosampler. Then, tighten or replace the leaking connection or other part as required.

3. After eliminating the leak, wipe up all liquid and dry the leak sensor (see [Figure 4-1](#)). To do so, use a cloth or tissue to absorb any liquid that has accumulated in the tray.

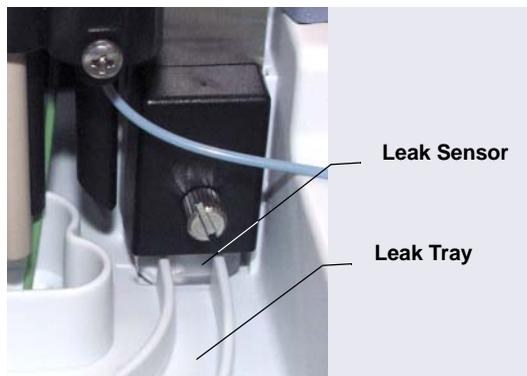


Figure 4-1. Leak Sensor and Leak Tray

IMPORTANT

When drying the tray and leak sensor, make sure you do not bend or damage the sensor.

4. Allow the sensor to adjust to the ambient temperature for a few minutes.
5. Turn on the autosampler.
6. If no error is reported after turning on the autosampler, operation can be resumed. If the error recurs, check for additional sources of leaks.

⚠ Motor switching valve malfunction. Check whether the spanner has been tightened too firmly. In this case, the valve cannot switch. Slightly loosen the spanner, and then turn the autosampler off and on again or perform a self test.

To troubleshoot:

NOTE The spanner can only be adjusted by a Thermo Fisher Scientific Service Representative.

1. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
2. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
3. If the error recurs, contact Thermo Fisher Scientific for assistance.



Motor switching valve timeout. Turn the autosampler off and on again or perform a self test.

To troubleshoot:

1. Try to manually switch the valve position by clicking the button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8).
2. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel or Control panel and then clicking the **Reset / Self Test** button.
3. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
4. If the error recurs, contact Thermo Fisher Scientific for assistance.



Reagent vial not found. Place a vial at the specified position or specify a different position.

This error occurs if a reagent vial is not installed in the tray position specified for the current operation.

To troubleshoot:

1. For instructions on how to specify vial positions, see [Section 3.4.7](#).



Sample height out of reach. Install an appropriate vial or change the sample height setting

This error can occur if a sample height is specified that places the needle above the height of the installed vial.

To troubleshoot:

1. Verify that the correct size vial is installed in the tray.
2. For instructions on how to change the sample height setting, see [Section 3.4.3](#).

 **Syringe is too empty. Change the program (volume to be dispensed).**

This error occurs if the syringe does not contain enough fluid to dispense the volume required for the current operation.

To troubleshoot:

1. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
2. Check the commands in the program to verify that they do not specify incorrect volumes and that the order of commands is correct.

 **(The) syringe size is too small or fluid volume in the syringe is not enough for TLV calibration.**

To troubleshoot:

1. If you are performing the sample transfer line volume (TLV) calibration procedure, check that you have entered the correct estimate of the tubing volume installed between the injection port and the injection valve. For instructions, see [Section 5.9](#).
2. Install a larger syringe. For information about selecting a syringe size, see [Section B.4](#).

 **Syringe valve malfunction. Check the syringe valve. Also, verify that the connections on the valve are not over-tightened.**

To troubleshoot:

1. Verify that the connections to the syringe valve are tightened correctly. Tighten the connections fingertight.
2. If the problem persists, the valve may need to be replaced. Contact Thermo Fisher Scientific for assistance.

 **Transport liquid vial not found. Place a vial at the specified position or specify a different position.**

This error occurs if a vial is not installed in the 8-position (wedge shaped) tray position specified for the current operation. The autosampler continues to the next vial in the sequence.

To troubleshoot:

Check the sequence to verify that the correct position is specified. For instructions on how to specify vial positions for the 8-position tray, see [page 82](#).

 **Unknown vial position. Check the specified position. On the Segments/Pump Link page, check and correct the segment settings if necessary.**

This error occurs if the vial position specified does not exist in the current configuration. Either the vial position specified is incorrect or the tray type specified in the configuration does not match the tray type installed in the autosampler.

To troubleshoot:

1. Verify that the vial position specified is valid. For instructions on how to specify vial positions, see [Section 3.4.7](#).
2. On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), verify that the tray types currently installed in the autosampler match the tray type assignments. If they do not match, you can do one of the following:
 - Change the tray types in the Chromeleon configuration. For instructions, see [“Segments/Pump Link Page” on page 207](#).
 - Install the tray type that matches the configured tray type.

 **Vial not found. Place a vial at the specified position or specify a different position. Check and correct the segment settings if necessary.**

This error occurs if a vial is not installed in the tray position specified for the current operation. The autosampler continues to the next vial in the sequence.

To troubleshoot:

1. Check the sequence to verify that the correct position is specified. For instructions on how to specify vial positions, see [Section 3.4.7](#).
2. On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), verify that the tray type currently installed in the autosampler matches the selected tray type. If they do not match, you can do one of the following:
 - Change the tray type assignments specified in the Chromeleon configuration. For instructions, see [“Segments/Pump Link Page” on page 207](#).
 - Install the tray type that matches the type selected in the Chromeleon configuration.

 **Vial pusher obstructed. Remove the obstruction.**

To troubleshoot:

1. Remove anything obstructing the movement of the vial pusher when it is performing the self-test.
2. Repeat the self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
3. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
4. If the error recurs, contact Thermo Fisher Scientific for assistance.



Wash port is not aligned.

To troubleshoot:

Align the needle. See [Section 5.3.2](#) for instructions.



Wash port missed. Turn the autosampler off and on again or perform a self test.

To troubleshoot:

1. Perform a self-test by clicking the **Service** button on the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and then clicking the **Reset / Self Test** button.
2. Turn the autosampler power off and on again by pressing the main power switch on the Dionex AS-AP rear panel.
3. Align the needle. See [Section 5.3.2](#) for instructions.
4. If the error recurs, contact Thermo Fisher Scientific for assistance.



Wrong tray type detected. On the Segments/Pump Link tab, check and correct the segment settings if necessary.

The type of tray installed in the carousel does not match the type specified in the Chromeleon configuration. For example, a well plate tray is installed in the carousel, but a 1.5 mL vial tray is specified in Chromeleon.

To troubleshoot:

1. Change the tray type assignments specified in the Chromeleon configuration. For instructions, see [“Segments/Pump Link Page” on page 207](#).
2. Install the configured tray type.



Wrong vial height.

To troubleshoot:

Check the vial height entered in the needle alignment procedure (see [Section 5.3.3](#)); either the entered height or the measured height is incorrect.

4.2 Liquid Leaks

4.2.1 Leaking Syringe or Syringe Valve

Possible Causes:

- Cracked syringe or leaking plunger seal
- Missing or worn gasket in the syringe valve

Actions:

- Check for a crack or a leaking plunger seal in the syringe. If found, replace the syringe (see [Section 5.4](#)).
- If the leak is from the syringe valve where the syringe is installed, remove the syringe (see [Section 5.4.1](#)), remove the existing gasket from inside the valve, and replace it with a new gasket. Gaskets are supplied with the syringe. Reinstall the syringe (see [Section 5.4.2](#)). If the valve continues to leak, the syringe valve may need to be replaced. Contact Thermo Fisher Scientific for assistance.

4.2.2 Leaking Drain Line Connection

- Make sure the drain line is not crimped or otherwise blocked.
- Make sure the drain line is not submerged in liquid in the waste container. Empty the container, if needed.
- Make sure the drain line is pushed tightly onto the fitting and that the line is not elevated at any point after it exits the autosampler.

4.2.3 Leaking Injection Port

- Check for a leaking fitting and tighten.
- Check the sampling needle; if the needle tip appears worn or damaged, replace the sampling needle (see [Section 5.2](#)).
- If fluid appears on the top of the injection port during injection, the needle may not be reaching the correct depth in the port or may not be aligned over the injection port. Realign the sampling needle (see [Section 5.3](#)).
- Air in the sample transfer line can cause continued flow after the syringe pump has stopped. Make sure all lines are primed and free of air bubbles. See [Section B.13](#) for priming instructions.

4.2.4 Leaking Fitting

Locate the source of the leak. Tighten or replace the liquid line connection (see [Section 5.1](#)).

4.2.5 Broken Liquid Line

Replace the line and fittings (see [Section 5.1](#)).

4.2.6 Leaking High-Pressure Valve

- Make sure the liquid line connections to the valve are tight. Replace any damaged fittings (see [Section 5.1](#)).
- If the leak is from behind the valve stator, the rotor seal may be scratched. Rebuild the valve (see [Section 5.11](#)).

4.3 Condensation on Vial Tops and Well Plate Covers

Under certain operating conditions, condensation can form on the vial tops or well plate covers. For example, this can occur if the tray temperature set point is at 4 °C and the ambient temperature and relative humidity in the laboratory are above 25 °C and 60% humidity. To prevent condensation from forming, use one or more of the following methods:

- Ensure that the laboratory temperature remains below 25 °C and the humidity below 60%.
- Increase the tray temperature set point (if the option is installed).
- Turn on the condensation fan. The fan blows air recycled from the carousel area onto the top of the vials or well plates and prevents condensation from forming.

To turn on the condensation fan, open the autosampler ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and press **F8**. Under **Sampler**, set the **CondensationFan** property to **Normal** or **Max**.

- On each injection, the carousel cover is opened to allow the needle to access the vial. This introduces additional moist air from the lab environment into the vial area. If the tray temperature control option is installed and the condensation fan is set to **Normal** or **Max**, the carousel automatically rotates after the injection operation is complete. This distributes the moist air and prevents it from condensing on the vial caps directly under the opening. The **TrayRotationNumber** property controls the number of rotations (either 2 times, 1 time, or 0 times). The default is 2 rotations.

This chapter describes Thermo Scientific Dionex AS-AP Autosampler service and repair procedures that users may perform. 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 1-800-346-6390. Outside the U.S. and Canada, call the nearest Thermo Fisher Scientific office.

Before replacing any part, refer to the troubleshooting information in [Chapter 4](#) to correctly identify the cause of the problem.

IMPORTANT

Substitution of 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.

5.1 Tubing and Fittings

[Table 5-1](#) lists tubing and fittings used to plumb a Dionex AS-AP.

Tubing/Fitting Type	Part Number	Used to connect...
1.55 mm (0.062 in) ID Perfluoroalkoxy (PFA) tubing, colorless	052112 (2.54 cm) (1 in)	Wash reservoir to syringe valve: 75 mm (30 in)
1/8 in flangeless fitting bolt (short), tan 1/8 in flangeless ferrule, yellow	057934 048949	Wash reservoir line to syringe valve

Table 5-1. Tubing and Fittings for the Dionex AS-AP

Tubing/Fitting Type	Part Number	Used to connect...
0.75 mm (0.030 in) ID PEEK tubing, green	044777 (2.54 cm) (1 in)	<ul style="list-style-type: none"> • Syringe valve to waste port: 75 mm (30 in) • 500 µL buffer line: 109 cm (43 in) • 1200 µL buffer line: 264 cm (104 in) • Injection valve to waste port (push modes): length depends on system
1/16 in flangeless fitting bolt (short), tan Two-piece ferrule (clear cone and tan flat)	071358 062511	<ul style="list-style-type: none"> • Waste line to syringe valve • Buffer line to syringe valve • Y-connector ports
1/16 in flangeless fitting bolt, tan Two-piece ferrule (clear cone and tan flat)	052230 062511	<ul style="list-style-type: none"> • Buffer line to needle (push modes) • Sample transfer line to needle (pull modes)
500 µL buffer line	074994	Syringe valve to needle
1200 µL buffer line	074989	Syringe valve to needle
8500 µL buffer line (must be assembled at the factory)	075520	Syringe valve to needle
0.33 mm (0.013 in) ID PEEK tubing, blue	049714 (2.54 cm) (1 in)	<ul style="list-style-type: none"> • Sample transfer lines (length varies depending on system) • Fraction collection valve to needle • Bridge line (fraction collection valve to injection valve)
10-32 fitting bolt, black Split cone ferrule, black	062980 062978	Sample transfer line to injection port (push modes)
10-32 fitting bolt, short thumb head, black Split-cone ferrule, black	074322 062978	Needle to needle holder
10-32 fitting bolt, blue 10-32 ferrule, double-cone, blue	074449 074373	Injection valve or diverter valve connections

Table 5-1. Tubing and Fittings for the Dionex AS-AP (Continued)

Tightening Guidelines for Fittings

Use high-pressure (blue) 10-32 fitting bolts (P/N 074449) and high-pressure (blue) double-cone ferrules (P/N 074373) for connections to the high-pressure valves (injection, diverter, fraction collection, or auxiliary). Use these fittings for both high-pressure and low-pressure connections to valves. To tighten the fittings, follow these guidelines:

1. Use your fingers to tighten the fitting bolt as tight as you can.
2. After finger-tightening, use a wrench to tighten the fitting an additional 3/4 turn (270 degrees).
3. If leaks occur, replace the fitting bolt (P/N 074449), ferrule (P/N 074373), and tubing.

Cutting Tubing

Use a tubing cutter to cut tubing to the required length. Make sure the cut is at a right angle to the length of the tubing and there are no nicks or burrs on the end.

5.2 Replacing the Sampling Needle

1. Lift up the Dionex AS-AP front panel.
2. To position the needle in a convenient position for servicing, open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and click **Alignment**. The Sampler Alignment panel opens (see [Figure 5-6](#)). Click **Move to Wash Port**. The needle moves to above the wash port.
3. While holding the needle holder (see [Figure 5-1](#)) to prevent twisting of the needle, disconnect the liquid line from the needle.

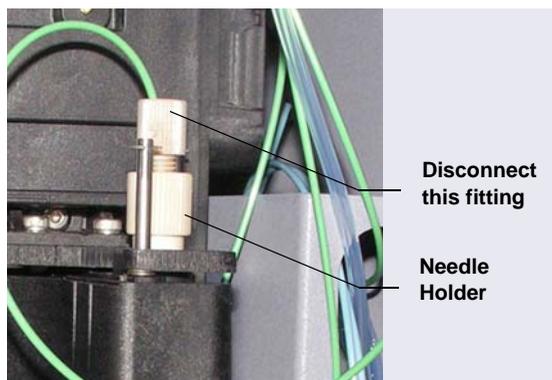


Figure 5-1. Liquid Line Connected to the Needle

4. Unscrew the needle holder from the horizontal needle arm (see [Figure 5-2](#)).
5. Lift up the needle holder and pull the needle up and out of the needle arm.

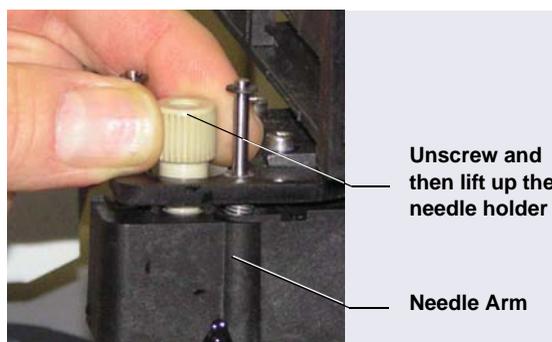


Figure 5-2. Removing the Needle

6. Unscrew the needle holder and remove it from the needle (see [Figure 5-3](#)). Remove the fitting bolt and ferrule from the needle. Save the fittings to use with the new needle.

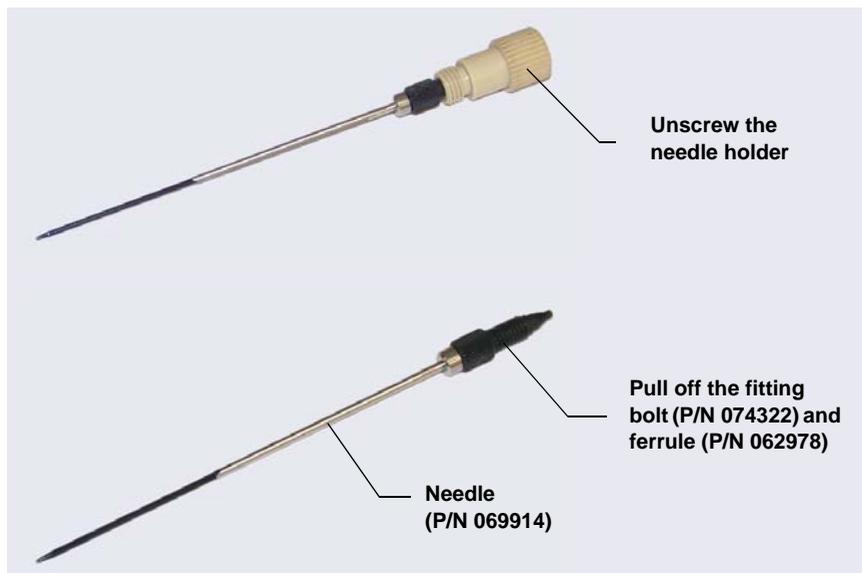


Figure 5-3. Needle Removed from Autosampler

7. Slide the fitting bolt (P/N 074322) and ferrule (P/N 062978) onto the new needle (P/N 069914). Hold the needle firmly near the fitting bolt and ferrule to maintain contact with the needle holder, and screw the needle holder onto the needle. Tighten fingertight.
8. From the top, insert the new needle and the holder down into the needle arm. Tighten the needle holder firmly.

9. Follow the steps below to reconnect the liquid line to the top of the needle:
 - a. Insert the tubing and fitting down into the center of the needle holder. When you insert the tubing, you should feel the tubing drop into a small indentation inside the holder (see [Figure 5-4](#)). If not, move the tubing slightly until it does.

IMPORTANT

When connecting the liquid line to the needle, make sure the tubing slides into the indentation inside the needle holder before tightening the fitting.

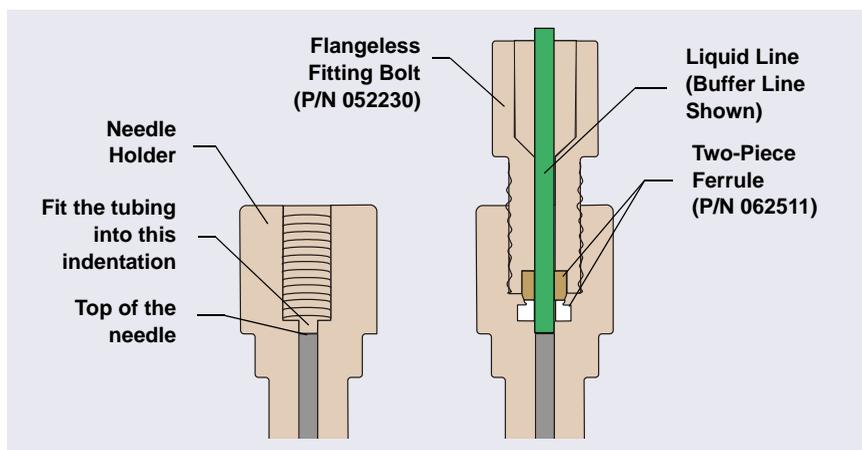


Figure 5-4. Cross-Section of Needle Holder and Liquid Line Fitting (Buffer Line Shown)

- b. While holding the needle holder to prevent twisting of the needle, tighten the liquid line fitting fingertight.
10. Align the needle (see [Section 5.3](#)).

5.3 Aligning the Needle

The needle alignment procedure consists of the following main steps:

- Aligning the needle in the injection port
- Aligning the needle in the wash port
- Adjusting the needle height over the vial
- Aligning the needle in the tray

You will need the following items to complete the procedure:

- J-clip (P/N 074976), installed at the factory and removed after initial needle alignment
- 2.5 mm Allen wrench (P/N 052952), included in the Dionex AS-AP Ship Kit (P/N 074929)
- 10 mL or 1.5 mL vial with the septum removed from the cap
- Flashlight
- Magnifying glass (optional)
- Right-angle mirror (optional)

5.3.1 Aligning the Needle in the Injection Port

1. The needle alignment procedure requires the Dionex AS-AP to be configured for push mode in the Chromeleon configuration.

If your autosampler is configured for pull mode, go to the **Options** page in the Chromeleon configuration properties and select **Push** under **Injection Mode**. For details, see [Section B.11.3](#). You do not need to change the autosampler's plumbing.

2. If the Dionex AS-AP power is off and the J-clip is not already installed, install the J-clip on the vial pusher before turning on the power. Installing the J-clip prevents possible needle damage during the self-test run at power up.

To install the J-clip:

- a. Lift up the vial pusher and attach the J-clip to the front most metal rod of the vial pusher (see [Figure 5-5](#)). During the alignment procedure,

the J-clip prevents the vial pusher from dropping down over the needle tip and allows a better view of the needle.

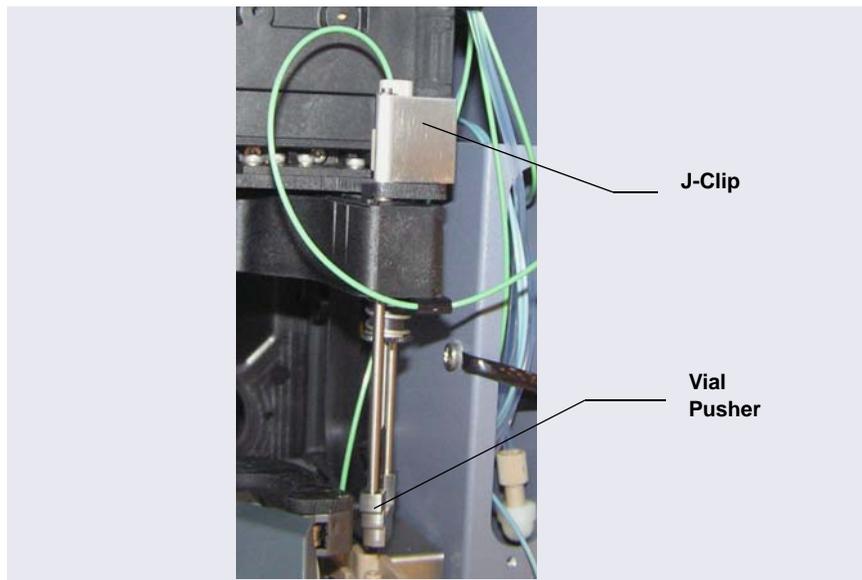


Figure 5-5. J-Clip Installed on Vial Pusher

- b. After installing the J-clip, turn on the Dionex AS-AP power and wait while the autosampler performs the self-test. Because the J-clip prevents the needle from descending into the injection port during the self-test, the following error message appears in the Audit Trail:

Needle Drive: Pusher sensor malfunction. Turn the autosampler off and on again or perform a self test.

- c. You can ignore the error message and continue to [Step 3](#). After you complete the alignment procedure, a self-test will be required.

- On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), click **Alignment**. The AS-AP Alignment panel opens (see [Figure 5-6](#)).

Alignment: AS-AP
Instrument: ICS-4000

1) Injection Port Alignment Install J-Clip first. Lower needle height to just above the port, then adjust value in X-Value box to center needle above the injection port.

Move to Injection Port Needle Down 2mm Needle Down 0.1mm

Align Inj X-Value: -5790 count Press Enter on keyboard to set Injection Port Alignment.

2) Wash Port Alignment Lower needle to just above wash port, then relax motors and manually center needle above wash port. Press Accept Wash Port Alignment button.

Move to Wash Port Needle Down 2mm Relax Motors Accept Wash Port Alignment

Needle Down 0.1mm

3) Self Test Remove J-Clip and click the Self Test button to reset system.

AS-AP Self Test

4) Vial Height Alignment Move needle to test vial. Install J-clip to view position and then remove J-Clip again. Enter a new adjustment value (higher number increases needle height).

Test Vial Height: 32.00 mm

Test Vial Location: RA1

Move Needle to Test Vial

Vial Height Adjustment: 0.400 mm

5) Tray Alignment Remove J-Clip. Press Move to Align 1, then Relax Motors, then adjust the carousel and needle to center the needle on the cross-hairs. Press Accept Align. Repeat for Align 2.

Move to Align 1 Relax Motors Accept Align

Move to Align 2 Relax Motors Accept Align

6) Record final values Perform a Self Test, then click Done to write values to module.

	Align Inj. Port	Align Wash	Height Adj.	Align1	Align2
X-Value	-5790	-5790		-3400	-1000
Y-Value				-7000	-1230
Height Adj.			0.400		

AS-AP Self Test

Done

Figure 5-6. Dionex AS-AP Alignment Panel
(Chromeleon 7 Version Shown)

4. On the panel, click **Move to Injection Port**. A message appears.



5. If you have not already done so, install the J-clip on the vial pusher (see [Step 2a](#)). Click **Start**. The needle moves to above the injection port.
6. On the panel, click **Needle Down 2mm**. The needle moves down 2 mm.
7. If the needle is still too far above the injection port to allow you to judge whether it is centered, move the needle down further. If there is no possibility of the needle hitting the surface of the injection port, click **Needle Down 2 mm**. Otherwise, click **Needle Down 0.1 mm** repeatedly until the needle is very close to the top of the port.

IMPORTANT

Do not execute another Needle Down command if there is a chance the needle will hit the surface of the injection port. Moving the needle down too far will jam it onto the port surface and damage the needle tip.

8. Using the flashlight and magnifying glass, check the position of the needle from the side to verify that it is centered front to back (Y-position) in the port. To do this, you can use a right-angle mirror to view the needle directly from the side. If the needle is *not* centered front to back, go on to [Step 9](#). If it is centered, go on to [Step 10](#).

9. To center the needle front to back in the port:
 - a. Locate the two screws that attach the wash and injection ports to the autosampler (see [Figure 5-7](#)).

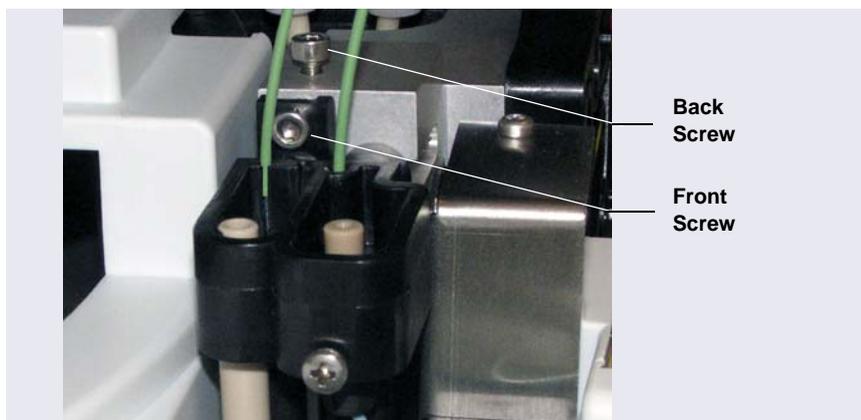


Figure 5-7. Wash and Injection Port Attachment Screws

- b. Use the Allen wrench to loosen the back screw (turn the screw counterclockwise). Then, use the Allen wrench to loosen or tighten the front screw to adjust the position of the port. Loosening the screw moves the port forward. Tightening it moves the port back.
 - c. When the port is centered front to back under the needle, retighten the back screw.

- Using the flashlight and magnifying glass, check the position of the needle to verify that it is centered left to right above the port. [Figure 5-8](#) shows a needle that is correctly centered above the injection port.



Figure 5-8. Needle Centered Above the Injection Port

- NOTE** When the needle is close to alignment and there is no possibility of it hitting the injection port, you can move the needle down into the port slightly to center it more easily.
- If it is not centered, adjust the needle position by changing the number in the **Align Inject** box on the panel. To move the needle to the right, enter a larger negative number. To move the needle to the left, enter a smaller negative number. Changing the number by four counts moves the needle about 0.1 mm. Press the **Enter** key after changing the number to execute the change.
 - When you press **Enter**, the needle will be raised and moved to the new position. You will need to then move the needle back down to check the centering.

5.3.2 Aligning the Needle in the Wash Port

1. Verify that the J-clip is installed on the vial pusher (see [Figure 5-5](#)).
2. On the panel, click **Move to Wash Port**. The needle moves to above the wash port.
3. Click **Needle Down 2mm**.
4. If the needle is still too far above the port to allow you to judge whether it is centered, move the needle down further. If there is no possibility of the needle hitting the surface of the port, click **Needle Down 2 mm**. Otherwise, click **Needle Down 0.1 mm** repeatedly until the needle is very close to the top of the port. Use the flashlight and magnifying glass to verify the position.

IMPORTANT

Do not execute another Needle Down command if there is a chance the needle will hit the surface of the injection port. Moving the needle down too far will jam it onto the port surface and damage the needle tip.

5. Click **Relax Motors**. This allows you to adjust the needle position to the left or right.
6. To move the needle, tap lightly on the needle arm.

NOTE When the needle is close to alignment and there is no possibility of it hitting the wash port, you can move the needle down into the port to center it more easily.

7. When the needle is aligned left to right in the port, click **Accept Wash Port Alignment**. This records a new alignment value for **Align Wash** on the panel.
8. Check the alignment:
 - a. Click **Move to Injection Port**.
 - b. Wait until the needle is finished moving and then click **Move to Wash Port**.
 - c. Move the needle down (see [Step 3](#)) and verify that the needle is centered correctly.
 - d. If it is not centered, click **Relax Motors** and move the needle as needed. Click **Accept Wash Port Alignment**. Repeat the alignment check.

9. After verifying the alignment, click **AS-AP Self Test**. A message appears:

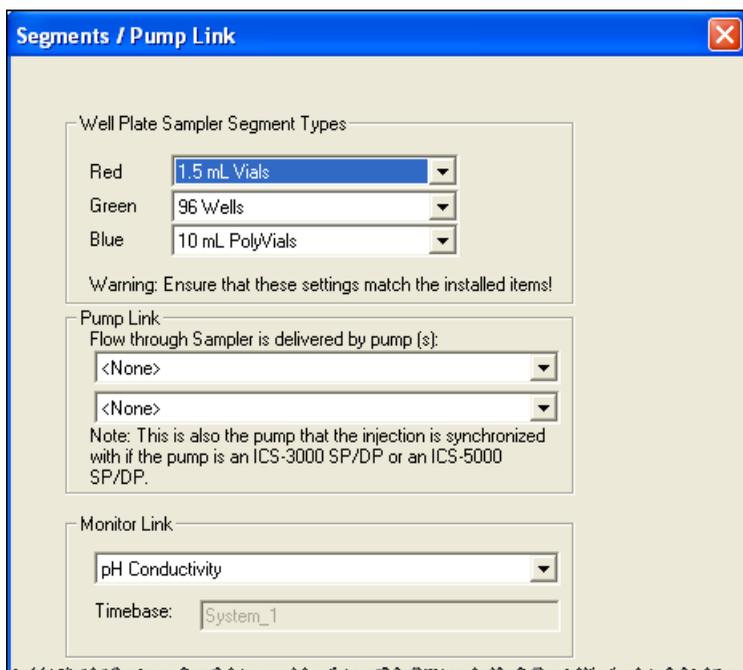


10. Remove the J-clip from the vial pusher and click **Start**.

5.3.3 Adjusting the Needle Height Over the Vial

1. Before beginning, make sure to:
 - Align the needle in the inject port and wash port (see [Section 5.3.1](#) and [Section 5.3.2](#))
 - Remove the J-clip from the vial pusher
2. Run a manual self-test (click AS-AP Self Test on the Alignment panel).
3. Install an empty vial tray in the red section of the carousel. You can use either a 10 mL or 1.5 mL tray.

- Verify that the setting on the **Segments / Pump Link** page of the Chromeleon configuration matches the installed tray type (see the following example).



- If needed, select the correct tray type and click **OK**. Click **Yes** to confirm sending the new configuration to the autosampler. For details about configuring the Dionex AS-AP in Chromeleon, see [Section B.11.3](#).
- Verify that the septum is removed from the cap of a 10 mL or 1.5 mL vial and the cap is tightened onto the vial. Use the size of vial that corresponds to the installed tray size.
- Measure the height of the vial, including the cap, to the nearest 0.1 mm.
- Place the vial into any position in the tray (for example, position **RB1**).
- Enter the measured vial height in the **Test Vial Height** box and press **Enter**.
- Enter the vial position in the **Test Vial Location** box and press **Enter**.
- Click **Move Needle to Test Vial**.

12. To view the needle height, install the J-clip on the vial pusher (see [Section 5.3.1, Step 5](#)).
13. Slide a piece of paper between the top of the vial cap and the needle tip (see [Figure 5-9](#)). If the needle is at the correct height, the paper should slide in with slight resistance. If there is no resistance, the needle is too high. If you cannot slide the paper under the needle or if the paper is buckled slightly, the needle is too low.

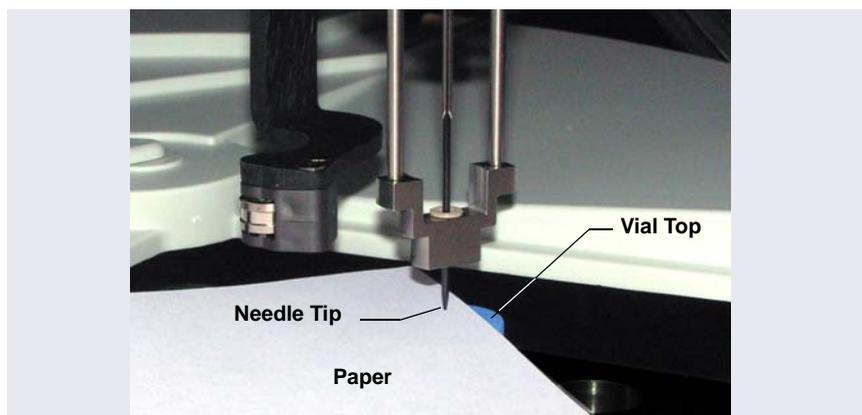


Figure 5-9. *Checking the Vial Height Alignment*

14. If you need to adjust the position, remove the J-clip and enter a new value in the **Vial Height Adjustment** box. To raise the needle, increase the number. To lower the needle, decrease the number (a negative number can be used). Press **Enter** after changing the number to execute the change. To check the position, install the J-clip.
15. After the needle is positioned correctly over the vial, remove the J-clip.

NOTE Save the J-clip. It is required for aligning the needle in the future and for other service procedures.
16. Click **Move to Injection Port** and then remove the test vial.

5.3.4 Aligning the Needle in the Tray

1. Before beginning, make sure the J-clip is *not* installed on the vial pusher. If the J-clip is installed, please remove it before proceeding.
2. Verify that the setting on the **Segments / Pump Link** page of the Chromeleon configuration matches the installed tray type (10 mL or 1.5 mL). For details, see [Step 4](#) on [page 123](#).
3. Note the two alignment targets  imprinted on the first and last rows of the vial tray (see [Figure 5-10](#)).

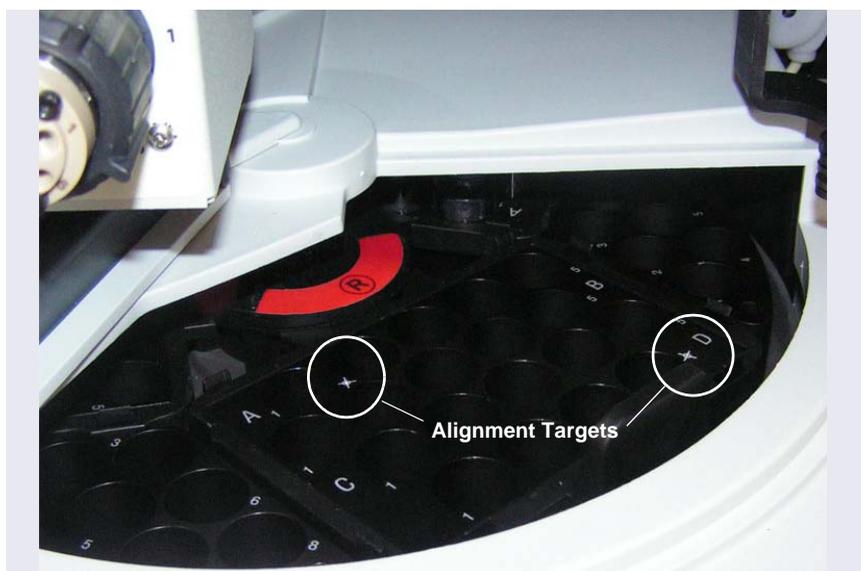


Figure 5-10. Alignment Targets on Empty 10 mL Tray Installed in Red Section

4. On the panel, click **Move to Align1**. The needle moves to the target in the last row and is positioned slightly above the tray.
5. Click **Relax Motors**. You can now adjust the position of the needle left to right (X-position) and rotate the carousel front to back (Y-position) to center the needle in the target.
6. If the needle is too far to the left or right of the target, move the needle arm to correct the position. If the needle is too far to the front or back of

the target, rotate the carousel to correct the position. Use the flashlight and magnifying glass to verify the position.

NOTE When checking the alignment of the needle over the target, be sure to check from two different angles that are 90° apart.

7. After the needle is aligned correctly, click **Accept Align**. This records a new **X-Value** and **Y-Value** for **Align1** on the panel.

NOTE If the error message “Alignment positions not precise,” appears in the Audit Trail after you click **Accept Align**, you can ignore the message and continue to the next step of the procedure. This error occurs when there is a large difference between the first alignment position and the second alignment position.

8. Click **Move to Align2**. The needle moves to slightly above the target in row A.
9. Repeat [Step 6](#) for the new target. After the needle is aligned correctly, click **Accept Align** to record an **X-Value** and **Y-Value** for **Align2**. If the error message described above appears, repeat the alignment procedure.
10. When the needle alignment is complete, click **AS-AP Self Test**.
11. Click **Done**.

5.4 Replacing the Syringe

The following syringe volumes are available:

Syringe Volume	Part Number
100 µL	074305
250 µL	074306
1000 µL	074307
5000 µL	074308

To complete this procedure you will need a size 8 open-end wrench. Use of a mirror is helpful, but optional.

5.4.1 Removing the Existing Syringe

1. Lift up the Dionex AS-AP front panel.
2. On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), click **Wellness**. The Wellness panel opens (see [Figure 5-11](#)).

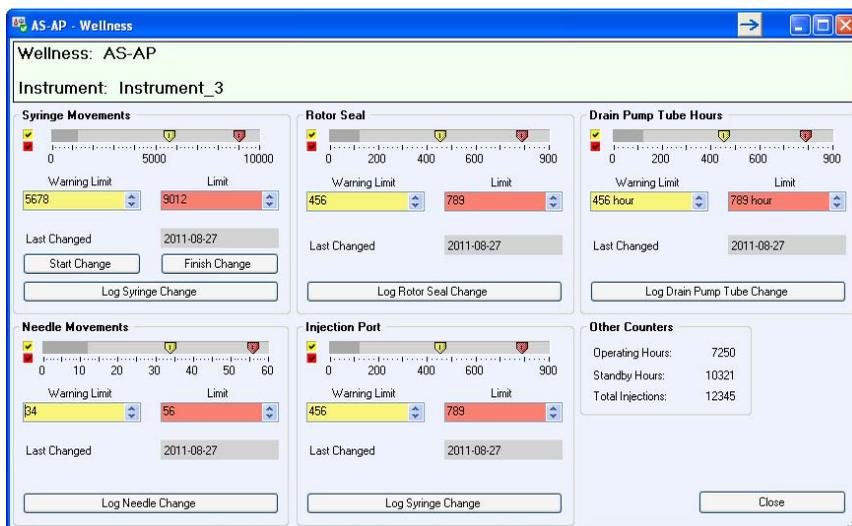


Figure 5-11. Wellness Panel (Chromeleon 7 Version Shown)

3. Under **Syringe**, click **Start Change**. The syringe moves down.
4. Use the open-end wrench to loosen the syringe plunger mounting bolt (see [Figure 5-12](#)) by turning it counterclockwise, and then use your fingers to unscrew and remove the bolt. Save the bolt.

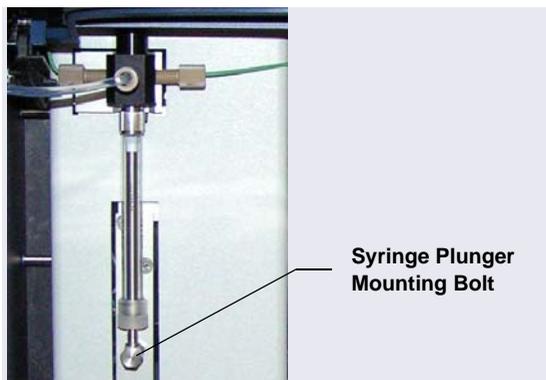


Figure 5-12. *Syringe Plunger Mounting Bolt*

5. Unscrew the syringe from the syringe valve (see [Figure 5-13](#)) and remove the syringe.

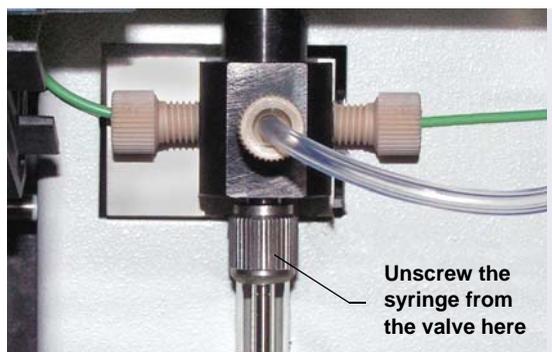


Figure 5-13. *Removing the Syringe from the Syringe Valve*

6. Verify that the gasket is still in place in the bottom bore of the syringe valve. You can use a mirror to view the bottom of the valve. The gasket is white. If the inside of the valve is black, a gasket is not present.

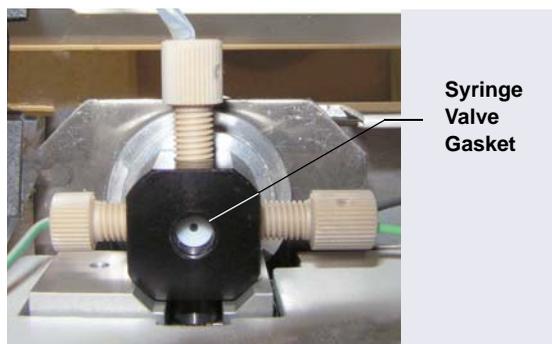


Figure 5-14. *Syringe Valve Gasket (Bottom View of Syringe Valve)*

7. If a gasket is not present, install one. Gaskets are shipped with the syringe.

IMPORTANT

Make sure that you install only one gasket in the syringe valve. If you install two or more gaskets, the valve and/or syringe will be damaged.

5.4.2 Installing the New Syringe

1. Follow the steps below to remove air from the new syringe:
 - a. Fill a container with deionized water or a 50:50 mixture of deionized water and methanol.
 - b. Place the threaded end of the syringe into the container.
 - c. Push the plunger completely into the syringe body and move the syringe several times rapidly to dislodge any air bubbles that might have gathered at the syringe inlet.
 - d. Fill the syringe and empty it completely several times. Push the syringe plunger up and pull down rapidly with short movements to dislodge the bubbles.
2. Fill the syringe completely.
3. Orient the syringe with the threaded end toward the top and position the syringe under the valve.
4. While holding the syringe vertically, push a small amount of liquid out the top to make sure that no air is present (see [Figure 5-15](#)).

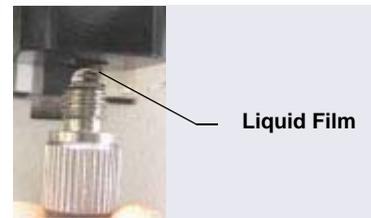


Figure 5-15. *Liquid Film Covering the Syringe Inlet*

5. Hold the bottom of the syringe with one hand to keep it vertical, then place the other hand at the top of the syringe and screw the syringe into the valve. Tighten the syringe fingertight. Do not overtighten.

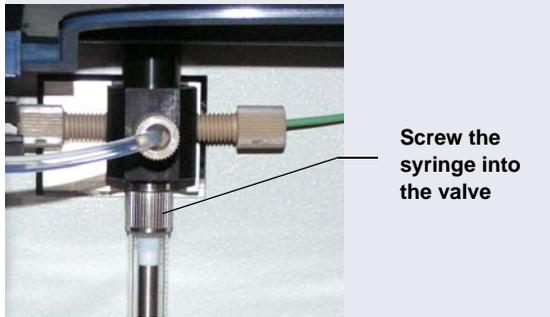


Figure 5-16. *Installing the Syringe in the Syringe Valve*

6. Align the end of the syringe plunger with the mounting bolt opening, insert the mounting bolt, and tighten the bolt fingertight. If needed, use the open-end wrench to tighten the bolt slightly more (less than one-quarter turn).
7. On the Wellness panel, under **Syringe**, click **Finish Change**. The syringe moves up.
8. Click **Log Syringe Change**. This resets the syringe movement counter to 0.
9. If the new syringe is a different size than the previous syringe, select the new size on the **Options** page in the Chromeleon configuration (see the example in [Figure 5-17](#)). Click **OK** and then click **Yes** to confirm sending

the new configuration to the autosampler. For details about Chromeleon configuration, see [Section B.11.3](#).

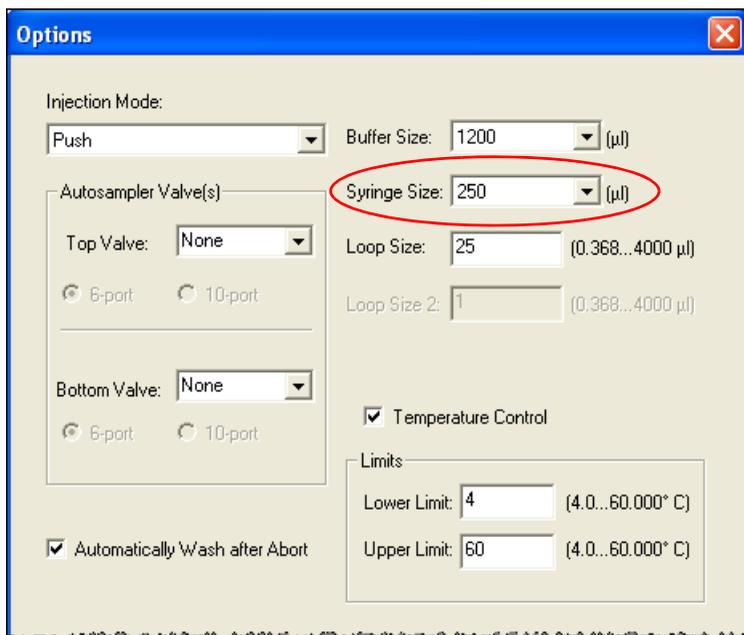


Figure 5-17. Example Chromeleon Configuration Options Page

In addition, verify that the correct sample loop and buffer line are installed (see [Table 5-2](#)).

10. Prime the syringe (see [Section B.13](#)).

IMPORTANT

Air in the syringe has a strong effect on the measurement results. Therefore, before you start your analysis, make sure there is no air in the syringe.

5.5 Replacing the Buffer Line

The following buffer line sizes can be used in the Dionex AS-AP. The appropriate size depends on the size of the syringe and sample loop (see [Table 5-2](#)):

Buffer Line	Syringe	Sample Loop
500 μL	100 μL	1–5 μL
1200 μL	250 μL	5–25 μL
1200 μL	1000 μL	5–100 μL
8500 μL	5000 μL	100–4000 μL also for concentrator columns

Table 5-2. Recommended Buffer Line, Syringe, and Sample Loop Combinations

Notes

- A 250 μL syringe and a 1200 μL buffer line are standard.
- You can order a pre-cut 500 μL buffer line (P/N 074994) or 1200 μL buffer line (P/N 074989). Pre-cut buffer lines are recommended because they are precision cut at the factory and provide the best tubing connections for improved precision. It is also possible to create a 500 μL or 1200 μL line from tubing provided in the Dionex AS-AP Ship Kit (P/N 074929). Instructions are provided in [Section 5.5.2](#).
- The 8500 μL buffer line must be assembled at the factory. If you need to install this buffer line size, order P/N 075520.

5.5.1 Removing the Old Buffer Line

1. Press the **Standby** button on the status bar.
2. Lift up the Dionex AS-AP front panel.
3. Disconnect the buffer line from the syringe valve (see [Figure 5-18](#)). Remove the fitting bolt and ferrule.

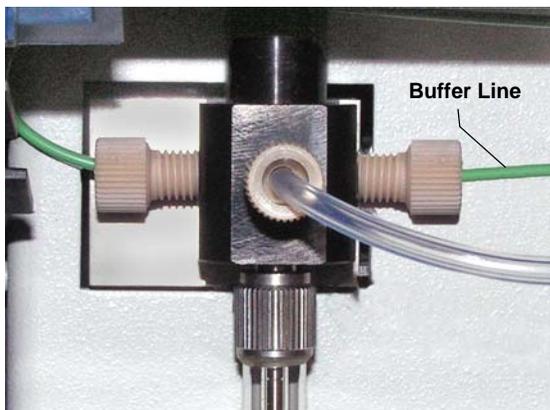


Figure 5-18. Buffer Line Connected to the Syringe Valve

4. Remove the buffer tubing from the flexible tubing tie in the upper-left corner of the autosampler (see [Figure 5-19](#)). To open the tie, pull the end of the tie down.

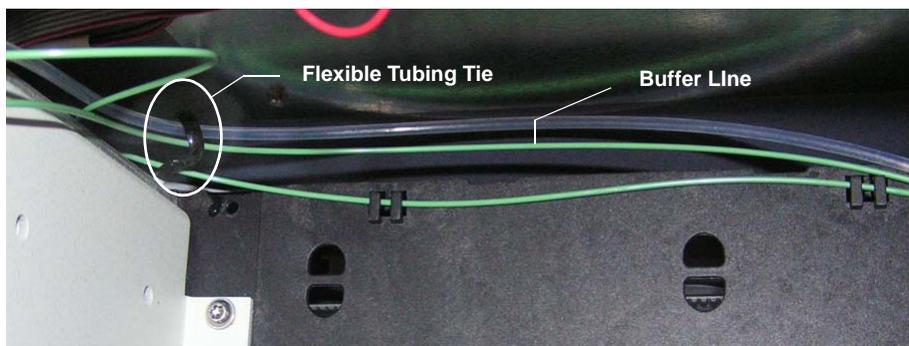


Figure 5-19. Tubing Tie in Upper-Left Corner Inside the Dionex AS-AP

5. Remove the buffer tubing from the flexible tubing tie in the upper-right corner (see [Figure 5-20](#)) and then remove the coiled tubing from the slotted compartment below the tie (see [Figure 5-20](#)).

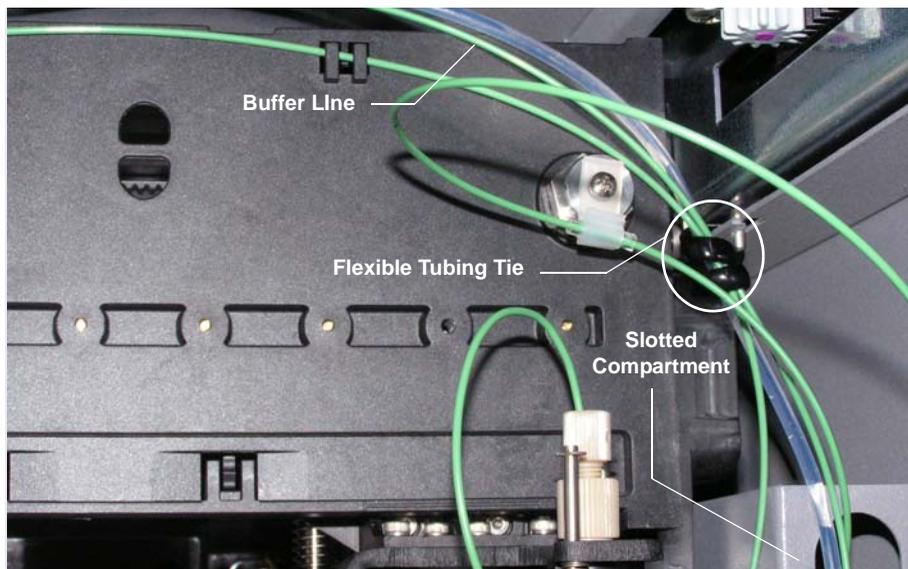


Figure 5-20. *Tubing Tie in Upper-Right Corner Inside the Dionex AS-AP (Dionex AS-AP Configured for Push Mode Shown)*

6. If the Dionex AS-AP is configured for pull mode, you can now remove the buffer line from the autosampler. Then, disconnect the buffer line from the injection valve.

- If the Dionex AS-AP is configured for push mode, lift up the tubing to remove it from the tubing clip above the needle (see [Figure 5-21](#)).

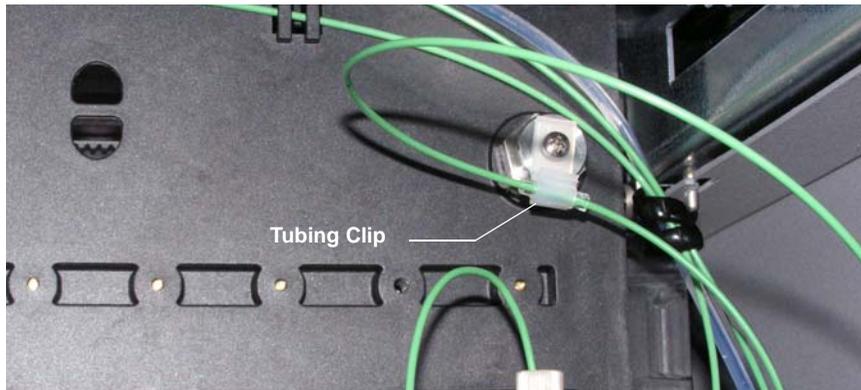


Figure 5-21. Tubing Clip Above Needle Inside the Dionex AS-AP (Dionex AS-AP Configured for Push Mode Shown)

- To disconnect the line from the needle, hold the needle holder with one hand to prevent twisting of the needle, and then disconnect the buffer line fitting (see [Figure 5-22](#)). Remove the fitting bolt and ferrule.

IMPORTANT

Make sure the needle holder does not turn while disconnecting (or reconnecting) the buffer line. If the needle holder turns, the needle may need to be realigned.

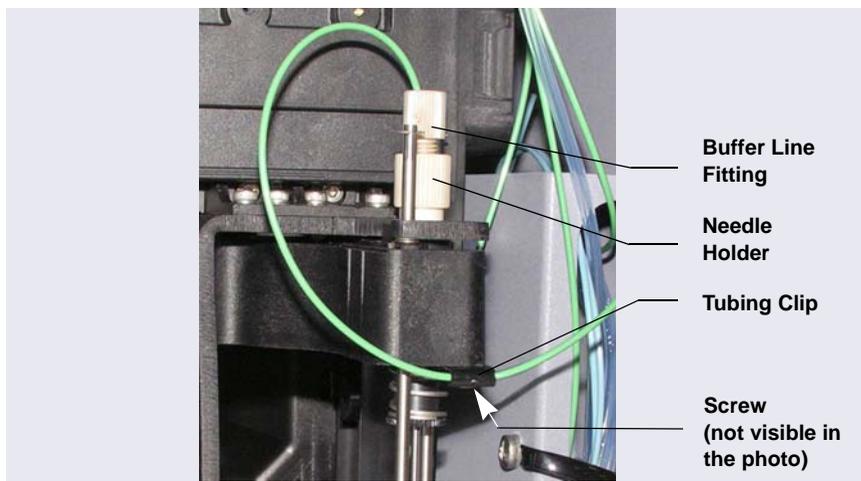


Figure 5-22. Buffer Line Connected to the Needle (Push Mode)

9. Use the 2.5 mm Allen wrench (P/N 052952) to loosen (but not remove) the screw on the underside of the tubing clip on the front of the needle arm (see [Figure 5-22](#)). Slide the tubing out of the clip and remove the buffer line from the Dionex AS-AP.
10. Slide the short piece of clear tubing off of the line. Save this tubing piece to use when installing the new line.

5.5.2 Connecting a 500 μ L or 1200 μ L Buffer Line

Creating a Buffer Line (Optional)

Pre-cut buffer lines are recommended, but you can create a buffer line if a pre-cut line is not available.

1. Locate the 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777) in the Dionex AS-AP Ship Kit (P/N 074929).
2. Cut the length of tubing required for your configuration:
 - To create a 500 μ L buffer line, cut a 109 cm (43 in) length of tubing.
 - To create a 1200 μ L buffer line, cut a 264 cm (104 in) length of tubing.

Connecting the Buffer Line to the Syringe

1. Locate the following items in the Dionex AS-AP Ship Kit:
 - For push mode configurations:
 - One tan 1/16 in short flangeless fitting bolt (P/N 071358)
 - One tan 1/16 in flangeless fitting bolt (P/N 052230)
 - Two two-piece ferrules (P/N 062511)
 - Two small cable ties (P/N 013331)
 - For pull mode configurations:
 - One tan 1/16 in short flangeless fitting bolt (P/N 071358)
 - One two-piece ferrule (P/N 062511)
 - One 10-32 fitting bolt (P/N 074449) and one double-cone ferrule (P/N 074373)

- Two small cable ties (P/N 013331)
2. To connect the buffer line to the syringe, use the short 1/16 in tan fitting bolt (P/N 071358) and a two-piece ferrule (P/N 062511).
 - a. Slide the fitting bolt onto the tubing as shown in [Figure 5-24](#).
 - b. Observe that one side of the small tan ferrule is beveled and one side is flat (see [Figure 5-23](#)). **Hint:** The flat side appears shiny.



Figure 5-23. Small Tan Ferrule (Enlarged)

- c. With the flat side of the small tan ferrule facing toward the fitting bolt, slide the ferrule onto the tubing. Then, slide the clear cone ferrule onto the tubing with the cone toward the flat ferrule and fitting bolt (see [Figure 5-24](#)).

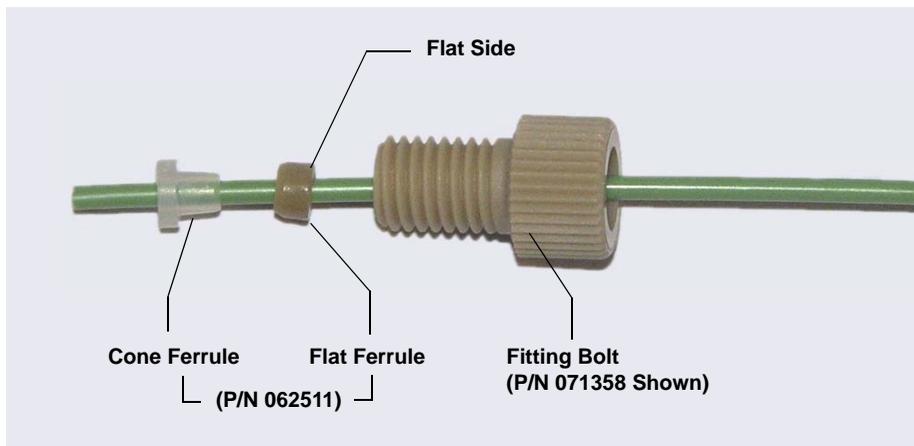


Figure 5-24. Fitting for Buffer Line
(Shorter Fitting Bolt Shown)

NOTE To make it easier to connect to the syringe port, you can pre-make the fitting using a 1/4 x 28 union. Slide the tubing with fitting into the union and tighten fingertight. Then, remove the union. This secures the fer-

rules so they do not fall off the tubing during installation in the syringe port.

3. Connect this fitting to the syringe port. Tighten fingertight.
4. Route the new buffer line toward the back of the autosampler and over to the right side. Secure the line in the flexible tubing ties as described in the instructions in [Section 5.5.1](#) for removing the old buffer line.
5. If the autosampler is configured for push mode, continue to the following section. If the autosampler is configured for pull mode, go on to [“Connecting the Buffer Line to the Injection Valve \(Pull Modes\)” on page 141](#).

Connecting the Buffer Line to the Needle (Push Modes)

1. Slide the small piece of clear tubing onto the free end of the buffer line. Position the clear tubing 46 cm (18 in) from the end of the buffer line.
2. Slide the free end of the tubing through the tubing clip on the front of the needle arm (see [Figure 5-22](#)).
3. Install the longer 1/16 in tan flangeless fitting bolt (P/N 052230) and a two-piece ferrule (P/N 062511) on the tubing as described in [Step 2 on page 137](#).
 - a. Position the bolt and ferrules away from the end of the tubing (so they do not fall off when you insert the tubing into the needle holder).
 - b. Insert the tubing down into the center of the needle holder. When you insert the tubing, you should feel the tubing drop into a small indentation inside the holder (see [Figure 5-25](#)). If not, move the tubing slightly until it does.

IMPORTANT

When connecting the buffer line to the needle, make sure the buffer line slides into the indentation inside the needle holder before tightening the fitting.

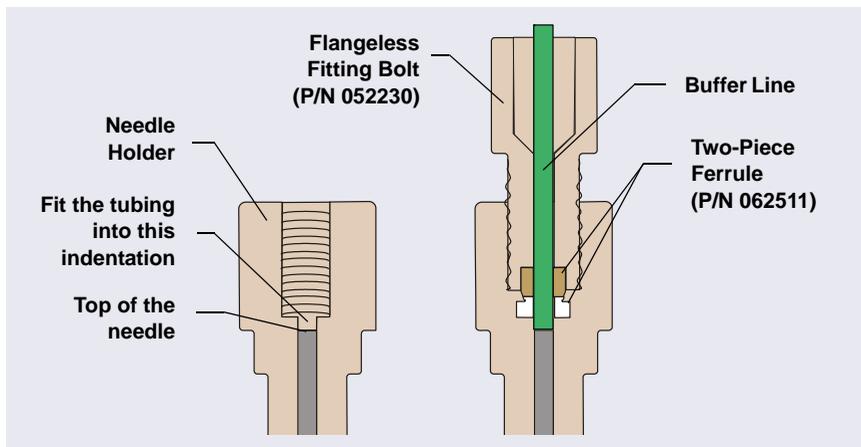


Figure 5-25. Cross-Section of Needle Holder and Buffer Line Fitting

- c. Slide the ferrules and fitting bolt down into the needle holder.
 - d. While holding the needle holder to prevent twisting of the needle, tighten the fitting fingertight.
4. Position the tubing so there is 15 cm (6 in) from the buffer line fitting to the tubing clip on the front of the needle arm (see [Figure 5-26](#)). Make sure the tubing loops toward the front of the autosampler at about a 30° angle as shown in [Figure 5-26](#).

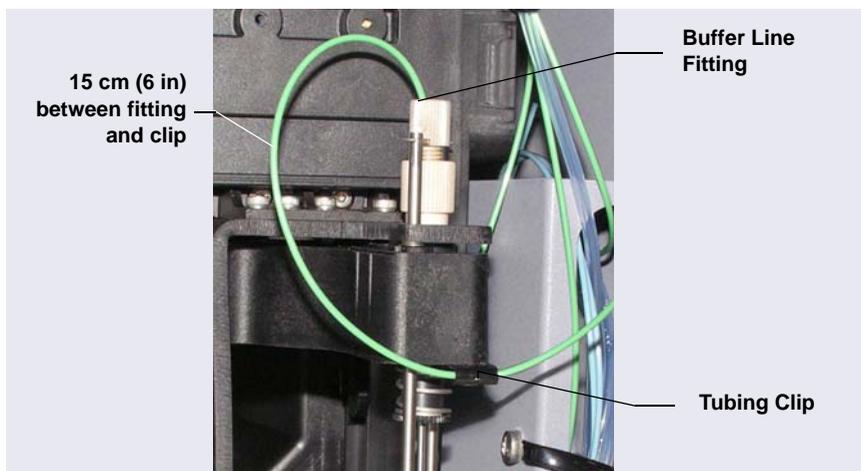


Figure 5-26. Buffer Line Positioned in Tubing Clip on Needle Arm (Push Mode)

5. Tighten the screw on the tubing clip just enough to prevent the tubing from sliding. Do not overtighten the screw.
6. Loop the buffer line up to the tubing clip on the back wall of the autosampler. Verify that the short piece of clear tubing is positioned 30.5 cm (12 in) from the tubing clip on the front of the needle arm and then push the tubing into the clip (see [Figure 5-21](#)).
7. Coil the excess tubing, secure the coil with the small cable ties, and place the coil in the slotted compartment on the right side of the autosampler.
8. Check the left to right movement of the needle arm by sliding the arm back and forth to make sure the buffer line moves freely and does not catch on any part of the autosampler. Adjust the buffer line routing as required (change the angle at which the line curves from the top of the needle arm, change the curve from the needle arm to the back tubing clip, verify the distances between the needle fitting and tubing clip and between the two clips).
9. Press the **Standby** button on the status bar. The autosampler will perform a self-test. Observe the needle arm movement to make sure the buffer line moves freely.
10. When the self-test is complete, run a manual wash cycle (see [Section 3.3.4](#)). Observe the needle arm movement when the needle descends into the wash port and verify that the buffer line moves freely.
11. If the new buffer line is a different size than the previous buffer line, go on to [Section 5.5.4](#) to configure the line in Chromeleon.

Connecting the Buffer Line to the Injection Valve (Pull Modes)

1. Coil the excess tubing, leaving enough tubing extending from the coil to connect to the injection valve.
2. Secure the coil with the small cable ties and place the coil in the slotted compartment on the right side of the autosampler.
3. Install a 10-32 fitting bolt and double-cone ferrule on the tubing and connect the line to the injection valve. For tightening requirements, refer to the guidelines on [page 111](#).
4. Press the **Standby** button on the status bar.
5. If the new buffer line is a different size than the previous buffer line, go on to [Section 5.5.4](#) to configure the line in Chromeleon.

5.5.3 Connecting an 8500 μ L Buffer Line

The 8500 μ L buffer line is pre-assembled at the factory (P/N 075520) and includes the fittings required to connect the line to the syringe and needle.

1. Remove the acorn nut from the PFA tubing end of the buffer line.
2. Connect this end of the buffer line to the syringe valve. Tighten the fitting fingertight.
3. Route the buffer line toward the back of the autosampler and over to the right side. Secure the line in the flexible tubing ties as described in the instructions in [Section 5.5.1](#) for removing the old buffer line.
4. Place the coil of PFA tubing in the slotted compartment on the right side of the autosampler.
5. If the autosampler is configured for push mode, remove the acorn nut from the green PEEK tubing end of the buffer line. Slide the ferrule and fitting bolt off of the end of the tubing. Then, follow the instructions in [“Connecting the Buffer Line to the Needle \(Push Modes\)” on page 138](#) to complete the connections.
6. If the autosampler is configured for pull mode, follow the instructions in [“Connecting the Buffer Line to the Injection Valve \(Pull Modes\)” on page 141](#) to complete the connections.

5.5.4 Configure the New Buffer Line in Chromeleon

If the new buffer line is a different size than the previous buffer line, select the new size on the **Options** page in the Chromeleon configuration (see the example in [Figure 5-27](#)). Click **OK** and then click **Yes** to confirm sending the new configuration to the autosampler. For details about configuring the Dionex AS-AP in Chromeleon, see [Section B.11.3](#).

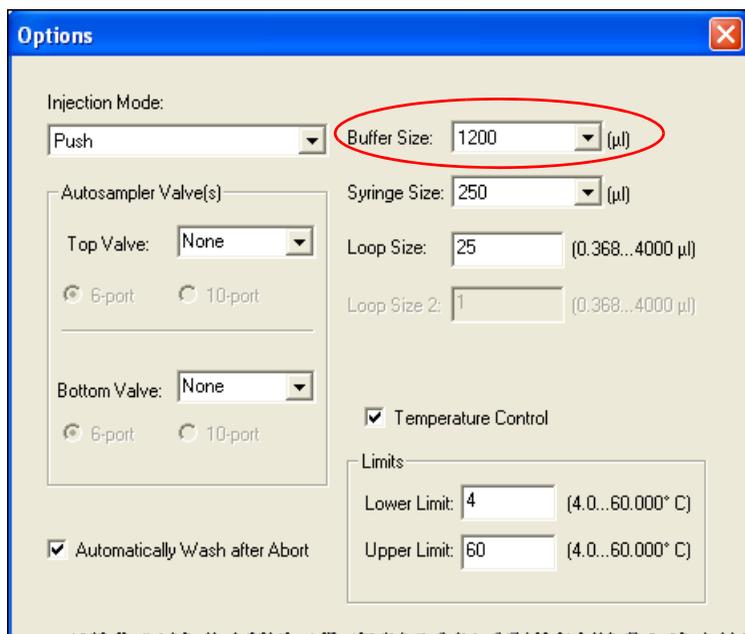


Figure 5-27. Example Chromeleon Configuration Options Page

5.6 Replacing the Syringe Valve Waste Line

1. Lift up the Dionex AS-AP front panel.
2. Disconnect the waste line from the syringe valve (see [Figure 5-28](#)).

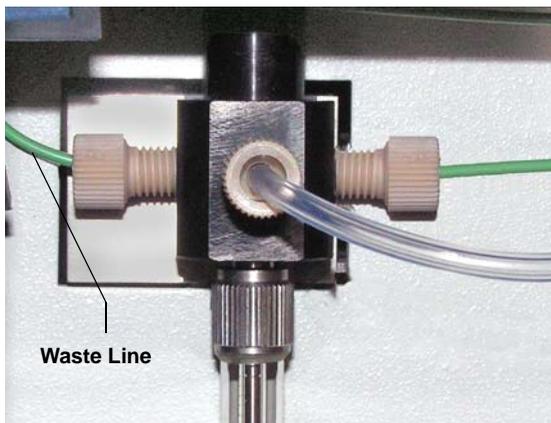


Figure 5-28. Waste Line Connected to the Syringe Valve

3. Remove the syringe valve waste line from the flexible tubing tie in the upper-left corner inside the autosampler (see [Figure 5-29](#)). To open the tie, pull down on the end of the tie. Lift the tubing out of the two clips on the back wall of the autosampler

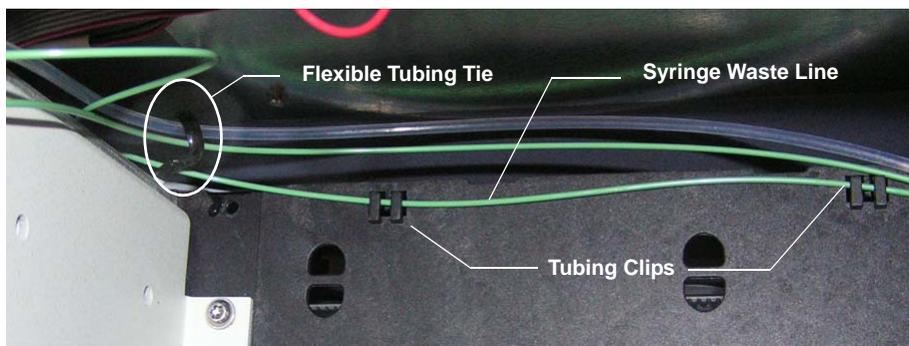


Figure 5-29. Flexible Tubing Tie and Tubing Clips in Upper-Left Corner Inside the Dionex AS-AP

4. Remove the syringe valve waste line from the flexible tubing tie in the upper-right corner inside the autosampler.

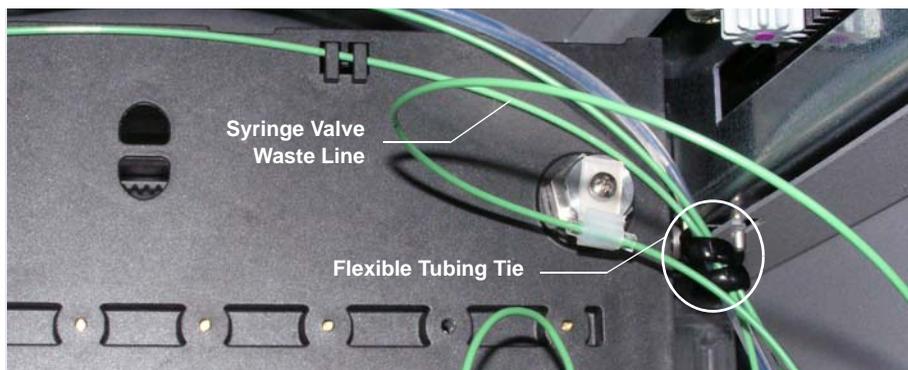


Figure 5-30. Tubing Tie in Upper-Right Corner Inside the Dionex AS-AP

5. Remove the syringe valve waste line from the autosampler.
6. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
 - One 1/16 in tan short flangeless fitting bolt (P/N 071358)
 - One two-piece ferrule (P/N 062511)
7. Cut a 76 cm (30 in) piece of tubing for the new waste line.
8. Follow the steps below to connect the waste line to the syringe:

- a. Slide the fitting bolt onto the tubing as shown in [Figure 5-32](#).
- b. Observe that one side of the small tan ferrule is beveled and one side is flat (see [Figure 5-31](#)). **Hint:** The flat side appears shiny.



Figure 5-31. Small Tan Ferrule (Enlarged)

- c. With the flat side of the small tan ferrule facing toward the fitting bolt, slide the ferrule onto the tubing. Then, slide the clear cone

ferrule onto the tubing with the cone toward the flat ferrule and fitting bolt (see [Figure 5-32](#)).

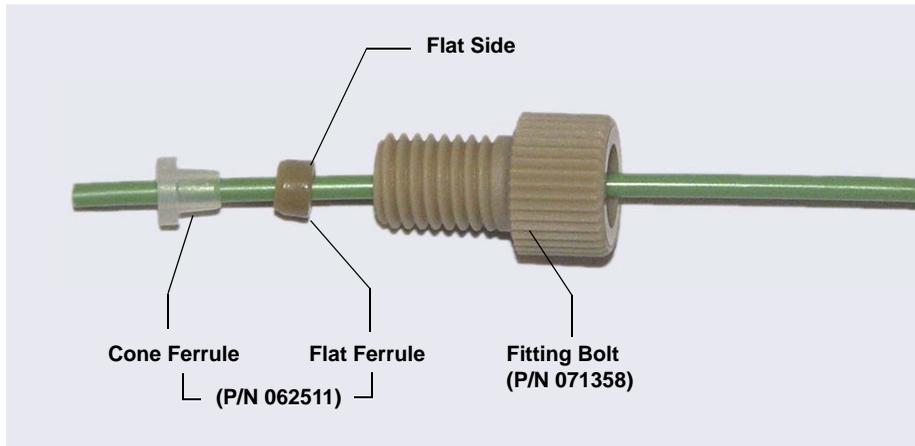


Figure 5-32. *Fitting for Waste Line*

- d. Connect this fitting to the syringe port. Tighten the fitting fingertight.

NOTE To make it easier to connect to the syringe port, you can pre-make the fitting using a 1/4 x 28 union. Slide the tubing with fitting into the union and tighten fingertight. Then, remove the union. This secures the ferrules so they do not fall off the tubing during installation in the syringe port.

9. Route the new waste line toward the back of the autosampler and then down to the wash port. Use the flexible tubing ties and tubing clips to secure the line.

10. Insert the waste line into the right-most opening in the wash port (see [Figure 5-33](#)) and then down into the drain opening in the waste tray (see [Figure 5-34](#)).

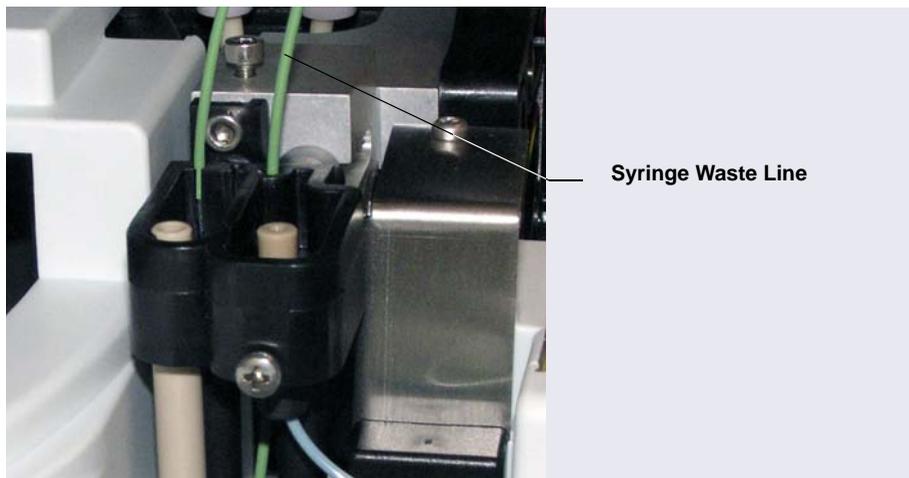


Figure 5-33. Syringe Waste Line in Wash Port

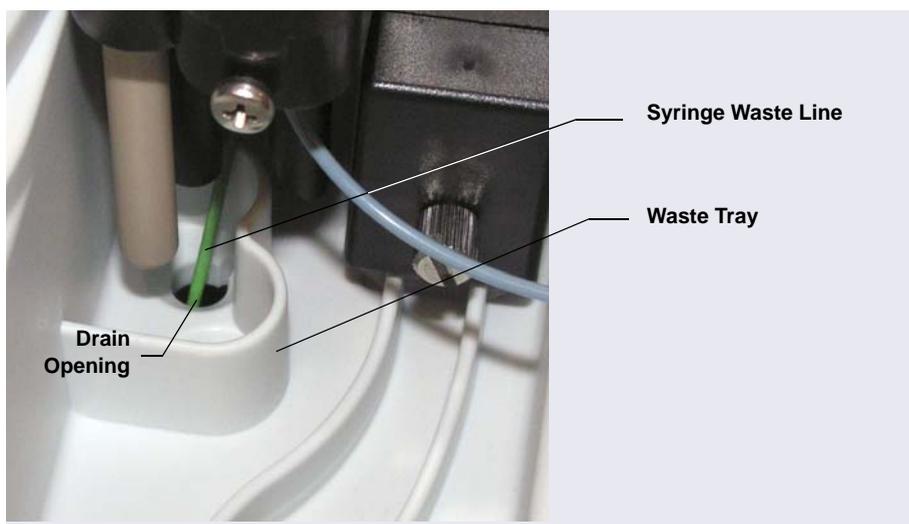


Figure 5-34. Syringe Waste Line in Waste Tray

5.7 Replacing the Wash Reservoir Line

1. Lift up the Dionex AS-AP front panel.
2. Disconnect the wash reservoir line from the syringe valve (see [Figure 5-35](#)).

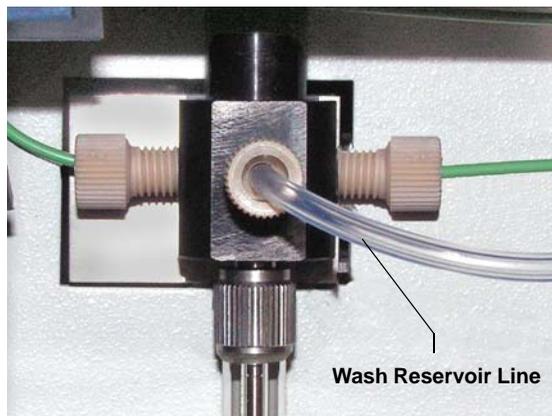


Figure 5-35. Wash Reservoir Line Connected to the Syringe Valve

3. Disconnect the other end of the line from the wash reservoir or degas channel.
4. Remove the wash reservoir line from the flexible tubing ties (see [Figure 5-36](#)), which hold the wash reservoir line and other tubing in place in the autosampler. To open a tie, pull down on the end of the tie.



Figure 5-36. Flexible Tubing Tie Inside the Dionex AS-AP

5. Remove the wash reservoir line from the autosampler.

6. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 1.55 mm (0.062 in) ID colorless PFA tubing (P/N 052112)
 - 1/8 in tan short flangeless fitting bolt (P/N 057934)
 - 1/8 in yellow flangeless ferrule (P/N 048949)
7. Cut a piece of tubing long enough to connect from the syringe to the reservoir or degas channel. The standard length is 76 cm (30 in).
8. Install the fitting bolt and ferrule onto the tubing and connect the fitting to the syringe valve. Tighten the fitting fingertight.
9. Route the new wash reservoir line to the back of the autosampler. Use the flexible tubing ties to secure it, and then route the line to the wash reservoir or degas channel.
10. Connect the new wash reservoir line to the wash reservoir or degas channel.

5.8 Replacing the Sample Transfer Line (Push Modes)

In push mode configurations, the sample transfer line connects the injection port to the injection valve. For a push sequential mode or push simultaneous mode configuration, the sample transfer line includes the line from the injection port to the diverter valve or Y-connector, and the line from the diverter valve or Y-connector to the injection valve. Refer to the following figures.

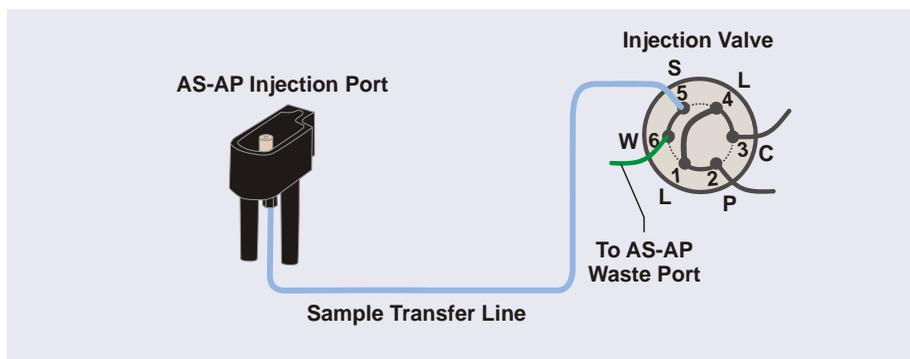


Figure 5-37. Sample Transfer Line Connections for Push Mode

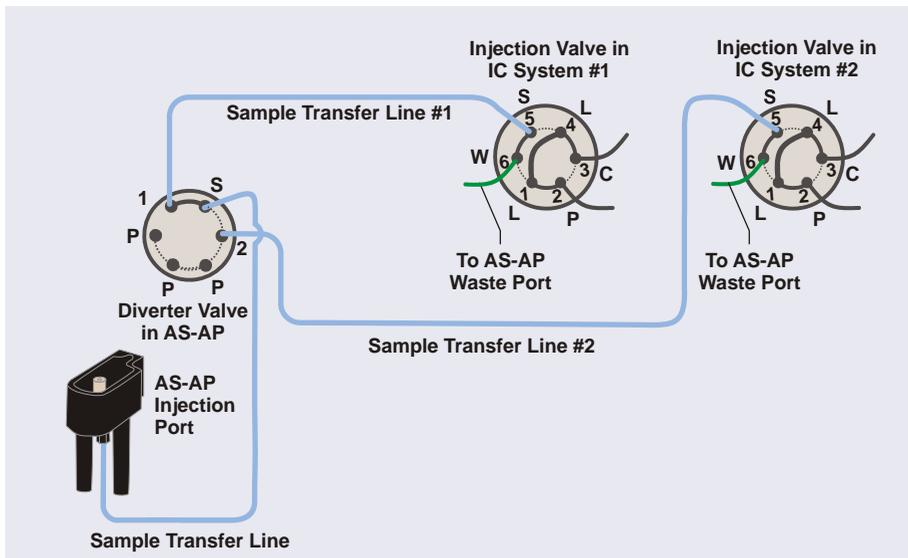


Figure 5-38. Sample Transfer Line Connections for Push Sequential Mode

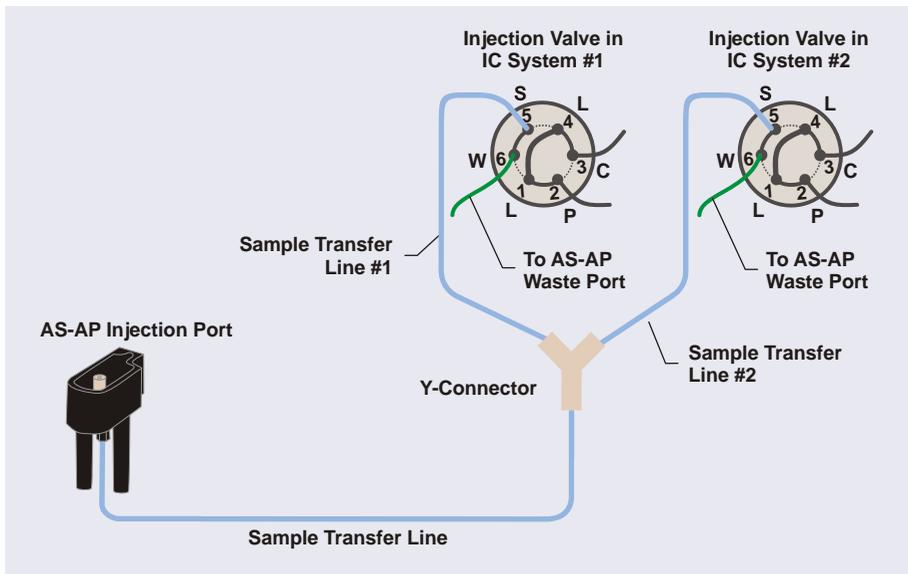


Figure 5-39. Sample Transfer Line Connections for Push Simultaneous Mode

1. Disconnect the sample transfer line from the injection valve, diverter valve (if the Dionex AS-AP is configured for sequential injections), or Y-connector (if the Dionex AS-AP is configured for simultaneous injections). Use a 5/16 in wrench to loosen the fitting and then complete the removal with your fingers. Save the fitting bolt and ferrule.
2. Using a small Phillips head screwdriver, loosen—but do not remove—the screw on the front of the injection port (see [Figure 5-40](#)).

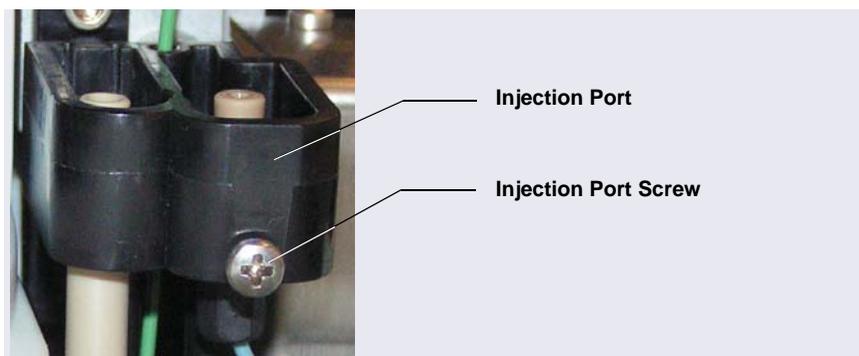


Figure 5-40. Injection Port Screw

3. Push up the injection port from below and pull the port and the sample transfer line out of the autosampler (see [Figure 5-41](#)).
4. Disconnect the sample transfer line from the injection port. Use a 1/4 in wrench to loosen the fitting and then complete the removal with your fingers. Save the fitting bolt.

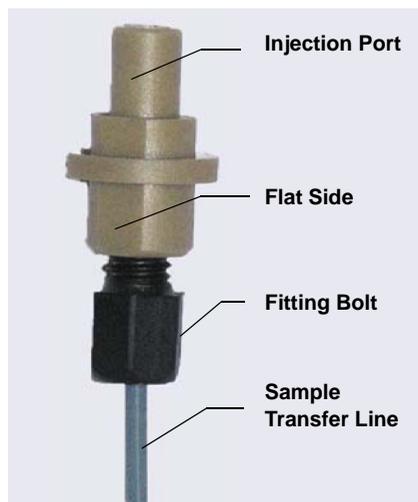


Figure 5-41. Injection Port and Sample Transfer Line (Removed)

5. Follow the steps below to create a new sample transfer line:
 - a. Locate the 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714) in the Dionex AS-AP Ship Kit (P/N 074929) and a split-cone ferrule (P/N 062978).
 - b. Cut a piece of tubing to the length required for your system configuration.
 - c. Slide the fitting bolt onto one end of the tubing. Orient the new split-cone ferrule with the split side facing toward the fitting bolt, and then slide the ferrule onto the tubing (see [Figure 5-42](#)).

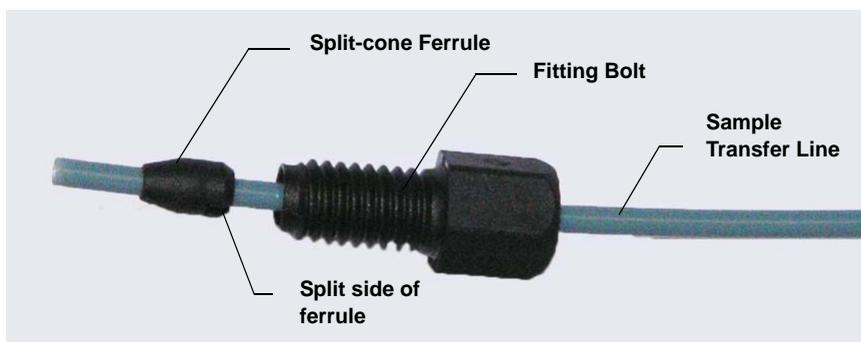


Figure 5-42. Sample Transfer Line Fitting

- d. Connect this fitting to the injection port. Make sure the tubing bottoms out in the injection port and there is no gap between the tubing and the port. Tighten fingertight and then use a 1/4 in wrench to tighten slightly more (one-quarter turn or less).
6. Thread the free end of the sample transfer line through the top opening where you removed the injection port. Make sure the flat side of the injection port (see [Figure 5-41](#)) is facing toward the front and then insert the injection port into the opening until it stops.

7. Gently tighten the screw on the front of the injection port (see [Figure 5-43](#)). Do not overtighten the screw.

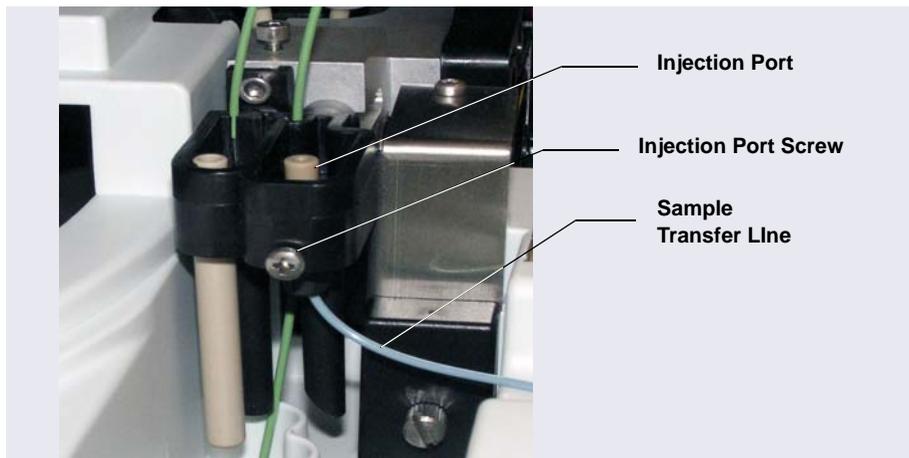


Figure 5-43. *Sample Transfer Line Installed*

8. Use a 10-32 fitting bolt (P/N 074449) and double-cone ferrule (P/N 074373) to connect the new sample transfer line to the injection valve or diverter valve. For tightening requirements, refer to the guidelines on [page 111](#).

To connect to a Y-connector, you can reuse the fitting bolt and ferrule provided with the Y-connector or use a 1/16 in flangeless fitting bolt (short) (P/N 071358) and tan two-piece ferrule (P/N 062511).

9. For a sequential or simultaneous mode configuration, also replace the sample transfer lines that connect from the diverter valve or Y-connector to the injection valves, as required.
10. Perform a manual wash cycle (see [Section 3.3.4](#)).
11. If the autosampler is configured for push mode or push sequential mode, calibrate the sample transfer line volume (see [Section 5.9](#)).
12. If the autosampler is configured for push simultaneous mode, calibration of the sample transfer line is not required. However, the flow to each valve must be balanced, so that equal flow moves through each valve. To do this, follow the guidelines on [page 191](#).

5.9 Calibrating the Sample Transfer Line Volume (Push Modes)

Calibrate the sample transfer line volume if the Dionex AS-AP is configured for push mode or push sequential mode. Sample transfer line calibration is not required for other injection mode configurations.

NOTE For push sequential mode, the sample transfer line for each system includes the tubing from the Dionex AS-AP injection port to the diverter valve, the path through the diverter valve, and the tubing from the diverter valve to the injection valve (see [Figure 5-44](#)). The sample transfer line volume to each injection valve must be calibrated separately.

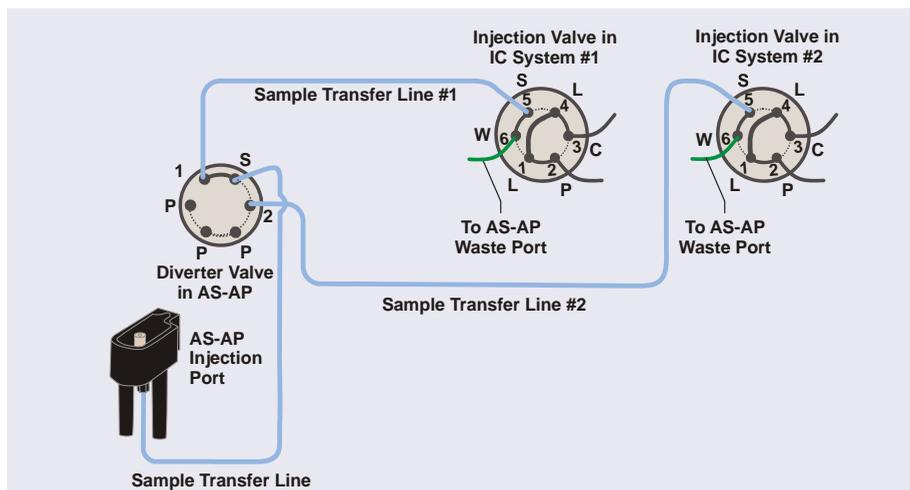


Figure 5-44. Sample Transfer Line Connections for Sequential Injections to Two Injection Valves

Preparation

Before performing the calibration, complete the following:

- Prime the syringe to make sure it is free of bubbles (see [Section B.13](#)).
- Verify that the correct injection mode is selected in the Chromeleon configuration (see [Section B.11.3](#)).

Calibration Procedure

1. On the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), click **TLV Calibration**. The TLV Calibration panel appears (see [Figure 5-45](#) for push mode or [Figure 5-46](#) for push sequential mode).

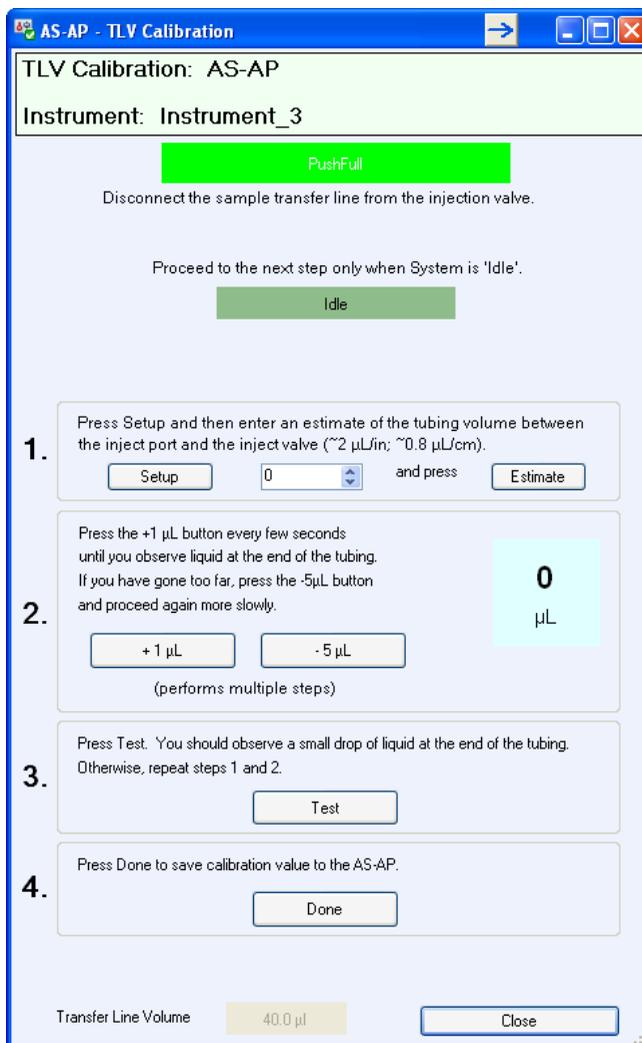


Figure 5-45. TLV Calibration Panel (Push Injection Mode)

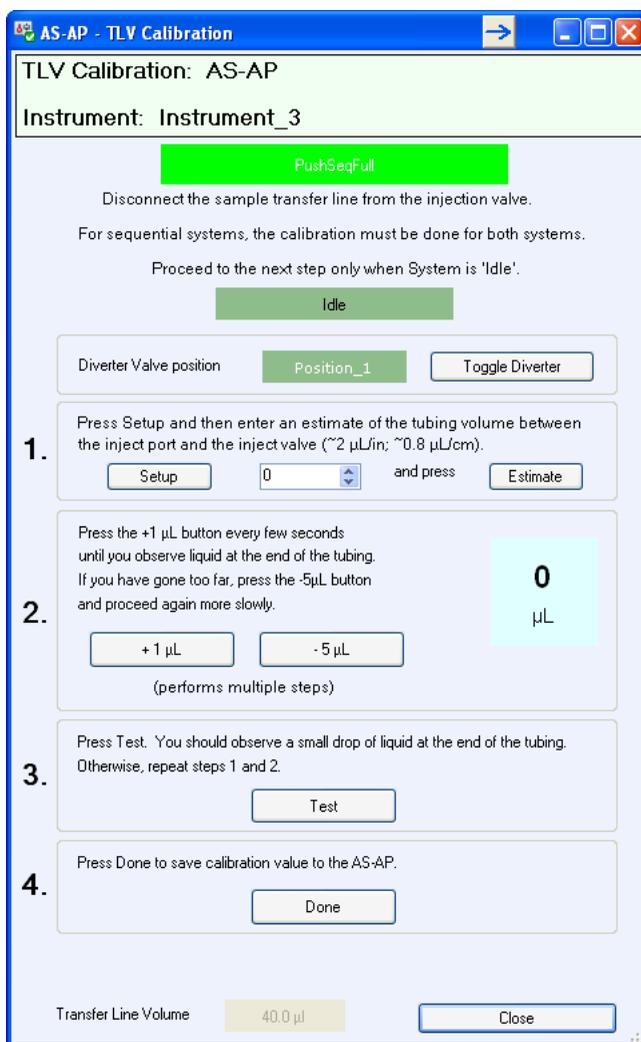


Figure 5-46. TLV Calibration Panel
(Push Sequential Injection Mode)

2. Disconnect the sample transfer line from the injection valve and route the line outside the autosampler or chromatography compartment.
3. Follow the instructions on the panel to complete the calibration. Also refer to the notes below.

Notes for sample transfer line volume calibration:

- In **Step 1**, after you click **Setup**, the Dionex AS-AP prepares for calibration by flushing and then emptying the sample transfer line. When you click **Estimate**, the Dionex AS-AP dispenses 10 μL less than your estimate into the injection port. This partially fills the sample transfer line.
- In **Step 2**, after you click **+1 μL** , wait until the status is **Idle** before clicking **+1 μL** again.

Continue clicking **+1 μL** until a tiny drop of liquid appears at the end of the needle seal line.

If you click **+1 μL** too rapidly and more than a single small drop of liquid appears, click **-5 μL** . The Dionex AS-AP will empty the line and then fill the line with about 5 μL less than was cleared. You can then begin again (repeat the steps 1 and 2 of the procedure on the TLV Calibration panel).

4. Reconnect the sample transfer line to the injection valve. For tightening guidelines, see [page 111](#).
5. For sequential mode only: After completing the procedure for system #1 and clicking **Done**, click **Toggle Diverter** and repeat the calibration procedure for system #2.

5.10 Replacing the Sample Transfer Line (Pull Mode)

In pull mode configurations, the sample transfer line connects the needle to the injection valve.

1. Lift up the Dionex AS-AP front panel.
2. To position the needle in a convenient position for servicing, open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and click **Alignment**. The Sampler Alignment panel opens (see [Figure 5-6](#)). Click **Move to Wash Port**. The needle moves to above the wash port.
3. While holding the needle holder to prevent twisting of the needle (see [Figure 5-47](#)), disconnect the sample transfer line from the needle. Remove the fitting from the line (save the fitting bolt).

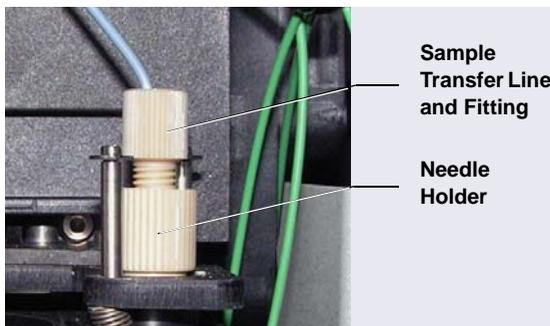


Figure 5-47. Sample Transfer Line Connected to the Needle

4. Disconnect the other end of the sample transfer line from port **S** (5) on the injection valve and remove the line from the autosampler. Remove the fitting from the line (save the fitting bolt).
5. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714)
 - One two-piece ferrule (clear cone and tan flat) (P/N 062511)
 - One double-cone ferrule (P/N 074373)
6. Cut a piece of tubing to the length required for your configuration.

7. Slide the fitting bolt and two-piece ferrule onto one end of the sample transfer line (see [Figure 5-32](#)). Follow the steps below to connect the line to the needle:
 - a. Position the fitting bolt and ferrules away from the end of the tubing (so they do not slide off when you insert the tubing into the needle holder).
 - b. There is a small indentation in the center of the needle holder (see [Figure 5-48](#)). The sample transfer line must be placed in the indentation before you tighten the fitting. When you slide the tubing into the needle holder, you should feel the tubing drop into the indentation. If not, move the tubing until it drops into the indentation.

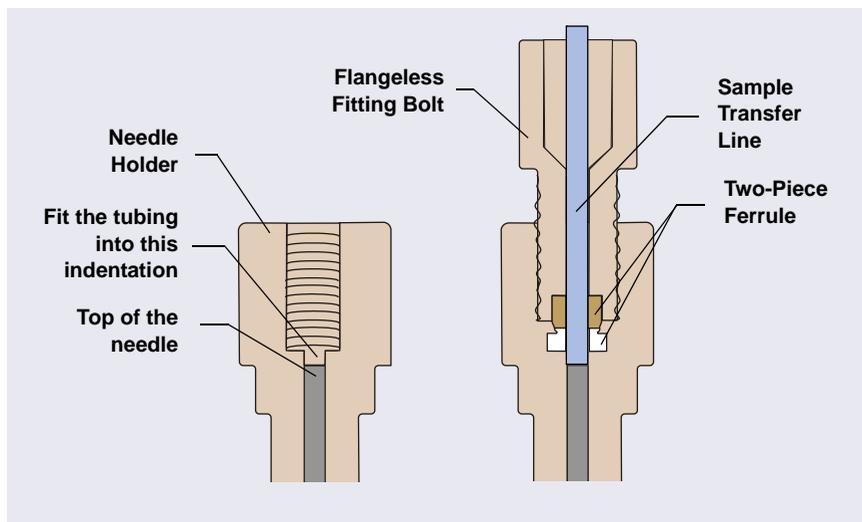


Figure 5-48. *Cross-Section of Needle Holder and Sample Transfer Line Fitting*

IMPORTANT

When connecting the sample transfer line to the needle, make sure you fit the tubing into the indentation inside the needle holder before tightening the fitting.

- c. Slide the ferrules and fitting bolt down into the needle holder.
- d. While holding the needle holder to prevent twisting the needle, connect the sample transfer line. Tighten the fitting fingertight.

8. Route the other end of the sample transfer line to the injection valve
9. Use the 10-32 fitting bolt and double-cone ferrule to connect the line to port **S** (5). For tightening guidelines, see [page 111](#).

5.11 Rebuilding a High-Pressure Valve

Thermo Fisher Scientific recommends rebuilding a high-pressure valve annually. High-pressure valves are the optional valves (injection, diverter, fraction collection, or auxiliary) installed in the Dionex AS-AP. The Valve Rebuild Kit (P/N 075973, 6-port valve; P/N 079054, 10-port valve) contains all required replacement parts.

NOTE Substitution of non-Dionex/Thermo Fisher Scientific parts may impair valve performance and void the product warranty.

1. Turn off the pump flow.
2. Press the main power switch on the rear panel of the Dionex AS-AP to turn off the Dionex AS-AP power.
3. Disconnect each liquid line connected to the valve.
4. Follow the instructions provided in the Rebuild Kit to replace the rotor seal, isolation seal, and stator face.
5. Reconnect all liquid lines to the valve.
6. Turn on the power to the Dionex AS-AP.
7. Turn on the pump flow.
8. Check for leaks from the valve. Tighten fittings as required. For tightening guidelines, see [page 111](#).

5.12 Updating the Autosampler Firmware

The autosampler is shipped with the most recent firmware version. The firmware is also included with Chromeleon. Whenever a new firmware version is released for the autosampler, the new version will be provided with the next Chromeleon update and described in the related release notes.

The new firmware will *not* be downloaded automatically to the autosampler when you install a Chromeleon update. To update the firmware in the Dionex AS-AP:

1. Go to the **General** page of the Chromeleon configuration (see [“General Page” on page 205](#)).
2. Before starting the download, click the **Help** button on the **General** page for detailed instructions.

5.13 Changing the Main Power Fuses

1. Press the main power switch on the rear panel of the Dionex AS-AP to turn off the power.
2. Disconnect the main power cord from both its source and from the Dionex AS-AP rear panel.



HIGH VOLTAGE—Disconnect the main power cord from its source and also from the rear panel of the Dionex AS-AP.



HAUTE TENSION—Débranchez le cordon d'alimentation principal de sa source et du panneau arrière du Dionex AS-AP.



HOCHSPANNUNG—Ziehen Sie das Netzkabel aus der Steckdose und der Netzbuchse auf der Rückseite des Dionex AS-AP.

3. The fuse cartridge is located next to the main power switch (see [Figure 5-49](#)). Use a small screwdriver to remove the fuse cartridge.



Figure 5-49. Dionex AS-AP Fuse Cartridge

4. Replace the two fuses with new 4 A IEC 60127-2 fast-blow fuses (P/N 954763). Thermo Fisher Scientific recommends always replacing *both* fuses.
5. Reinstall the fuse cartridge.
6. Reconnect the main power cord and turn on the power.

A • Specifications

Thermo Scientific Dionex AS-AP Autosampler Specifications	
Injection	
Sample Capacity	10 mL vials: 81 1.5 mL vials: 120 0.3 mL vials: 120 Well Plates: 288 - 3 x 96 standard or deep well Well Plates: 1152 - 3 x 384 standard well
Minimum Sample Volume	10 µL can be sampled from a 300 µL micro vial 20 µL can be sampled from a 500 µL micro vial
Maximum Injection Volume	7500 µL
Variable Volume Range	1-100 µL in 0.1 µL increments 100-7500 µL in 1 µL increments
Injection Cycle Time (including sample preparation such as dilution)	15 s, with sample overlap function 60 s for a 5 µL full loop without sample overlap
Injection modes	Full Loop Partial Loop Limited Sample Capillary
Sampling Technique	Pull Mode Push Mode
Injection Precision	Fixed Loop: <0.3% RSD at 20 µL Partial Loop: <0.5% RSD at 20 µL Capillary Mode: <0.5% RSD at 0.4 µL
Dilution	1:1 to 1:1000

Thermo Scientific Dionex AS-AP Autosampler Specifications	
AutoDilution	With post-run functionality and Chromeleon AutoDilution License
Dilution Precision	<1.0% RSD for a 1:10 dilution
Carryover	<0.01% with 500 µL flush volume
Valves (Optional)	
Injection Valves	One or two two-position six-port or ten-port
Diverter Valve	One two-position six-port or ten-port
Fraction Collection Valve	One two-position six-port or ten-port
Auxiliary Valve	One or two two-position six-port or ten-port
Sampling Features	
Sample Preparation	Dilution, addition of internal standards, concentration/matrix elimination, derivatization, etc.
Inline Sample Filtration	Dual filter, back flush
Sample Degassing	CRD 200/300, upgradeable, user installable
Dual Instrument Support	Sequential (asynchronous) and Simultaneous modes, field upgradeable
Fraction Collection	With reinjection and Chromeleon Fraction Collection License
Sample Tray Thermostatting (Optional)	4 °C to 60 °C
Sample Conductivity and pH (Optional)	Inline measurement of sample conductivity and pH with post-run functionality
System Software	
Software	Chromeleon Chromatography Data System software, supports Microsoft Windows WP or Vista
Automated Procedure Wizards	Yes, standard features
System Smart Startup and Smart Shutdown	Yes, standard feature
System Wellness and Predictive Performance	Yes, standard feature

Thermo Scientific Dionex AS-AP Autosampler Specifications	
Application Templates	Yes, standard feature
Automation Support of Third-Party Instruments	Yes, fully controls >300 different instruments from more that >30 manufactures, including GC, HPLC and MS.
Customizable System Control Panels	Yes, standard feature
Data Trending Plots	Yes, all device numerical parameters
Power Failure Protection	Yes, standard feature
System Trigger Commands and Conditional	Yes, standard feature (Chromeleon 6.8 only)
Daily Audit Trail	Yes, standard feature
Sample Audit Trail	Yes, standard feature
System Calibration Storage	Yes, factory, current and previous. Completely user selectable.
Customized Reporting	Yes, standard feature with unlimited report workbooks
GLP Compliance	Yes, optional
Electrical	
Main Power Requirements	90–265 VAC, 47–63 Hz (Auto-sensing power supply; no manual voltage or frequency adjustment required) Typical input power: 160 W Maximum line draw: 2 A at 110 VAC
Fuse Requirements	Two IEC 60127-2 fast-blow fuses (P/N 954763) rated at 4 A, 250 V
Physical Specifications	
Dimensions (h x w x d):	44.5 x 35.9 x 51.6 cm (17.5 x 14.1 x 20.3 in)
Weight	25.2 kg (55.5 lb) without sample temperature control 26.8 kg (59.0 lb) with sample temperature control
Flow Path	All polymeric (PEEK), anion or cation configurations

Thermo Scientific Dionex AS-AP Autosampler Specifications	
Environmental	
Operating Temperature	4–40 °C (40–104 °F)
Operating Humidity	5–95% relative humidity (noncondensing)

This chapter provides installation instructions for the Thermo Scientific Dionex AS-AP Autosampler.

NOTE The order of the steps is important. It is especially important to install the Chromeleon Chromatography Data System before connecting the USB cable and turning on the system power.

B.1 Facility Requirements

- Make sure the Dionex AS-AP installation site meets the electrical and environmental specifications listed in [Appendix A](#).
- Install the Dionex AS-AP on a sturdy workbench at a height that ensures convenient access to the interior.
- For optimum operation, place the Dionex AS-AP as close as possible to the left side of the IC system. The Dionex AS-AP can also be placed on top of or underneath the Thermo Scientific Dionex ICS-5000 Detector/Chromatography Module (DC).

B.2 Unpacking the Dionex AS-AP



Two or more persons must lift the Dionex AS-AP, which weighs more than 23 kg (50 lb). Lift the AS-AP only from each side of the cabinet bottom. Lifting from the front door will damage the door hinges.



Au moins deux personnes peuvent soulever l'Dionex AS-AP, qui pèse plus de 32 kg (50 lb). Ne soulevez l'AS-AP que par chaque côté du fond de l'armoire. Son soulèvement par la porte du panneau avant endommagera les charnières de la porte.



Der Dionex AS-AP wiegt über 23 kg. Daher sollte das Gerät nur von zwei oder mehr Personen angehoben werden. Greifen Sie dazu an beiden Seiten unter das Gerät. Heben Sie den Autosampler nicht an der Vordertür an, da dadurch die Türangeln beschädigt werden könnten.

NOTE Check the shipping container for any external signs of damage. If the container shows signs of damage, contact Dionex immediately.

1. Follow the instructions printed on the shipping container to turn the container on its side, open the bottom flaps, and turn it right side up again (see [Figure B-1](#)).



Figure B-1. Shipping Container with Bottom Flaps Opened

2. Lift up the shipping container to remove it (see [Figure B-2](#)) and set the container aside. Remove the top foam packing insert.



Figure B-2. *Lift Up the Shipping Container*

3. Remove the ship kit box from the top of the module (see [Figure B-3](#)).



Figure B-3. *Ship Kit on Top of the Module*

4. Remove the foam packing cage (see [Figure B-4](#)).
5. With two or more persons, grasp each side of the Dionex AS-AP cabinet bottom, lift up the module, and then place it on the bench.
6. Remove the polyethylene bag the module is shipped in.
7. Check that the main power switch on the rear panel is turned off.



Figure B-4. *Module with Packing Cage Removed*

8. Lift up the Dionex AS-AP front panel (see [Figure B-5](#)) and pull out the foam insert that secures the needle arm and carousel cover during shipment (see [Figure B-6](#)).

NOTE **Save the foam insert.** It is required to protect the needle when the autosampler is moved or shipped.

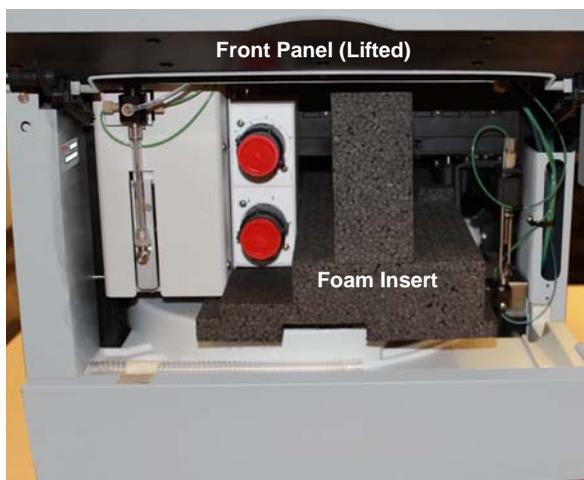


Figure B-5. *Dionex AS-AP with Foam Insert for Protecting the Needle Arm and Carousel (Dionex AS-AP with Optional Valves Shown)*

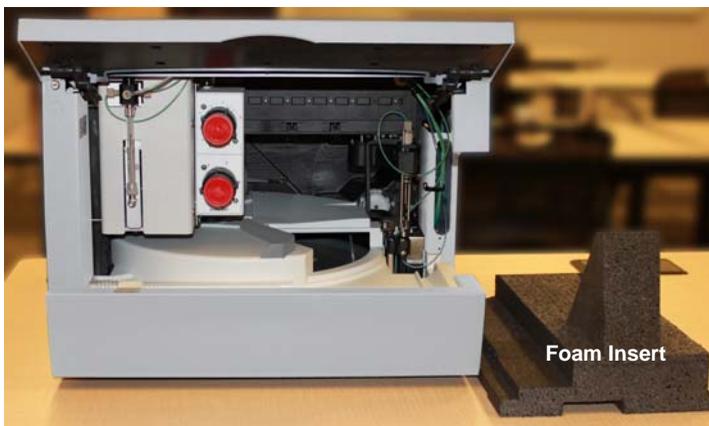


Figure B-6. *Dionex AS-AP with Foam Insert Removed*

9. Unpack the Dionex AS-AP Ship Kit (P/N 074929) (see [Figure B-7](#) and [Figure B-8](#)).
10. Place the items in a convenient location and check them against the packing list (see [Figure B-9](#)). Report any discrepancies to Dionex immediately.



Figure B-7. *Ship Kit with Packing List*



Figure B-8. Ship Kit Items Removed from Box



Figure B-9. Ship Kit Items Unpacked

IMPORTANT

Save the shipping container and all other shipping materials for later use. Should it be necessary to return the Dionex AS-AP during the warranty period, Dionex recommends repacking the autosampler in the original shipping container.

B.3 Plumbing Schematics

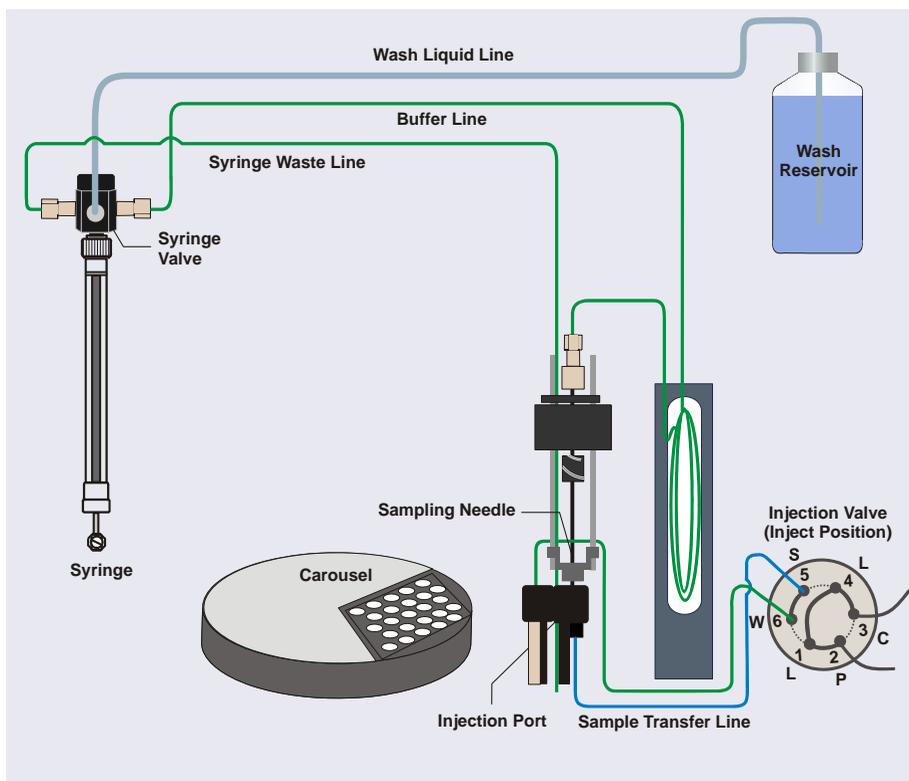


Figure B-10. Dionex AS-AP Plumbing Schematic for Push Mode

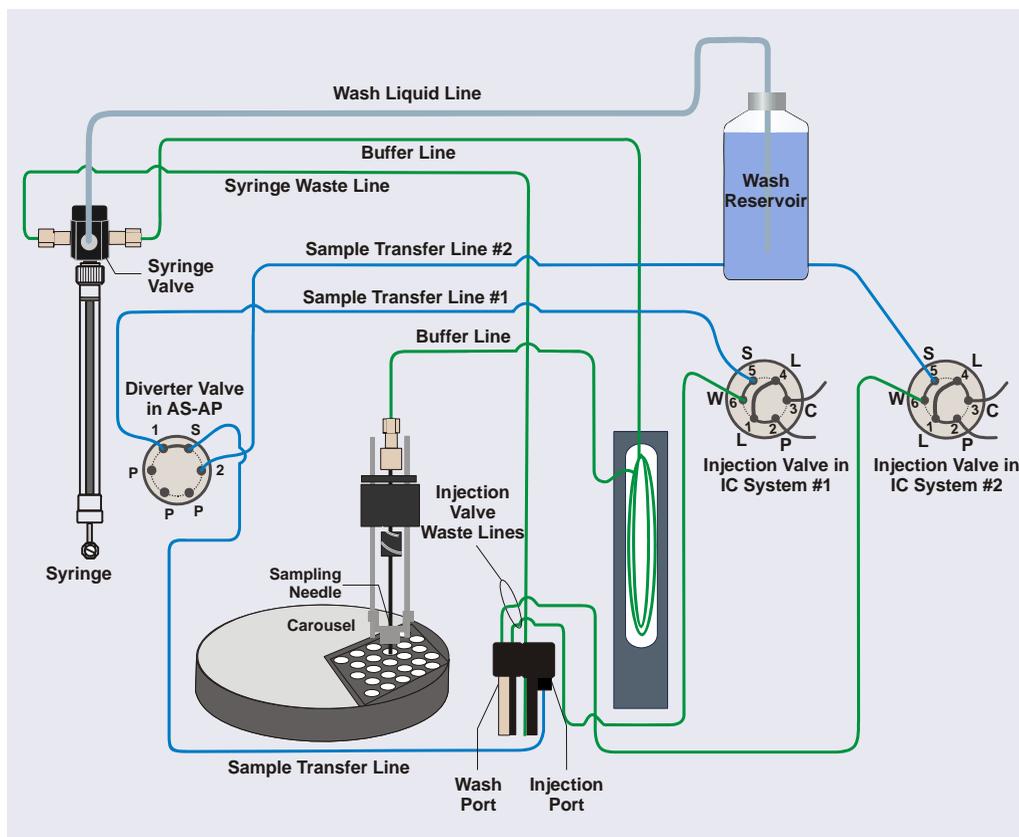


Figure B-11. Dionex AS-AP Plumbing Schematic for Push Sequential Mode

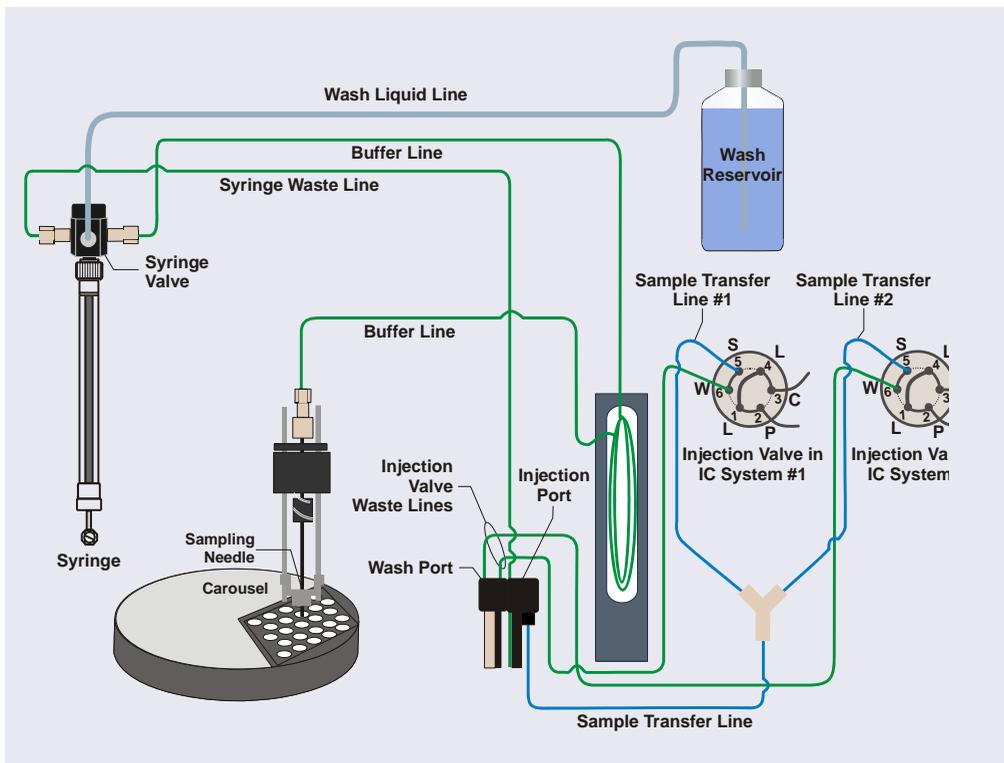


Figure B-12. Dionex AS-AP Plumbing Schematic for Push Simultaneous Mode

B.4 Syringe, Buffer Line, and Sample Loop Guidelines

[Table B-1](#) lists the recommended syringe, buffer line, and sample loop combinations required for correct Dionex AS-AP operation.

Syringe	Buffer Line	Sample Loop ^a
100 µL	500 µL	0.4–50 µL
250 µL	1200 µL	0.4–1.50 µL
1000 µL	1200 µL	5–500 µL
1000 and 5000 µL	8500 µL	100–7000 µL ^b also for concentrator columns

Table B-1. Recommended Syringe, Buffer Line, and Sample Loop Combinations

a The autosampler will use multiple syringe draws to fill the loop, as required.

b In this configuration, if the sample loop volume is over 4000 µL, the autosampler will use multiple syringe draws to fill the loop.

- A 250 µL syringe and a 1200 µL buffer line are standard. Verify that your sample loop size falls into the recommended volume range for this combination. If it does not, make the appropriate change (either replace the sample loop or replace the syringe and/or buffer line).
- For all capillary applications, a 100 µL or 250 µL syringe is recommended.
- For all partial-loop injections, a 250 µL syringe is recommended.
- If a Sample Conductivity and pH Accessory is installed, install a 1000 µL or 5000 µL syringe.
- If you are loading a 4 mm concentrator column, install a 5000 µL syringe and an 8500 µL buffer line.
- For the best precision, use a syringe, buffer line, and sample loop combination that requires only a single syringe pull (see [Table B-1](#)). However, if the sample volume specified for an injection exceeds the installed syringe size, the autosampler will draw multiple syringe volumes to achieve the required injection volume. This may result in slightly reduced precision.

Syringe Size Notes

If the syringe is required to draw a volume that is 95% of its capacity, Dionex recommends installing the next larger syringe size. To estimate the volume of liquid the syringe will draw during operation, use the following formula:

*Syringe Draw Volume (full-loop injection) = (Transfer Line Volume) + (Loop Overfill Factor * Loop Size) + 40 μ L*

To estimate the transfer line volume, use the following formula:

*Tubing Volume (μ L) = ((Tubing ID in mm / 2)²) x 3.14159 * Tubing Length in mm*

The tubing volume of the 0.33 mm (0.013 in) ID blue PEEK tubing used for the sample transfer line is approximately 0.8 μ L per cm (2 μ L per in).

Buffer Line Notes

- A 1200 μ L buffer line is installed at the factory. This line is 263 cm (103.5 in) of 0.75 mm (0.030 in) ID PEEK tubing (green) (P/N 044777). A replacement 1200 μ L buffer line (P/N 074989) is available.
- If a 500 μ L buffer line is required, order a pre-cut 500 μ L buffer line (P/N 074994) (recommended) or you can cut a 109 cm (43 in) length of 0.75 mm (0.030 in) ID PEEK tubing (green) (P/N 044777).
- If an 8500 μ L buffer line is required, order P/N 075520. The 8500 μ L buffer line must be pre-assembled at the factory. The assembly consists of two sizes of tubing joined by a special union and includes the fittings required for installation in the autosampler.

For buffer line installation instructions, see [Section 5.4](#)

Tightening Guidelines for Fittings

High-pressure (blue) 10-32 fitting bolts (P/N 074449) and high-pressure (blue) double-cone ferrules (P/N 074373) are used for connections to the injection and diverter valves. These fittings are used for both high-pressure and low-pressure connections to the valves. To tighten the fittings, follow these guidelines:

1. First, use your fingers to tighten the fitting bolt as tight as you can. Then, use a wrench to tighten the fitting an additional three-quarter turn (270°).
2. If leaks occur, replace the fitting bolt, ferrule, and tubing.

B.5 Installation Checklist

Installation Step	Page
<input type="checkbox"/> Set up the wash liquid reservoir	page 179
<input type="checkbox"/> Connect to the injection valve	page 184
<input type="checkbox"/> Connect the drain line	page 198
<input type="checkbox"/> Connect the USB cable	page 200
<input type="checkbox"/> Plug the power cord into a grounded power source	page 201
<input type="checkbox"/> Set up the Dionex AS-AP in Chromeleon	page 202
<input type="checkbox"/> Check the needle alignment	page 211
<input type="checkbox"/> Prime the syringe and remove any bubbles	page 211
<input type="checkbox"/> Connect TTL and relays (optional)	page 212

B.6 Setting Up the Wash Liquid Reservoir

The 2 L wash liquid reservoir (P/N 062510) provided in the Dionex AS-AP Ship Kit (P/N 074929) can be set up for offline degassing (see [Section B.6.1](#)) or for online degassing (see [Section B.6.2](#)).

B.6.1 Connecting the Reservoir for Offline Degassing

1. Rinse the wash liquid reservoir with ASTM Type 1 (18 meghom-cm) filtered and deionized water.
2. Degas the deionized water offline first and then fill the reservoir.
3. Install the reservoir cap. Make sure that the end of the liquid line inside the reservoir extends to the bottom of the reservoir. Hand-tighten the cap.
4. Place the reservoir in the system's reservoir holder or in appropriate secondary containment.

5. Locate the wash liquid line that extends out of the slot on the right side of the autosampler (see [Figure B-14](#)). This line is connected to the center port on the syringe valve (see [Figure B-15](#)). Route the line to the reservoir and connect it to the union on the line from the reservoir cap.

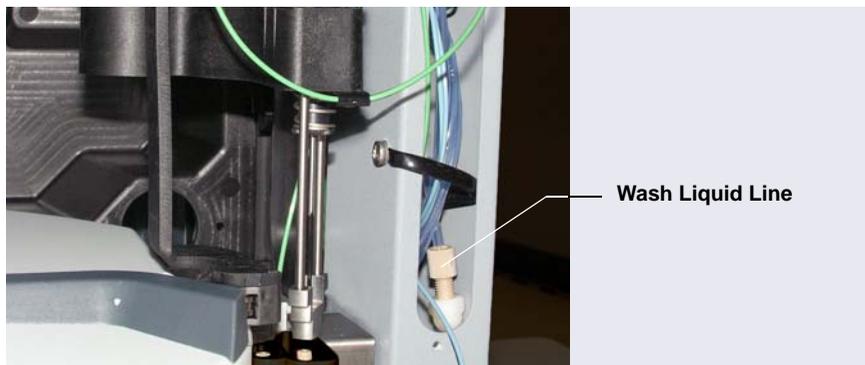


Figure B-14. Wash Liquid Line on Right Side of Autosampler

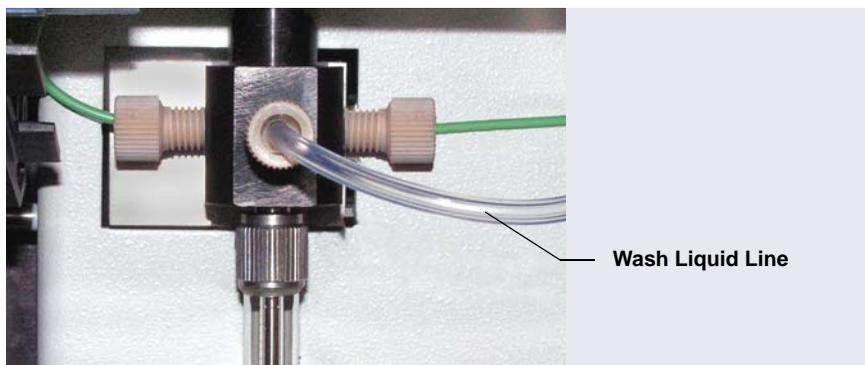


Figure B-15. Syringe Valve Connections

B.6.2 Connecting the Reservoir for Online Degassing

Two methods are available for online degassing of the wash liquid:

- If an unused vacuum degas channel is available in the pump, you can connect the Dionex AS-AP wash liquid line to the unused channel (see [page 181](#)).
- If an unused vacuum degas channel is not available, you can share a channel by installing a tee on the eluent line after the degasser. A Degas Tee Kit (P/N 075010) that includes the tee, fittings, and tubing is available. For connection instructions, see [page 182](#).

NOTE The reservoir connected to the degas channel must contain ASTM Type 1 (18 megohm-cm) filtered and deionized water. You can use the 2 L reservoir (P/N 062510) provided in the Dionex AS-AP Ship Kit or a reservoir provided with the pump.

To connect the reservoir to an unused degas channel:

1. In the pump, disconnect the outlet line from the degas out port of the unused degas channel. See the example in [Figure B-16](#).
2. In the Dionex AS-AP, locate the wash liquid line that extends out of the slot on the right side of the autosampler (see [Figure B-14](#)). This line is

connected to the center port on the syringe valve (see [Figure B-15](#)). Route the wash liquid line to the pump and connect it to the degas outlet port.

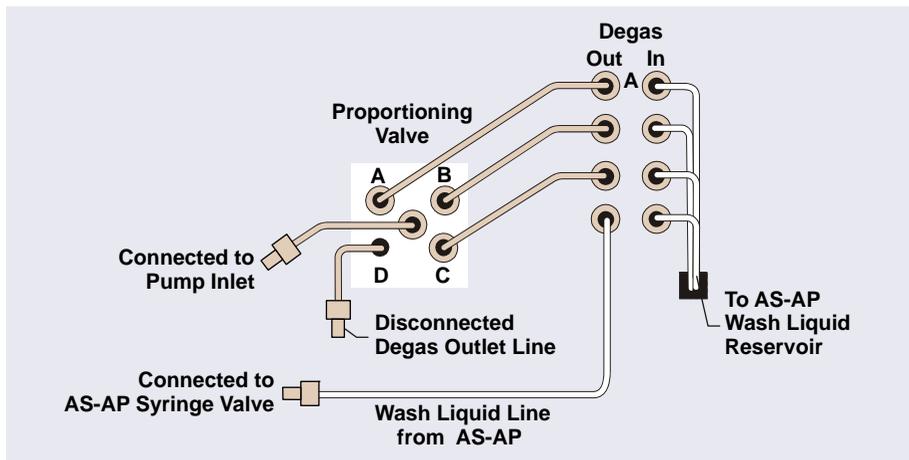


Figure B-16. Connections for Online Degassing Using an Unused Pump Degas Channel (Example Using Degas Channel D Shown)

To share a pump degas channel:

A Degas Tee Kit (P/N 075010) is required for this configuration. Order the kit separately.

Tubing/Fitting Type	Part Number	Quantity
Tee, 3-way manifold, 1/4-28 port	024313	1
Fitting nut, 1/4-28 x 1/8 flangeless	052267	3
Ferrule, 1/8 in flangeless ferrule	048949	3
Tubing, 1.55 mm (0.062 in) ID PFA	052112	15 cm (6 in)

Table B-2. Contents of Degas Tee Kit (P/N 075010)

1. Connect the short piece of PFA tubing (P/N 052112) to the tee (see [Figure B-17](#)).

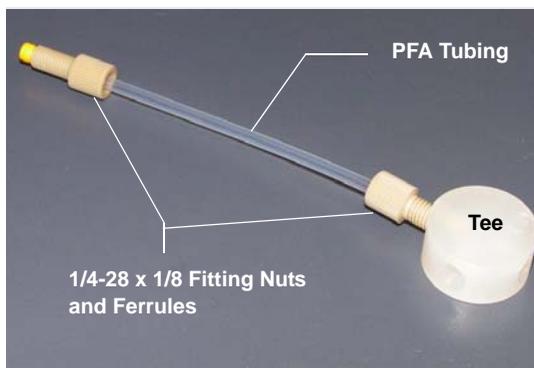


Figure B-17. Tee with Connector Tubing Attached

2. Connect the short piece of PFA tubing with degas tee to the degas channel outlet port (see [Figure B-18](#)).
3. Disconnect the degasser outlet line from the pump degas channel. For example, if you have a gradient pump and you want to share channel A, disconnect the line from degas outlet port A.
4. Connect the pump degas outlet line to the tee.

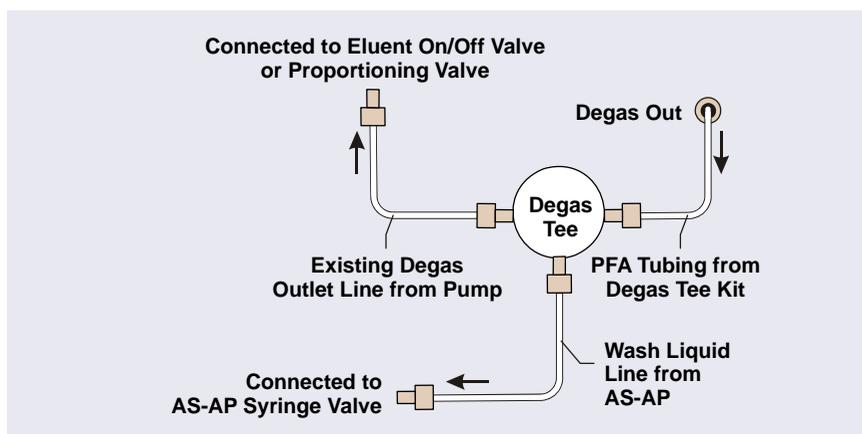


Figure B-18. Connections for Sharing a Degas Channel Using a Tee

5. Locate the wash liquid line that extends out of the slot on the right side of the autosampler (see [Figure B-14](#)). This line is connected to the center port on the syringe valve (see [Figure B-15](#)). Connect the line to the remaining port on the tee.

B.7 Connecting to the Injection Valve

Injection valve connections depend on your system configuration.

- To connect to a single injection valve for push mode, see [Section B.7.1](#).
- To connect to two injection valves for push sequential injections, see [Section B.7.2](#).
- To connect to two injection valves for push simultaneous injections, see [Section B.7.3](#).
- To connect to a single injection valve for pull mode, see [Section B.7.4](#).
- To connect to a fraction collection valve, refer to [Appendix D](#).

NOTE To connect to a Sample Conductivity and pH Accessory, refer to the *Dionex AS-AP Sample Conductivity and pH Accessory Setup and Operation Guide* (Document No. 065470). The guide is shipped with the accessory and also included on the Thermo Scientific Reference Library DVD (P/N 053891).

Notes for Push Mode Configurations

A 91 cm (36 in) sample transfer line is connected to the injection port at the factory. The volume of this line is calibrated and recorded in the autosampler's memory.

You can reduce the length of the installed sample transfer line by cutting it, or you can install a new longer line. If you change the length of the sample transfer line, calibrate the volume of the line before connecting it to the injection valve. For sample transfer line replacement instructions, see [Section 5.8](#). For calibration instructions, see [Section 5.9](#).

B.7.1 Connecting to a Single Injection Valve for Push Mode

[Figure B-19](#) shows the completed injection valve connections for push mode injections to a single injection valve.

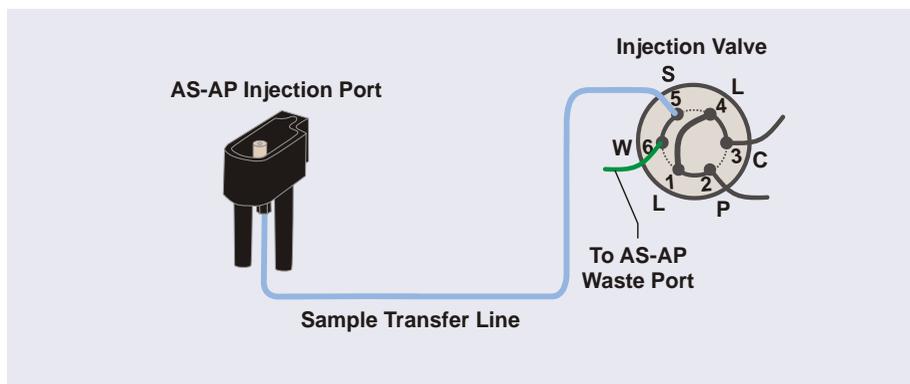


Figure B-19. Sample Transfer Line Connections for Push Mode Injections to a Single Injection Valve

NOTE If you reduced the length of the sample transfer line or installed a longer sample line, calibrate the volume of the line before proceeding. For calibration instructions, see [Section 5.9](#).

1. If the injection valve is installed in the IC system, route the sample transfer line from the Dionex AS-AP injection port out the right side of the Dionex AS-AP and then to the injection valve in the IC system.
2. Install a 10-32 fitting bolt (P/N 074449) and double-cone ferrule (P/N 074373) on the end of the sample transfer line and connect the line to port **S** (5) on the injection valve (see [Figure B-19](#)).

NOTE In a capillary system, port 5 is labeled **Sample In**.

3. If a waste line is not already connected to port **W** (6) on the injection valve, follow the steps below to create the line:
 - a. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
 - 0.25 mm (0.010 in) ID black PEEK tubing (P/N 042690)
 - 10-32 fitting bolt (P/N 074449) and double-cone ferrule (P/N 074373)
 - b. For an analytical system, cut a length of green tubing long enough to reach from the injection valve to the Dionex AS-AP waste port.

NOTE To improve sample loading precision in analytical systems, add a 51 cm (20 in) piece of 0.25 mm (0.010 in) ID black PEEK tubing to the green waste line.

- c. For a capillary system, cut a 61 cm (24 in) length of black tubing. If this is not long enough to reach from the injection valve to the Dionex AS-AP waste port, cut an additional length of green tubing and use a union to connect it to the black tubing.
 - d. Connect one end of the waste line to port **W** (6) on the injection valve. For a capillary system with a two-piece waste line, connect the black tubing to the injection valve.

4. Route the waste line from the injection valve to the Dionex AS-AP waste port and insert the line into one of the round openings in the waste port (see [Figure B-20](#)). To ensure the waste lines do not interfere with needle arm movement, secure the excess tubing with the flexible tubing tie in the slotted compartment next to the needle (see [Figure B-21](#)).

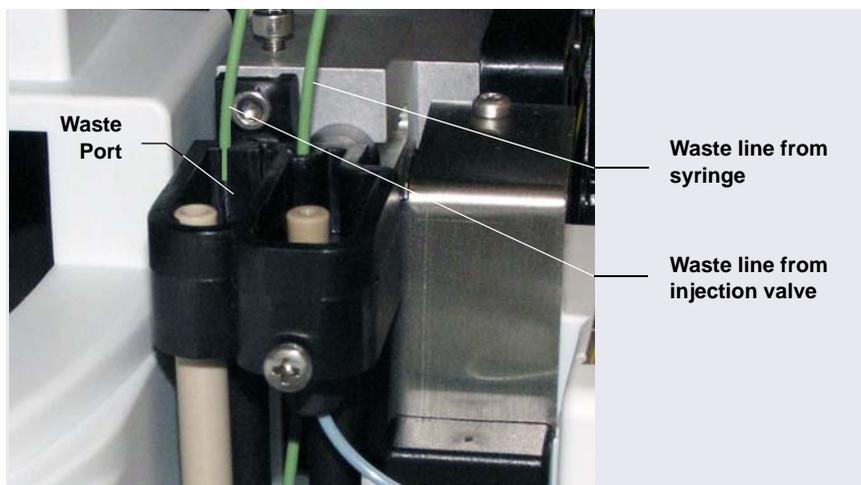


Figure B-20. Injection Valve Waste Line Installed in Waste Port

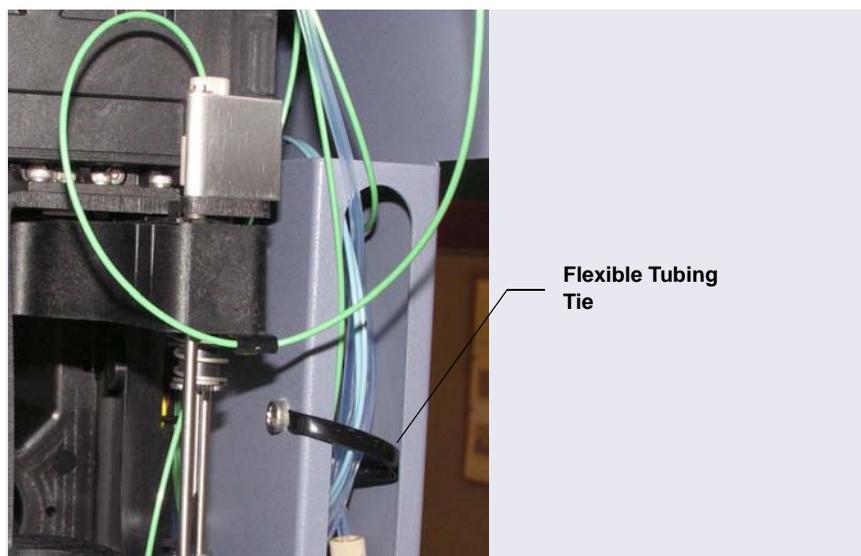


Figure B-21. Flexible Tubing Tie in Slotted Compartment

B.7.2 Connecting to Two Injection Valves for Sequential Injections

[Figure B-22](#) shows the completed injection valve connections for sequential injections.

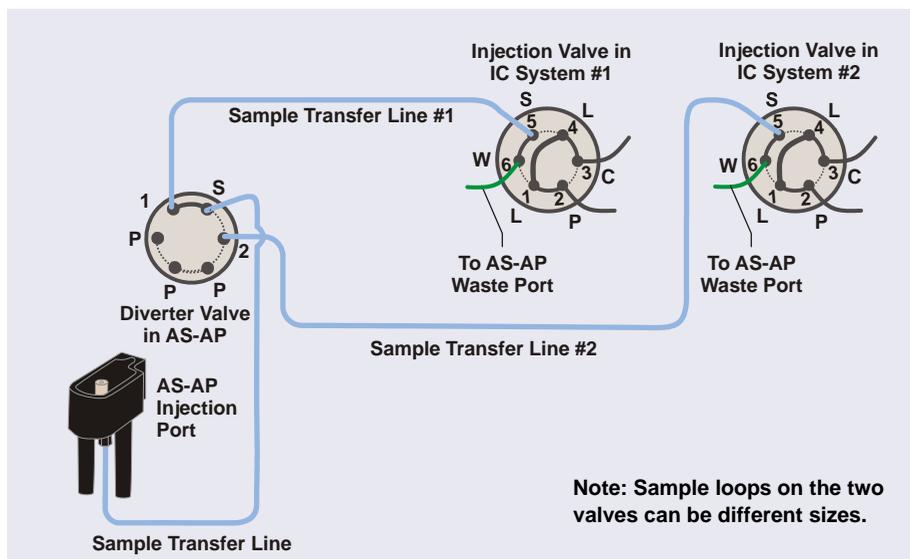


Figure B-22. Sample Transfer Line Connections for Sequential Injections to Two Injection Valves

1. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929) or in the 6-Port Valve Plumbing kit (P/N 075527) provided with the diverter valve:
 - Five 10-32 fitting bolts (P/N 074449) and five double-cone ferrules (P/N 074373)
 - 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714)
2. Install a fitting bolt and ferrule on the end of the sample transfer line from the injection port and connect the line to port **S** on the diverter valve.
3. Follow the steps below to create two sample transfer lines for connecting the diverter valve to each injection valve:
 - a. Cut a length of tubing long enough to connect from the diverter valve to the injection valve in system #1. Connect this line between port **1** on the diverter valve and port **S** (5) on the injection valve.

- b. Cut a length of tubing long enough to connect from the diverter valve to the injection valve in system #2. Connect this line between port **2** on the diverter valve and port **S** (5) on the injection valve.

NOTE In a capillary system, port 5 is labeled **Sample In**.

4. If a waste line is not already connected to port **W** (6) on each injection valve, follow the steps below to create the lines:
 - a. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
 - 0.25 mm (0.010 in) ID black PEEK tubing (P/N 042690)
 - 10-32 fitting bolt (P/N 074449) and double-cone ferrule (P/N 074373)
 - b. For an analytical system, cut a length of green tubing long enough to reach from the injection valve to the Dionex AS-AP waste port.

NOTE To improve sample loading precision in analytical systems, add a 51 cm (20 in) piece of 0.25 mm (0.010 in) ID black PEEK tubing to the green waste line.

- c. For a capillary system, cut a 61 cm (24 in) length of black tubing. If this is not long enough to reach from the injection valve to the Dionex AS-AP waste port, cut an additional length of green tubing and use a union to connect it to the black tubing.
- d. Connect one end of the waste line to port **W** (6) on the injection valve. For a two-piece waste line, connect the black tubing to the injection valve.

5. Route the waste lines to the Dionex AS-AP waste port and insert the lines into the round openings in the port (see [Figure B-23](#)).

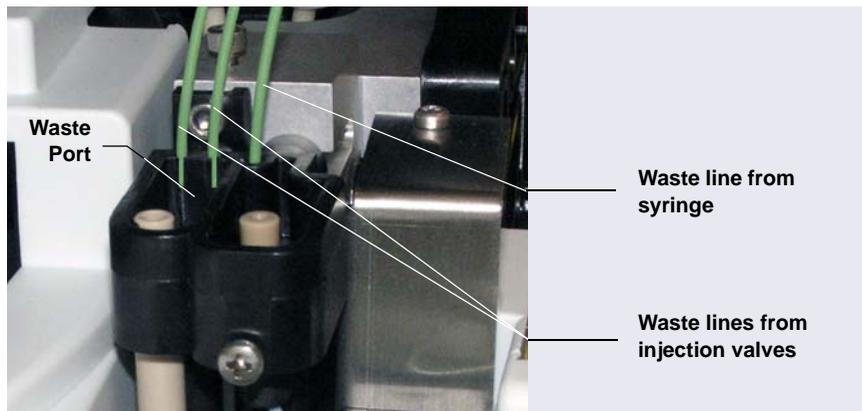


Figure B-23. *Waste Lines from Each Injection Valve Installed in Waste Port*

6. To ensure the waste lines do not interfere with needle arm movement, secure the excess tubing with the flexible tubing tie in the slotted compartment next to the needle (see [Figure B-21](#)).
7. Calibrate the volume of each sample transfer line and enter the volumes in Chromeleon. See [Section 5.9](#) for instructions.

B.7.3 Connecting to Two Injection Valves for Simultaneous Injections

To configure the Dionex AS-AP for simultaneous injections, a Dionex AS-AP Simultaneous Injection Kit (P/N 075008) is required. This kit must be ordered separately. The kit consists of the following parts:

- Y-connector (P/N 061538) for splitting the sample stream to two injection valves. Fitting bolts and ferrules are included with the Y-connector.
- 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714) for connecting the Y-connector to each valve
- 10-32 fitting bolts (P/N 074449) and double-cone ferrules (P/N 074373) are installed on the ends of each line for connecting the Dionex AS-AP sample transfer line to the injection valves.

- Two Phillips head screws (P/N 045685) for mounting the Y-connector on the Dionex AS-AP

[Figure B-24](#) shows an example of the completed connections.

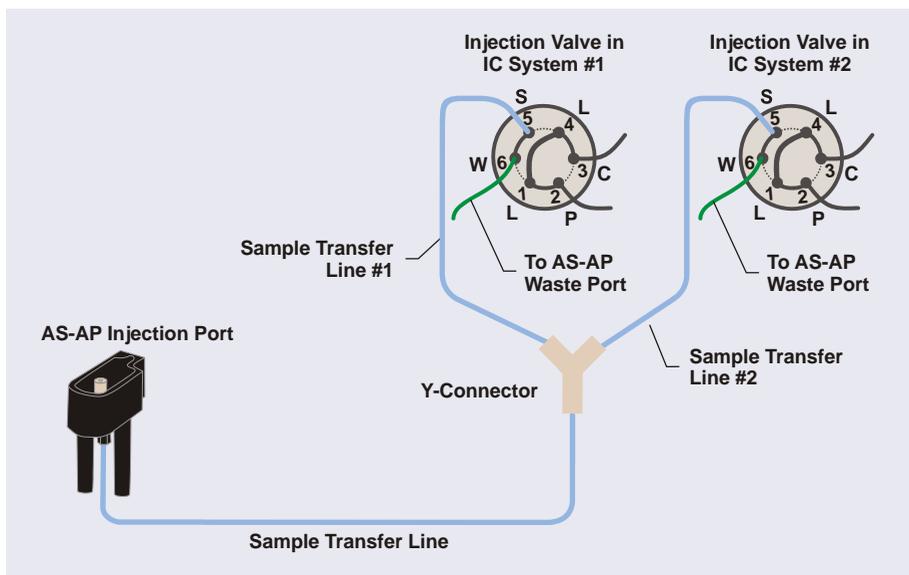


Figure B-24. Example Sample Transfer Line Connections for Simultaneous Injections to Two Injection Valves

Before beginning, refer to the following guidelines for information about balancing the flow to each system.

Guidelines for Balancing the Flow to Each Valve for Simultaneous Injections

For simultaneous injections, the sample transfer lines to the injection valves do not need to be calibrated. However, the flow to each valve must be balanced, so that equal flow moves through each valve. To do this, follow the guidelines below:

- The total length of each type (color/size) of tubing connected to each system must be equal after the Y-connector splits the sample stream. This includes the sample transfer lines from the Y-connector to each injection valve, the sample loops installed on the valves, and the waste lines (if the tubing IDs of the waste lines are less than 0.75 mm (0.030 in).

- Place any tubing used strictly to match the tubing of the other system after the injection valve (connect it to the waste line) (see [Figure B-25](#)).

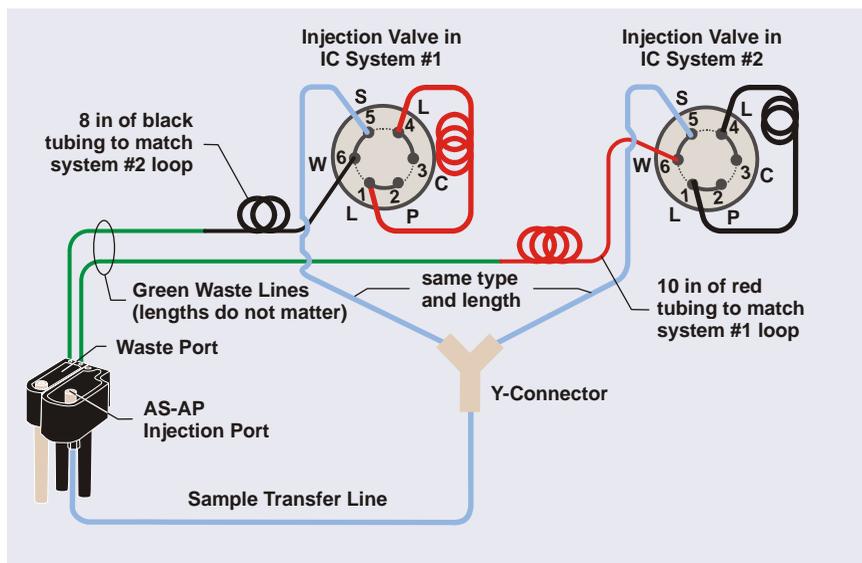


Figure B-25. Example Sample Transfer Line Connections for Simultaneous Injections with Tubing Added for Balancing Flow

- The balance of flow to each system will not be perfect because of the differences in tubing IDs from nominal. In addition, any differences in the ambient temperature where each tubing is located after the Y-connector will cause a variation.

Connection Instructions

- Locate the blue sample transfer line that is connected to the Dionex AS-AP injection port. This line will be connected to the Y-connector (P/N AAA-061538) of the Simultaneous Injection Kit. The Y-connector mounts onto the right side of the Dionex AS-AP (see [Figure B-26](#)). To reduce the excess tubing length, you can shorten the sample transfer line by cutting it.
- Remove the fitting bolt and ferrule from the unconnected leg of the Y-connector and install them onto the end of the sample transfer line. Connect the line to the Y-connector and tighten the fitting fingertight.

3. Remove the fitting cap and union from one of the lengths of tubing installed on the Y-connector. Connect this line to port **S** (5) on the injection valve of system #1. Repeat this step for system #2.

NOTE If the fitting bolts and ferrules provided with the Y-connector ever need replacement, use 1/16 in flangeless fitting bolts (short) (P/N 071358) and tan two-piece ferrules (P/N 062511).

4. Locate the two mounting holes on the right side of the Dionex AS-AP (see [Figure B-26](#)). Orient the Y-connector with the double-legs pointed toward the right and mount the Y-connector using the two screws provided. Coil the excess sample transfer line tubing and place it in the slotted compartment above the Y-connector.



Figure B-26. Y-Connector Mounting Location on Right Side of Dionex AS-AP

5. If waste lines are not already connected to port **W** (6) on each injection valve, follow the steps below to create the lines:
 - a. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
 - Two 10-32 fitting bolts (P/N 074449) and two double-cone ferrules (P/N 074373)

- b. Cut a length of tubing long enough to reach from the injection valve in IC system #1 to the Dionex AS-AP waste port. Repeat this step for system #2.
 - c. If required for your system, connect matching tubing to the waste lines to balance the flow on both systems. Refer to the guidelines and the example on [page 191](#).
 - d. Connect each waste line to port **W** (6) on the system's injection valve.
6. Route the waste line from each injection valve to the Dionex AS-AP waste port and insert the lines into the round openings in the port (see [Figure B-27](#)).

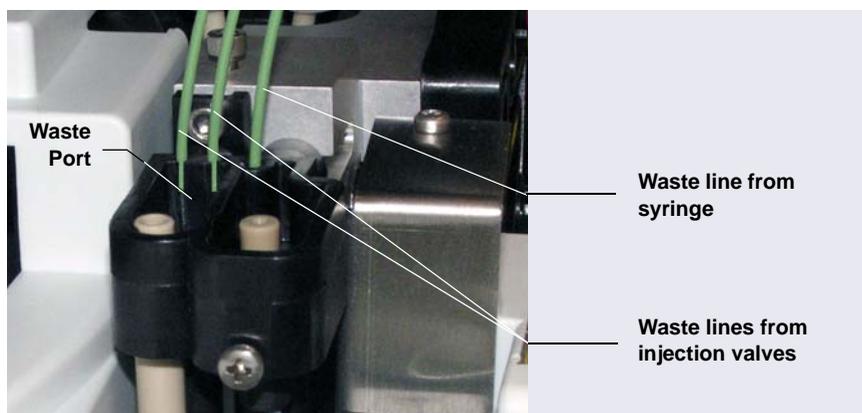


Figure B-27. *Injection Valve Waste Lines Installed in Waste Port*

7. To ensure the waste lines do not interfere with needle arm movement, secure the excess tubing with the flexible tubing tie in the slotted compartment next to the needle (see [Figure B-21](#)).

B.7.4 Connecting to the Injection Valve for Pull Mode

[Figure B-28](#) shows the completed injection valve connections for pull mode.

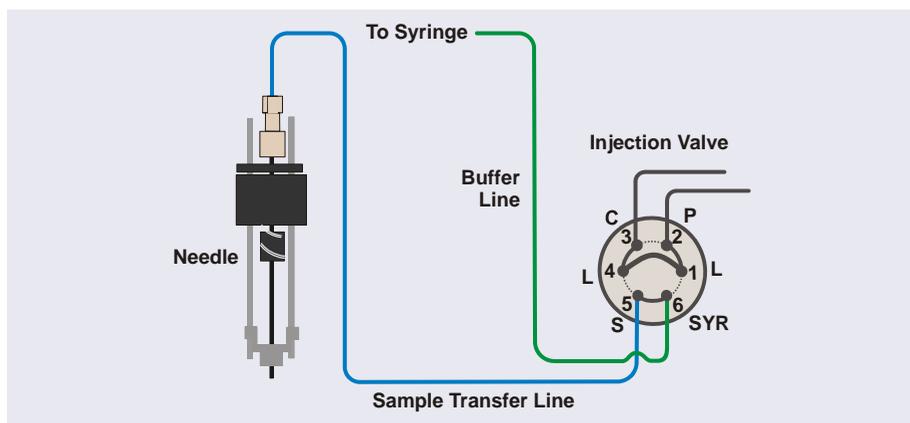


Figure B-28. Injection Valve Connections for Pull Mode

1. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929):
 - Two 10-32 fitting bolts (P/N 074449) and two double-cone ferrules (P/N 074373)
 - 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714)
 - One tan 1/16 in flangeless fitting bolt (P/N 052230) and one two-piece ferrule (clear cone and tan flat) (P/N 062511)
2. Using a 10-32 bolt and double-cone ferrule, connect the buffer line to port 6 on the injection valve (see [Figure B-13](#)). If the injection valve is installed in the IC system, this port is labeled **W**. If the injection valve is installed in the Dionex AS-AP, this port is labeled **SYR**. Refer to the tightening guidelines on [page 178](#).
3. To create a sample transfer line, cut a length of 0.33 mm (0.013 in) ID blue PEEK tubing long enough to connect from the top of the needle to the injection valve. Minimize the length of this tubing as much as possible.

4. Follow the steps below to connect this line to the needle:
 - a. Use the 1/16 in flangeless fitting bolt and two-piece ferrule for the connection. Slide the fitting bolt onto the tubing as shown in [Figure B-30](#).

- b. Observe that one side of the small tan ferrule is beveled and one side is flat (see [Figure B-29](#)). **Hint:** The flat side appears shiny.



Figure B-29. Small Tan Ferrule (Enlarged)

- c. With the flat side of the small tan ferrule facing toward the fitting bolt, slide the ferrule onto the tubing. Then, slide the clear cone ferrule onto the tubing with the cone toward the flat ferrule and fitting bolt (see [Figure B-30](#)).

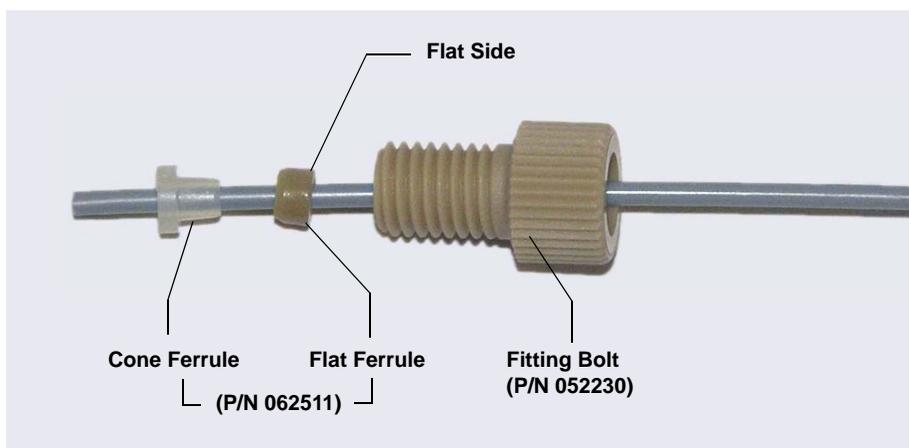


Figure B-30. Fitting for Sample Transfer Line (Pull Mode)

- d. Position the bolt and ferrules away from the end of the tubing (so they do not fall off when you insert the tubing into the needle holder).

- e. Insert the tubing down into the center of the needle holder. When you insert the tubing, you should feel the tubing drop into a small indentation inside the holder (see [Figure B-31](#)). If not, move the tubing slightly until it does.

IMPORTANT

When connecting the sample transfer line to the needle, make sure the line slides into the indentation inside the needle holder before tightening the fitting.

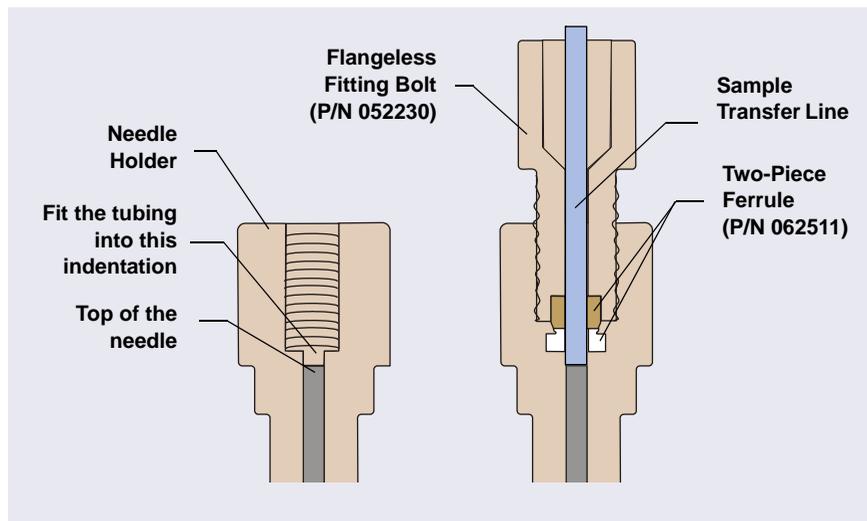


Figure B-31. Cross-Section of Needle Holder and Sample Transfer Line Fitting

- f. Slide the ferrules and fitting bolt down into the needle holder.

- g. While holding the needle holder to prevent twisting the needle, tighten the fitting. Tighten the fitting fingertight to set the ferrules.

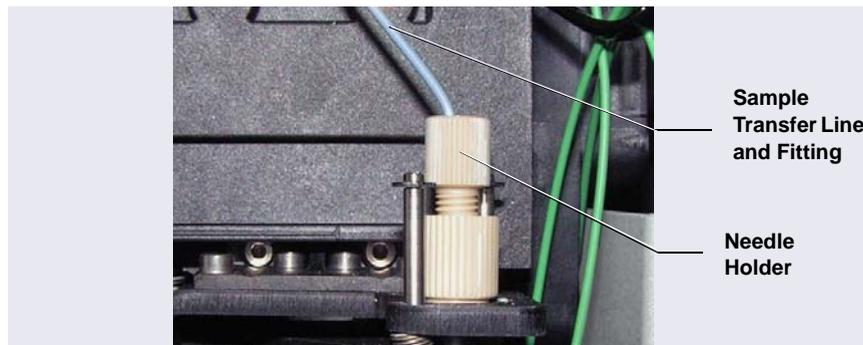


Figure B-32. Sample Transfer Line Connected to the Needle for Pull Mode

- 5. Using a 10-32 fitting bolt and double-cone ferrule, connect the other end of the sample transfer line to port **S** (5) on the injection valve. Refer to the tightening guidelines on [page 178](#).

B.8 Connecting the Drain Line

Connections for a Dionex AS-AP Without Sample Temperature Control

[Figure B-33](#) shows the completed drain line connections for a Dionex AS-AP without sample temperature control.

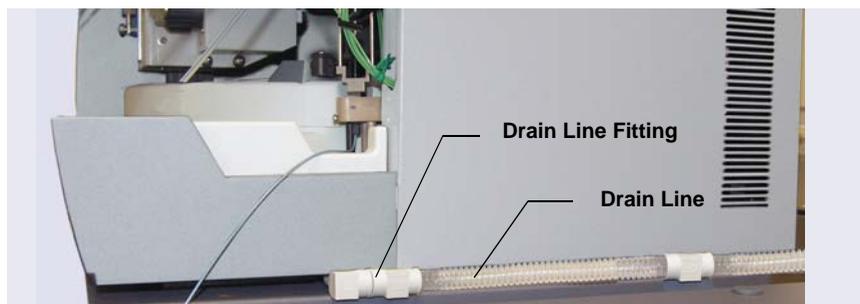


Figure B-33. Drain Line Connection for a Dionex AS-AP Without Sample Temperature Control

1. Locate the convoluted drain line (P/N 055075) in the Dionex AS-AP Ship Kit (P/N 074929).
2. Locate the rubber drain line fitting that extends from the right side of the autosampler (see [Figure B-33](#)).
3. Connect the drain line to this fitting.
4. Place the free end of the drain line into a waste container or appropriate drain.
5. Make sure that the outlet of the drain line is below the level of the Dionex AS-AP and is not elevated at any point.

Connections for a Dionex AS-AP with Sample Temperature Control

[Figure B-34](#) shows the completed drain line connections for a Dionex AS-AP with sample temperature control.

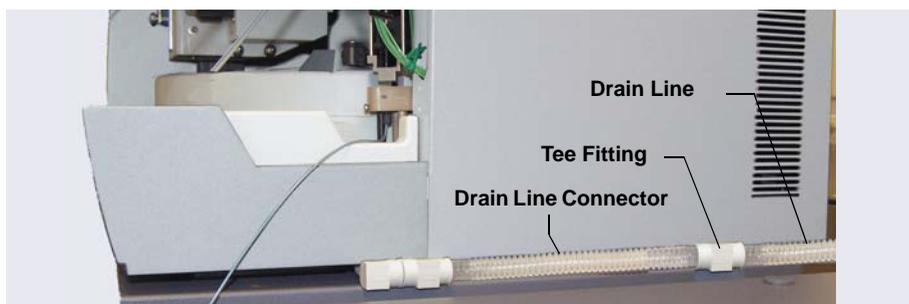


Figure B-34. *Drain Line Connections for a Dionex AS-AP with a Sample Temperature Option*

1. Locate the convoluted drain line (P/N 055075) and the drain line tee fitting (P/N 074978) in the Dionex AS-AP Ship Kit (P/N 074929).
2. Push the tee fitting onto the small stainless steel drain tube that extends from the back right side of the autosampler.
3. Connect the convoluted drain line to the right side of this tee.

4. Untape the short length of convoluted drain line from the front of the autosampler (see [Figure B-35](#)) and connect this line to the left side of the tee.

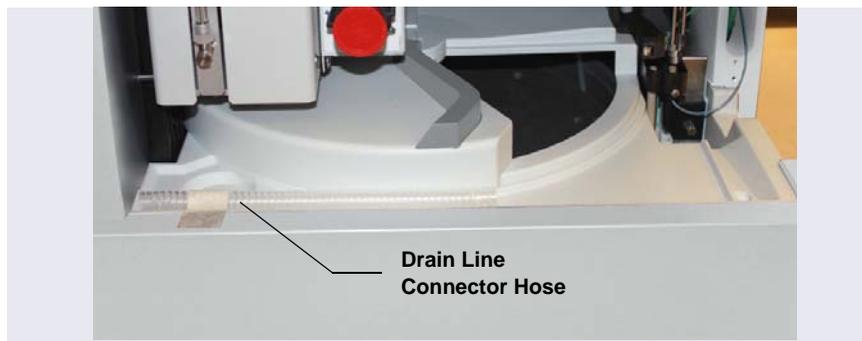


Figure B-35. *Drain Line Connector Hose for the Sample Temperature Control Option*

5. Connect the other end of the short drain line to the fitting on the front right side of the autosampler (see [Figure B-34](#)).
6. Place the free end of the drain line into a waste container or appropriate drain.
7. Make sure that the outlet of the drain line is below the level of the Dionex AS-AP and is not elevated at any point.

B.9 Connecting the USB Cable

IMPORTANT

Do not turn on the power to the Dionex AS-AP until after you connect the USB cable.

Before connecting the USB cable, verify that Chromeleon is installed on the PC. If not, Windows will be unable to identify the new USB device when the power is turned on.

1. Locate the USB cable (P/N 960777) in the Dionex AS-AP Ship Kit (P/N 074929).
2. Connect the USB cable between the USB connector on the Dionex AS-AP rear panel and a USB port on either the Chromeleon computer or the host IC system.

A USB 2.0 or USB 1.1 external hub can be used to connect the Dionex AS-AP to the PC. Refer to the manual provided by the hub vendor for complete installation instructions. One or more hubs is required in the following situations:

- Use a hub if the number of USB devices in the system exceeds the number of available USB ports.
- Use a hub if the Dionex AS-AP is more than 5 meters (16 ft) from the PC.

IMPORTANT

The USB standard limits the USB cable length to 5 meters (16 ft). Each USB device can be separated from the PC by no more than five hubs. Thus, each USB device can be located no more than 30 meters (32 yds) from the PC.

B.10 Connecting the Power Cord

1. Verify that the main power switch on the rear panel of the Dionex AS-AP is turned off. (The power switch may be turned on accidentally when the module is unpacked.)
2. Connect the power cord (IEC 320 C13) (ordered separately) from the main power receptacle on the rear panel to a grounded power source. The Dionex AS-AP power supply is auto-sensing, so no adjustment is required to select the line voltage.



SHOCK HAZARD—To avoid electrical shock, use a grounded receptacle. Do not operate the Dionex AS-AP or connect it to AC power mains without an earthed ground connection.



The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the Dionex AS-AP and is easily accessible.



Operation at AC input levels outside of the specified operating voltage range may damage the Dionex AS-AP.



DANGER D'ÉLECTROCUTION—Pour éviter toute électrocution, il faut utiliser une prise de courant avec prise de terre. Ne l'utilisez pas et ne le branchez pas au secteur C.A. sans utiliser de branchement mis à la terre.



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.



STROMSCHLAGGEFAHR—Zur Vermeidung von elektrischen Schlägen ist eine geerdete Steckdose zu verwenden. Das Gerät darf nicht ohne Erdung betrieben bzw. an Wechselstrom angeschlossen werden.



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

B.11 Setting Up Chromeleon

This section provides brief instructions for setting up Chromeleon. For details about any of these steps, refer to the appropriate installation guide and to the Chromeleon Help. The installation guides are provided on the Thermo Scientific Reference Library DVD (P/N 053891).

- For Chromeleon 7, refer to *Chromeleon 7 Installation Guide*.
- For Chromeleon 6.8, refer to *Installing Chromeleon with a Dionex Ion Chromatograph* (Document No. 031883).

B.11.1 Installing the Software and License

When you purchase Chromeleon and a PC from Dionex, the chromatography software and the computer hardware are installed at the factory. In this case, you may omit this section.

To install Chromeleon software and the software license, follow the instructions in the appropriate installation guide.

B.11.2 Installing the Dionex AS-AP Device Driver

1. If you have not already done so, turn on the PC power.
2. For a local PC: Log onto Windows as an **administrator**.

For a network PC: Log on as a user with local PC administrator privileges.

3. If Chromeleon 7 is installed, check the Instrument Controller Service icon on the Windows taskbar and start the service, if it is not already running:
 - If the icon is gray , the Instrument Controller Service is running (idle).
 - If the icon is crossed out in red , the Instrument Controller Service is not running. Right-click the icon and click **Start Chromeleon Instrument Controller**. The icon changes to gold  to indicate that the Instrument Controller Service is starting.
4. If Chromeleon 6.8 is installed, check the Server Monitor icon on the Windows taskbar and start the server, if it is not already running:
 - If the icon is gray , the server is already running (idle).
 - If the icon is crossed out in red , the server is stopped. To start the server, right-click the icon and select **Start Server**. The icon changes to gold  to indicate that the Chromeleon 6.8 server is starting.
5. Verify that the J-clip is installed on the vial pusher (see [Figure B-36](#)).

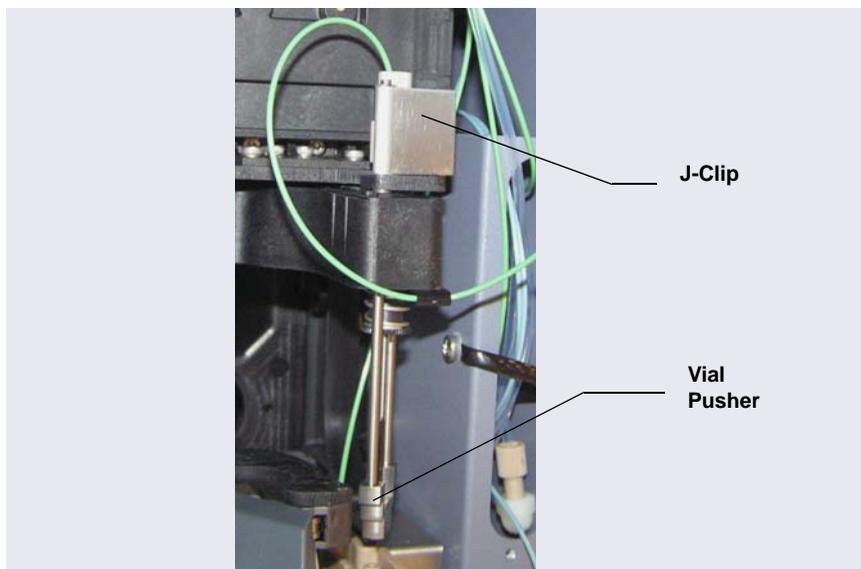


Figure B-36. J-Clip Installed on Vial Pusher

6. Press the main power switch on the Dionex AS-AP rear panel to turn on the power. The autosampler will begin running a self test. Because the J-

clip prevents the needle from descending into the injection port during the self test, the following error message appears in the Audit Trail:

Needle Drive: Pusher sensor malfunction. Turn the autosampler off and on again or perform a self test.

You can ignore the error message and continue with the installation. After you complete the installation and check the needle alignment (see [Section 5.3](#)), a self test will be required.

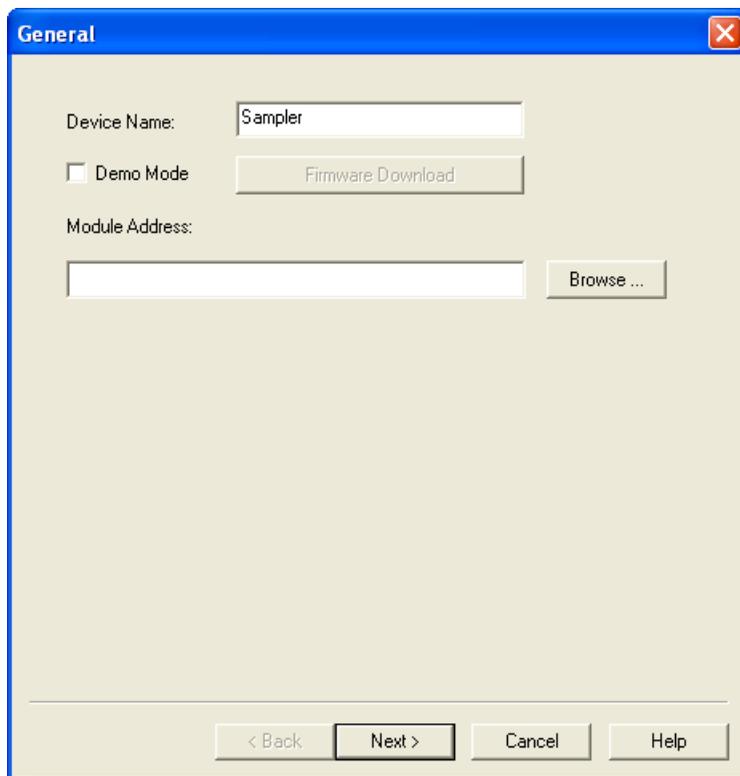
7. Windows automatically detects the new USB device. A message flashes on the screen to inform you that new hardware was found.
8. Depending on the Windows version, Windows either automatically installs the device driver or it launches the Found New Hardware Wizard. Complete the wizard (if it appears) by selecting the following options:
 - If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.
 - Accept the default option (**Install the software automatically**) and click **Next >**. It is not necessary to insert a hardware installation disk.

B.11.3 Configuring the Dionex AS-AP in Chromeleon

1. Start the Chromeleon 7 Instrument Configuration Manager or the Chromeleon 6.8 Server Configuration program:
 - For Chromeleon 7, click **Start** on the Windows taskbar and click **All Programs > Chromeleon 7 > Instrument Configuration Manager**.
 - For Chromeleon 6.8, click **Start** on the Windows taskbar and click **All Programs > Chromeleon > Server Configuration**.
2. Add the Dionex AS-AP to an existing instrument or timebase or create a new instrument or timebase.
3. After you add the Dionex AS-AP to an instrument or timebase, Chromeleon connects to the autosampler and starts a configuration wizard that guides you through the installation. Refer to the following descriptions to complete each wizard page.
4. After completing all wizard pages, click **Finish**.
5. On the **File** menu, click **Save Installation** and then close the program.

NOTE To change settings after finishing the wizard, double-click the Dionex AS-AP device in the instrument or timebase. The configuration properties dialog box opens.

General Page



The screenshot shows a dialog box titled "General" with a blue header and a close button (X) in the top right corner. The dialog contains the following elements:

- Device Name:** A text input field containing the text "Sampler".
- Demo Mode:** A checkbox that is currently unchecked.
- Firmware Download:** A button located to the right of the Demo Mode checkbox.
- Module Address:** A text input field that is currently empty.
- Browse ...:** A button located to the right of the Module Address input field.
- Navigation Buttons:** A row of four buttons at the bottom: "< Back", "Next >", "Cancel", and "Help". The "Next >" button is highlighted with a black border.

Figure B-37. Example Chromeleon Configuration Wizard: General Page

Click **Browse** and double-click the USB address of the Dionex AS-AP. Click **Next**. A message is displayed. After reading the message, click **OK** to go to the next wizard page.

Sharing Page

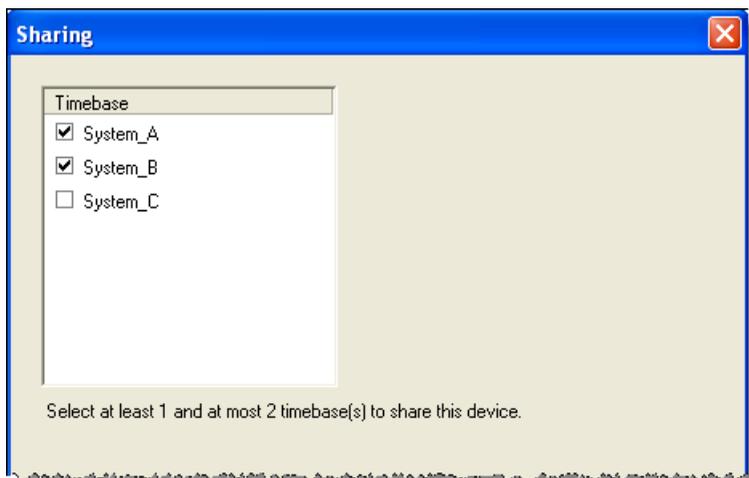


Figure B-38. Example Chromeleon Configuration Wizard: Sharing Page

Verify that the instrument or timebase in which the Dionex AS-AP is installed is selected. To share the Dionex AS-AP between two instruments or timebases, select a second instrument or timebase. When the autosampler is shared, it appears in both instruments or timebases and can be controlled from either one. In the example above, the Dionex AS-AP is shared between two timebases (**System_A** and **System_B**).

Segments/Pump Link Page

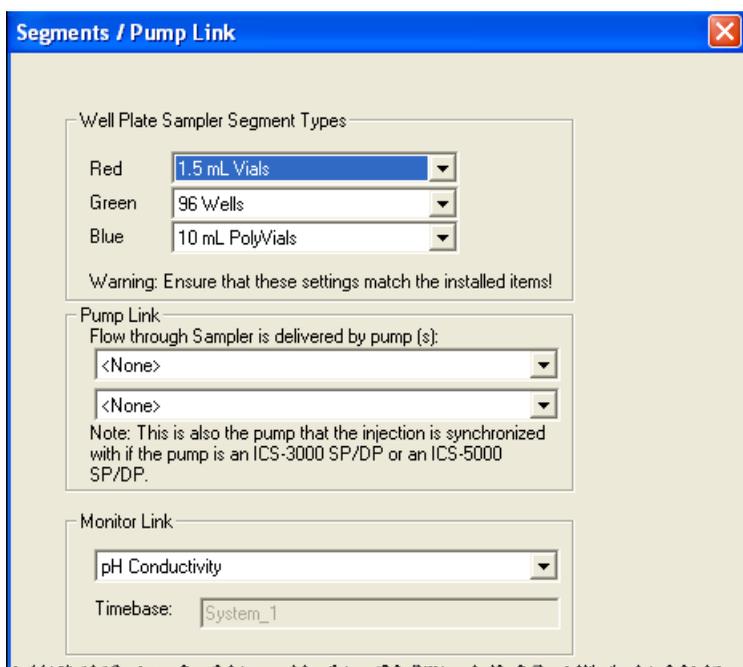


Figure B-39. Example Chromeleon Configuration Wizard: Segments/Pump Link Page

- **Well Plate Sampler Segment Types:** Select the type of tray that will be installed in each color section (segment) of the carousel.

IMPORTANT

For correct operation, Chromeleon must know the type of tray installed in each carousel section. If you later choose to install different tray types, you must change the settings here to match the new types.

- **Pump Link:** (Optional) If the autosampler is connected to a Dionex ICS-3000 or Dionex ICS-5000 DP or SP, select the pump that delivers the flow to the injection valve. If the autosampler is connected to two injection valves, also select the pump for the second injection valve. For a DP, the bottom pump (Pump 1) is **DPSP3000_L_STRK** and the top pump (Pump 2) is **DPSP3000_R_STRK**.

When the pump is linked, the injection command can be synchronized with the pump strokes. Synchronization ensures that all injections are performed at the same phase of the pump cycle. This increases retention

time precision in gradient applications. Synchronization of injections is enabled and disabled in the Sampler Options of the Chromeleon 7 Instrument Method Wizard or Chromeleon 6.8 Program Wizard. See the example in [Figure 3-9](#).

NOTE For capillary systems, enabling synchronization of injections with the pump may delay the start of a run by several minutes.

- **Monitor Link:** If a Sample Conductivity and pH Accessory is installed, select **pH Conductivity** in the list.

Options Page

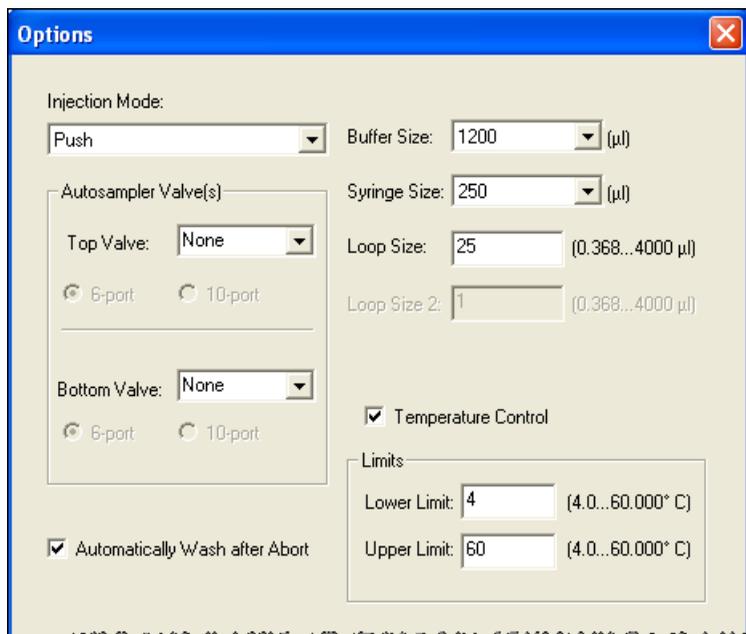


Figure B-40. Example Chromeleon Configuration Wizard: Options Page

- **Injection Mode:** Select the mode that corresponds to your autosampler's plumbing configuration.
- **Autosampler Valve(s):** Select the function of each optional high-pressure valve installed in the autosampler. The valve function depends on the

autosampler's plumbing configuration. Also, select whether the valve is a 6-port or 10-port valve.

- **Automatically Wash after Abort:** Select the check box to perform a wash cycle after an Abort error occurs.
- **Buffer Size:** Select the volume of the installed buffer line.
- **Syringe Size:** Select the volume of the installed syringe.
- **Loop Size:** Enter the volume of the loop installed on each injection valve.
- **Bridge Size** (available if a fraction collection valve is configured and pull mode is selected): Enter the volume of the installed bridge tubing. To estimate the volume of 0.33 mm (0.013 in) ID blue PEEK tubing, use a conversion factor of 0.86 $\mu\text{L}/\text{cm}$ (2.2 $\mu\text{L}/\text{in}$).
- **Temperature Control** (available if the temperature control option is installed and configured): Set the range of allowed temperature set points for the sample carousel.

B.11.4 Connecting to the ePanel Set or Panel Tabset

Connecting to the Chromeleon 7 ePanel Set

1. To start the Chromeleon 7 client, click **Start > All Programs > Chromeleon 7 > Chromeleon 7**.
2. To display the Dionex AS-AP ePanel, click the **Instruments** category bar on the Console. Click your instrument in the Navigation Pane.

Chromeleon 7 connects to the instrument and displays the ePanel Set. Click the **Sampler** tab (see [Figure B-41](#)).

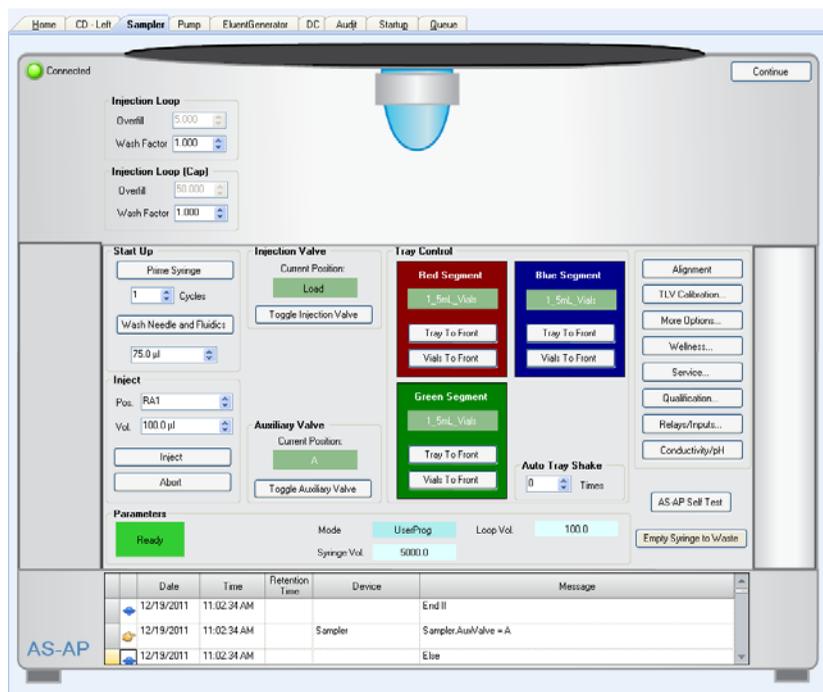
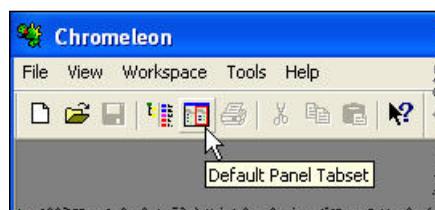


Figure B-41. Example Chromeleon 7 ePanel Set: Dionex AS-AP ePanel

Connecting to the Chromeleon 6.8 Control Panel

1. To start the Chromeleon client, click **Start** and select **All Programs > Chromeleon > Chromeleon**.
2. To display the panel tabset, select **View > Default Panel Tabset** or click the **Default Panel Tabset** toolbar button.



3. To display the Dionex AS-AP Control panel, click the **Autosampler** tab

B.12 Checking the Needle Alignment

1. The needle may become misaligned during shipping and installation. Before priming the syringe or performing any other autosampler operations, check the needle alignment and realign the needle if needed. For instructions, see [Section 5.3](#).
2. After checking the needle alignment, remove the J-clip from the vial pusher.

NOTE Save the J-clip. It is required for aligning the needle in the future and for other service procedures.

3. Because the J-clip was installed when the power was turned, the self test did not complete successfully. A self test must be completed before the autosampler can start operation. To run a self test, open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8), click the **Service** button, and then click the **Reset / Self Test** button.

B.13 Priming the Syringe

During priming, the syringe, the syringe wash liquid line, and the syringe waste tubing are flushed with wash liquid. This removes air bubbles from the syringe and tubing.

1. Open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8).
2. In the **Cycles** box under **Prime Syringe**, enter the number of times the syringe should empty and fill during priming. The number of times required depends on the size of the syringe and the length of the wash liquid line.
3. Click **Start**. The syringe empties and fills the specified number of cycle times and then priming stops. Repeat as required until no more bubbles are seen in the wash liquid line.
4. If bubbles still remain in the syringe, prime for an additional two cycles.
5. If bubbles still remain after priming, follow the steps in [Section 5.4.1](#) to remove the syringe. Then, follow the steps in [Section 5.4.2](#). To remove the bubbles from the syringe and reinstall the syringe.

6. When the bubbles are gone, perform a manual wash operation (under **Wash Needle and Fluidics**, enter a **Volume**, and click **Start**). The volume required for a manual wash depends on the status of the buffer line.
 - If the buffer line is dry (for example, after changing the line), enter a wash volume that is 1.5 times the buffer line tubing.
 - If the buffer line has sample or other liquid in it that you want to flush out, enter a volume large enough to flush the sample from the line.

B.14 TTL and Relay Connections (Optional)

1. Locate the following items in the Dionex AS-AP Ship Kit:
 - Twisted pair of wires (P/N 043598)
 - (For a TTL input) 8-position connector plug (P/N 924133)
 - (For a relay output) 12-position connector plug (P/N 923686)
2. For each TTL or relay to be used, connect an active wire (red) and a ground wire (black) to the connector plug at the appropriate pin locations.

Refer to [Figure B-42](#) or the label on the Dionex AS-AP rear panel for the connector pin assignments.

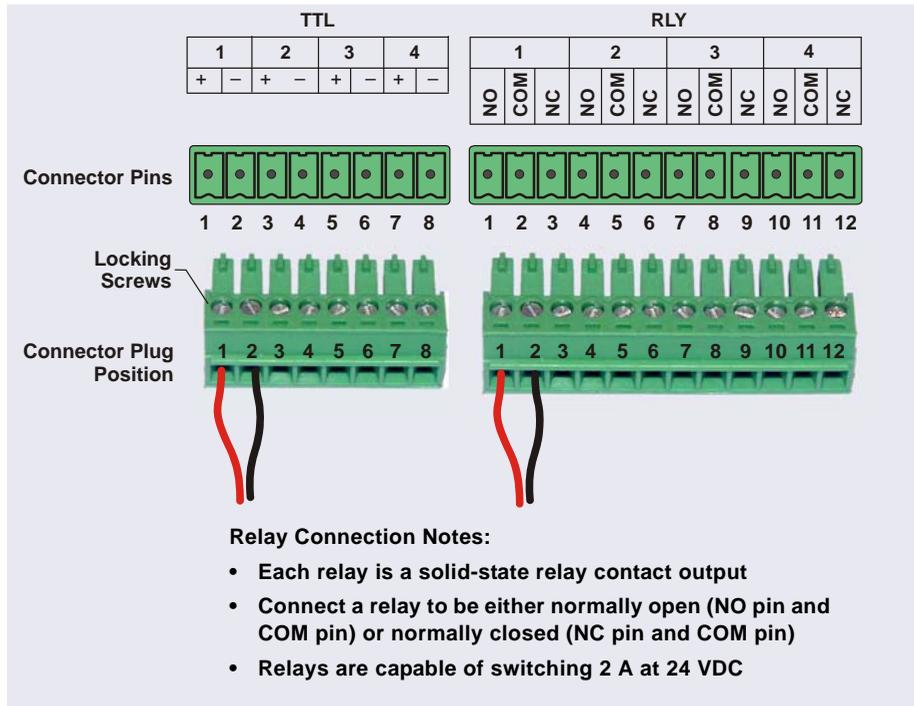


Figure B-42. Dionex AS-AP Relay and TTL Connector Strips and Connector Plugs

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.



When attaching wires to the connector plug, be careful not to allow stray strands of wire to short to an adjoining position on the connector.

3. Plug the connector plug into the connector on the Dionex AS-AP rear panel.
4. Connect the wires from the Dionex AS-AP connector plug to the appropriate connector pins on the other modules. Additional connector plugs are provided with other Dionex modules.

NOTE For TTL connections, check the polarity of each connection. Connect signal wires to signal (+) pins and ground wires to ground (-) pins.

5. In the Chromeleon 7 Instrument Configuration program or the Chromeleon 6.8 Server Configuration program, double-click the Dionex AS-AP device to open the configuration properties dialog box.
 - On the **Relays** page, select the check box for each connected relay.
 - On the **Inputs** page, select the check box for each connected input.

Installation of the Dionex AS-AP is now complete. For operating instructions, refer to [Chapter 3](#).

C • Installing Optional Valves

This chapter provides installation instructions for the following Thermo Scientific Dionex AS-AP Autosampler valve options.

Valve Option	Part Number
6-port valve with mounting bracket	074123
10-port valve with mounting bracket	074122
6-port valve without mounting bracket	070209
10-port valve without mounting bracket	070208

C.1 Setting the Valve Electronics Board Jumpers

1. Locate the two jumpers (labeled **JMP1** and **JMP2**) on the electronics board attached to the rear of the valve (see [Figure C-1](#)).

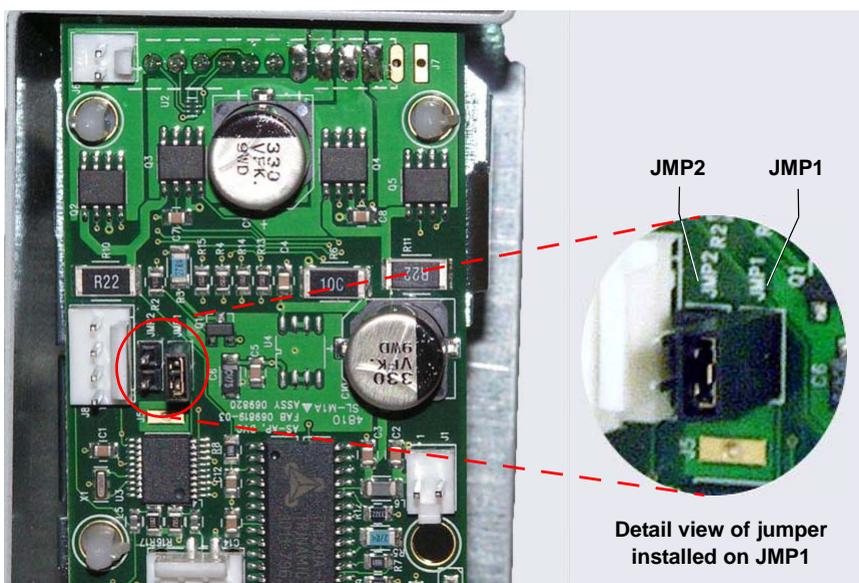


Figure C-1. Jumpers on Valve Electronics Board
(Jumper Installed on JMP1 in the Photo)

[Table C-1](#) shows the required jumper settings for each valve configuration.

Number of Valves	Valve Position	Jumper Setting
One valve	Either top or bottom	JMP1
Two valves	Top valve Bottom valve	JMP2 JMP1

Table C-1. Required Jumper Settings on Valve Electronics Boards

NOTE To change a jumper location, pull the jumper off of the pins and then push it onto the other set of pins.

- For a single valve, install the jumper on **JMP1** as shown in the detail view in [Figure C-1](#).
- For two valves, install the jumpers as follows:
 - Top valve: Install the jumper on **JMP2**
 - Bottom valve: Install the jumper on **JMP1**

NOTE If you are installing a second valve onto an existing valve with mounting bracket, install the top valve's jumper on **JMP2** after removing the valve with mounting bracket from the Dionex AS-AP.

- If you are installing a single valve with mounting bracket, go on to [Section C.2](#) to install the valve with mounting bracket in the Dionex AS-AP.
- If you are installing a second valve (on either a new uninstalled mounting bracket or on an existing mounting bracket), go on to [Section C.3](#).

C.2 Installing a Valve with Mounting Bracket

Included Parts

[Table C-2](#) lists the additional parts included with the 6-port or 10-port valve with mounting bracket.

Part Number	Item	Quantity
075524	Phillips head screw (for attaching mounting bracket to Dionex AS-AP)	4
050481	Cap socket head screw, M04 (for attaching grounding strap)	1
070042	Dionex AS-AP labels	1
075527	Plumbing kit for 6-port valve	1
075528	Plumbing kit for 10-port valve	1

Table C-2. Additional Parts Included with the Valve with Mounting Bracket

Additional Items Required

- Phillips head screwdriver
- 3 mm Allen wrench

Installation Procedure

For reference, [Figure C-2](#) shows the Dionex AS-AP interior after installation of the valve with mounting bracket is complete.



Figure C-2. *Optional Valve Installed in the Dionex AS-AP
(10-Port Valve Shown)*

1. Turn off the pump flow.
2. Press the main power switch on the rear panel to turn off the Dionex AS-AP power.
3. Lift up the Dionex AS-AP front panel.
4. Verify that the jumpers on the valve electronics board for each valve being installed are set correctly (see [Section C.1](#)).

5. Locate the two valve cables inside the Dionex AS-AP in the upper-left back corner. Connect these two cables to the connectors on the electronics board attached to the rear of the valve (see [Figure C-3](#) and [Figure C-4](#)).

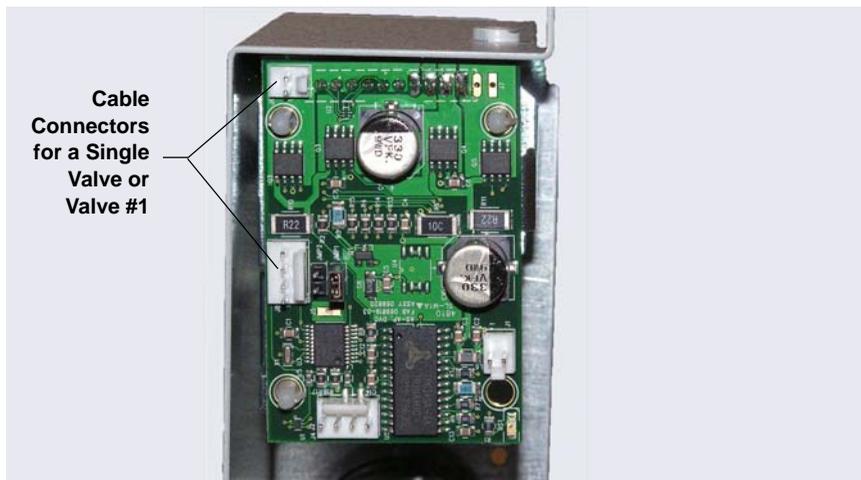


Figure C-3. Cable Connectors on Valve Electronics Board

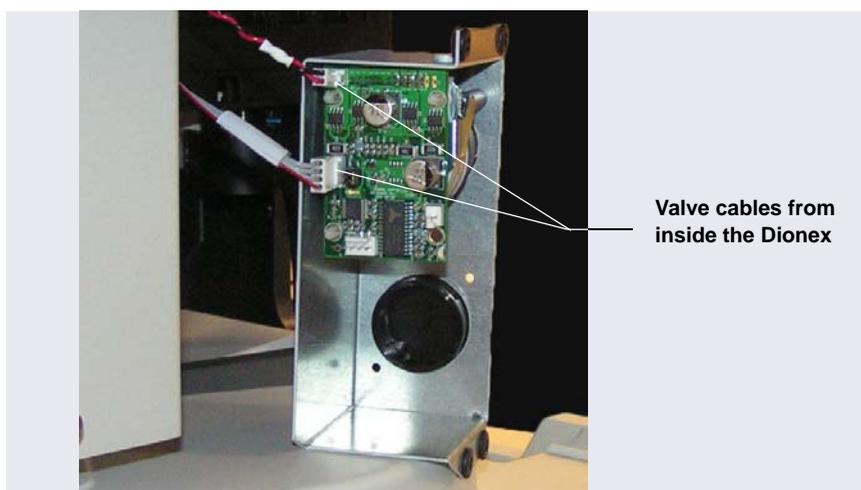


Figure C-4. Valve Cables Connected to Valve Electronics Board (Single Valve Configuration Shown)

6. Before continuing, note the raised opening on the top of the mounting bracket (see [Figure C-5](#)). Later in the procedure, you will connect a grounding strap here. The grounding strap is a flat cable located inside the Dionex AS-AP in the upper-left back corner (where the valve cables are located).

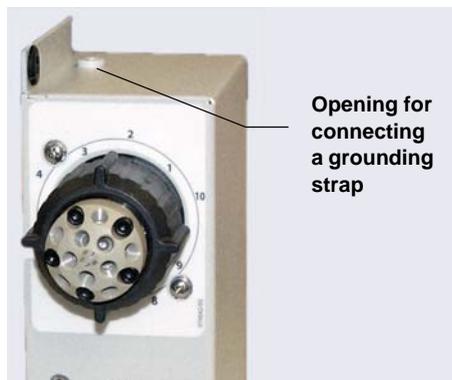


Figure C-5. *Grounding Strap Connection Location*

7. Note the four mounting screw openings on the side of the syringe assembly box (see [Figure C-6](#)) and the corresponding openings on the mounting bracket (see [Figure C-7](#)).

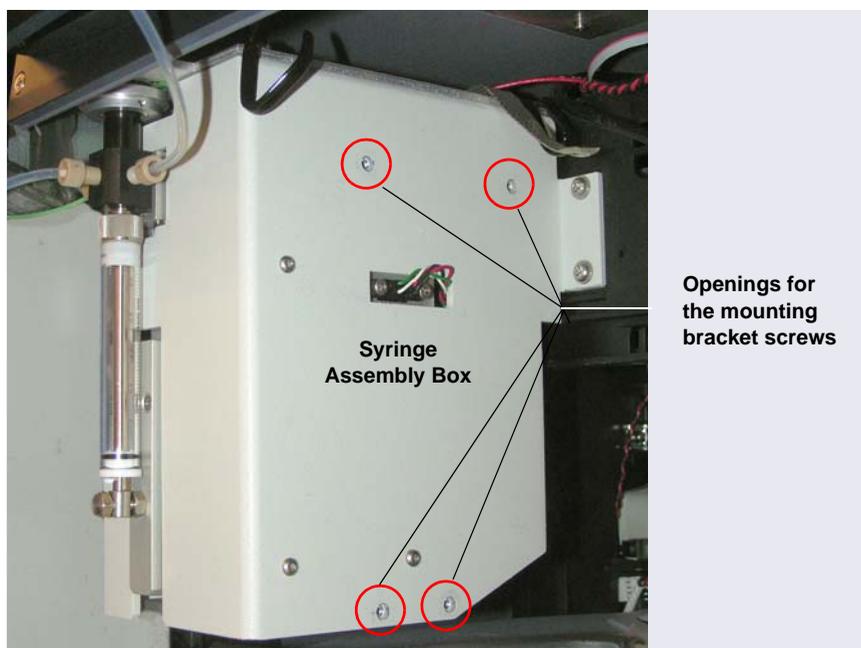


Figure C-6. *Mounting Location for the Valve with Mounting Bracket*

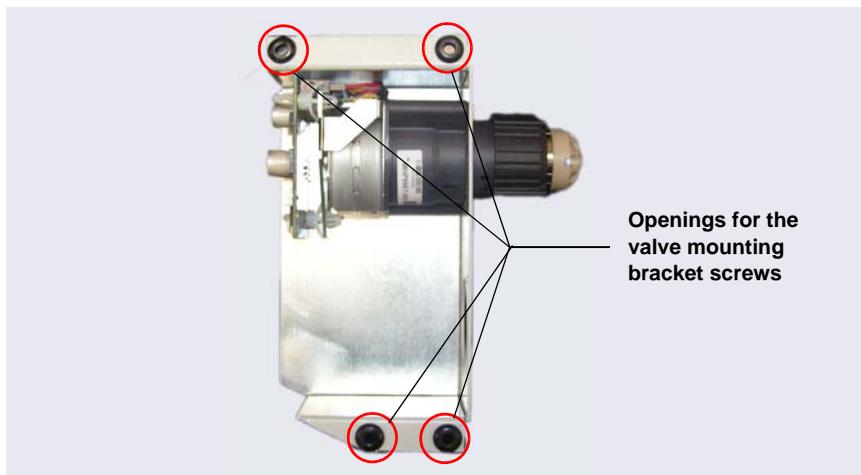


Figure C-7. Valve with Mounting Bracket Side View

8. Locate the four Phillips head screws (P/N 075524) provided with the valve with mounting bracket.
9. Align the mounting bracket on the side of the syringe assembly enclosure (see [Figure C-8](#)). Using a Phillips head screwdriver, attach the upper-left screw first (to help hold the valve with mounting bracket in place), and then attach the remaining screws.

Tighten the screws just enough to secure the mounting bracket to the enclosure. Do not overtighten the screws.



Figure C-8. Valve with Mounting Bracket Installed

10. Locate the grounding strap inside the Dionex AS-AP in the upper-left back corner.

11. Using the cap socket head screw (P/N 050481) provided, attach the grounding strap to the connection location on the mounting bracket (see [Figure C-9](#)). Use a 3 mm Allen wrench to tighten the screw.

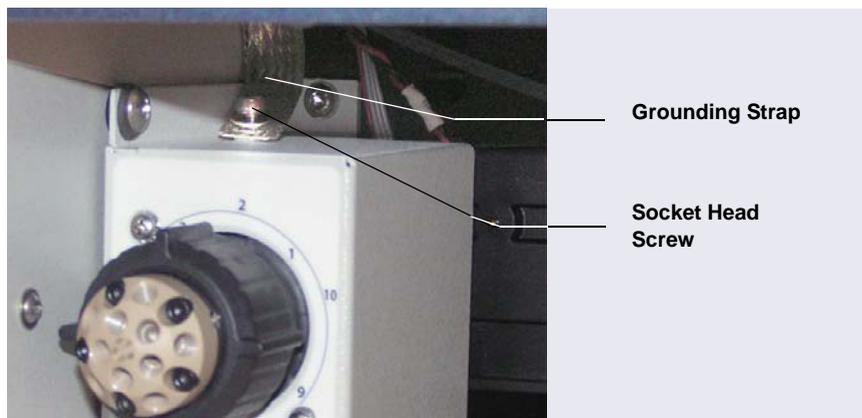


Figure C-9. *Grounding Strap Attached to Valve Mounting Bracket*

12. Plumb the valve ports as required for your application, using the plumbing kit provided with the valve with mounting bracket. If you installed a 6-port injection valve, diverter valve, or fraction collection valve, refer to [Section B.7](#) for plumbing instructions. For a 6-port or 10-port auxiliary valve, refer to the documentation for your application for plumbing instructions.

C.3 Installing a Second Valve on the Valve Mounting Bracket

Included Parts

[Table C-2](#) lists the additional parts included with the valve.

Part Number	Item	Quantity
030207	Phillips head screw (for attaching valve to mounting bracket)	2
045691	Washer (for attaching valve to mounting bracket)	2
075496	Valve cable	1
075497	Valve cable	1

Table C-3. Additional Parts Included with the Valve

Additional Items Required

- Phillips head screwdriver
- 3 mm Allen wrench

C.3.1 Removing the Valve Mounting Bracket from the Dionex AS-AP (If Installed)

NOTE If you are installing a second valve on a new valve with mounting bracket, go on to [Section C.3.2](#).

If the valve with mounting bracket is already installed in the Dionex AS-AP, follow the instructions in this section to remove it from its mounting location before installing the second valve.

1. Turn off the pump flow.
2. Press the main power switch on the rear panel to turn off the Dionex AS-AP power.
3. Lift up the Dionex AS-AP front panel.
4. Using a 3 mm Allen wrench, remove the screw from the grounding strap connected to the top of the valve with mounting bracket (see [Figure C-10](#)).

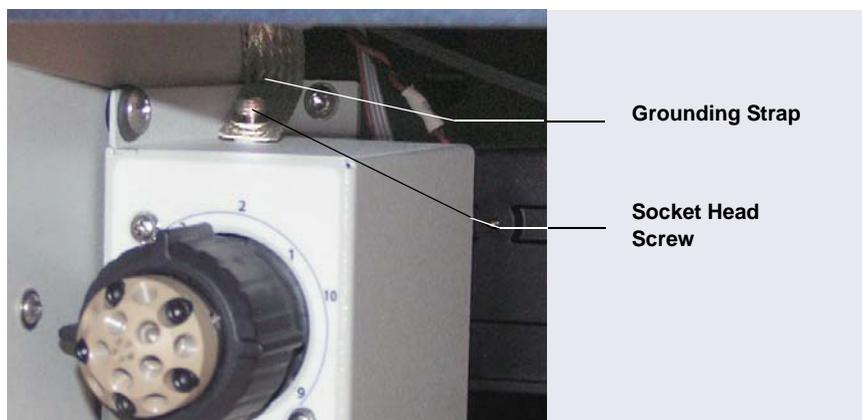


Figure C-10. *Grounding Strap Attached to Valve Mounting Bracket*

5. Using a Phillips head screwdriver, remove the four screws that attach the valve with mounting bracket to the side of the syringe assembly box (see [Figure C-8](#)).

6. Remove the valve with mounting bracket and disconnect the two cables connected to the valve electronics board on the rear of the valve (see [Figure C-11](#)).

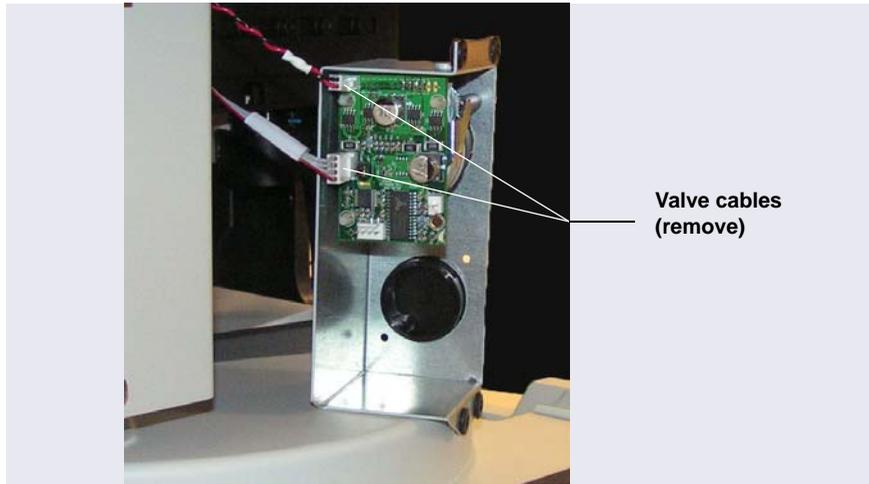


Figure C-11. *Valve Cables Connected to Valve Electronics Board*

C.3.2 Installing a Second Valve on an Uninstalled Mounting Bracket

1. Remove the black cover from the valve opening on the mounting bracket (see [Figure C-12](#)) by pushing from the rear of the bracket.
2. Locate the sheet of labels (P/N 070042) provided with the valve with mounting bracket. Remove the label for the type of valve you are installing and attach it to the front of the mounting bracket.
3. Locate the two screws (P/N 030207) and washers (P/N 045691) provided with the valve.

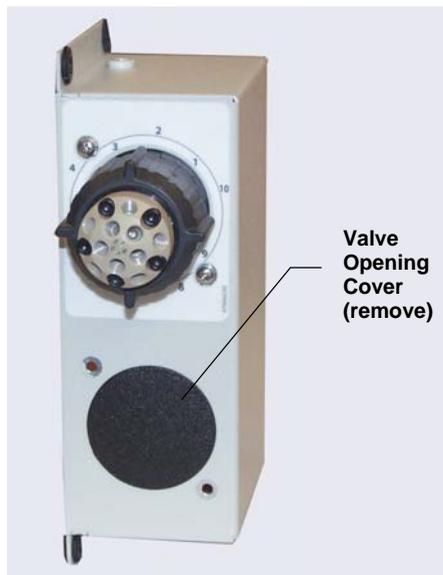


Figure C-12. Mounting Bracket with Valve Opening Cover

4. Slide the washers onto the screws.
5. From the rear of the bracket, slide the valve through the valve opening. Using a Phillips head screwdriver, secure the valve to the bracket with the two screws and washers (see [Figure C-13](#)).



Figure C-13. Second Valve Installed on Mounting Bracket

6. Check the settings of the two jumpers (labeled **JMP1** and **JMP2**) on the electronics board attached to the rear of each valve (see [Section C.1](#)). Install the jumpers as follows:

- Top valve: Install the jumper on **JMP2**
- Bottom valve: Install the jumper on **JMP1**

NOTE To change a jumper location, pull the jumper off of the pins and then push it onto the other set of pins.

7. Locate the two cables provided with the valve. Connect each cable between the electronics boards on the top and bottom valves as shown in [Figure C-14](#).

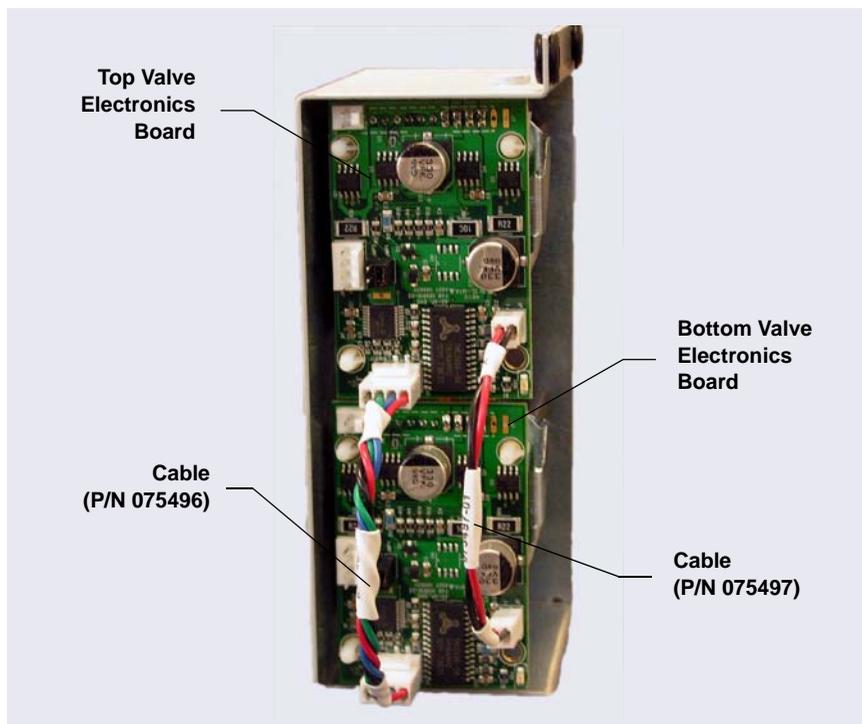


Figure C-14. Rear of Valve Mounting Bracket with Cables for the Second Valve Connected

8. The valves with mounting bracket can now be installed in the Dionex AS-AP. Follow the instructions in [Section C.2](#).

D • Fraction Collection Option

When configured for fraction collection, the Dionex AS-AP is connected to two high-pressure valves (injection and fraction collection), which are installed in the Dionex AS-AP. In addition, to operate the Dionex AS-AP with fraction collection, a fraction collection license for Chromeleon 6.8 is required, and a fraction collection driver must be configured in the Chromeleon 6.8 timebase. Installation of the injection valve, fraction collection valve, license, and driver allows automation of injection, fraction collection, and reinjection in one system.

NOTE Support for the fraction collection option is not available in Chromeleon 7.

NOTE Because of the flow volume required for adequate recoveries, Thermo Fisher Scientific recommends performing fraction collection on systems configured for 4-mm columns.

IMPORTANT

If a suppressor is configured in the system, it must be plumbed for external water mode.

D.1 Installing and Plumbing the Valves

To install the two high-pressure valves, follow the instructions in [Appendix C](#). Designate the top valve as the injection valve and the bottom valve as the fraction collection valve.

To plumb the valves, follow the instructions for the type of injection mode to be used. For push mode injections, see [Section D.1.1](#). For pull mode injections, see [Section D.1.2](#).

D.1.1 Plumbing the Valves for Push Mode with Fraction Collection

[Figure D-1](#) illustrates the Dionex AS-AP plumbing schematic for fraction collection in push mode.

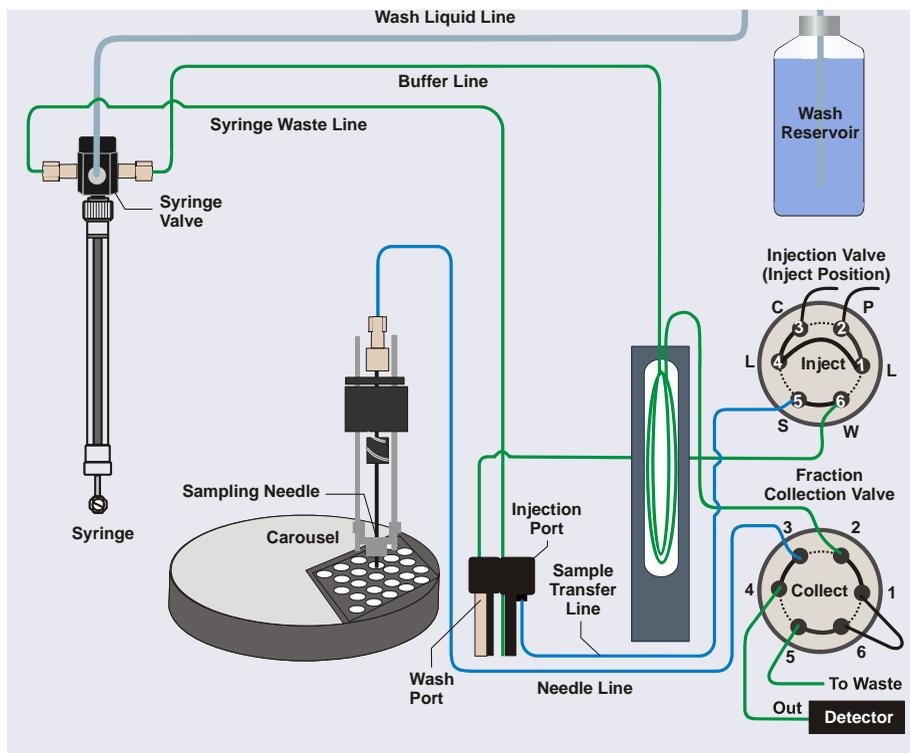


Figure D-1. Plumbing Schematic: Fraction Collection in Push Mode

Plumbing the Injection Valve

To plumb the injection valve, follow the instructions in [Section B.7.1](#). The injection valve plumbing is the same as that for push mode without fraction collection.

Plumbing the Fraction Collection Valve

1. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929) or the plumbing kit provided with the valve (P/N 075527):
 - 0.25 mm (0.010 in) ID black PEEK tubing (P/N 042690)

- 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714)
- 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
- A tan 1/16 in flangeless fitting bolt (P/N 052230) and a two-piece ferrule (clear cone and tan flat) (P/N 062511)
- Six 10-32 fitting bolts (P/N 074449) and six double-cone ferrules (P/N 074373)

NOTE Use 10-32 fitting bolts (P/N 074449) and six double-cone ferrules (P/N 074373) for all valve connections described below. For tightening requirements, refer to the guidelines on [page 111](#).

2. Follow the steps below to disconnect the buffer line from the needle and reconnect it to the fraction collection valve:
 - a. To position the needle in a convenient position for servicing, open the Dionex AS-AP ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) and click **Alignment**. The Sampler Alignment panel opens. Click **Move to Wash Port**. The needle moves to above the wash port.

- b. To prevent twisting of the needle, hold the needle holder (see [Figure D-2](#)) with one hand and then disconnect the buffer line from the needle.

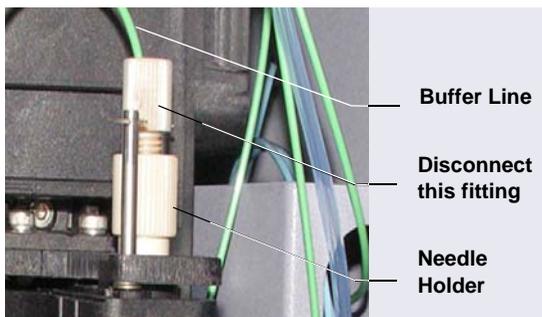


Figure D-2. Buffer Line Connected to the Needle

- c. Remove the fitting and ferrules from the line.
 - d. Use a 10-32 fitting bolt and double-cone ferrule to connect the buffer line to port **2** on the fraction collection valve.
3. Cut a length of 0.33 mm (0.013 in) ID blue PEEK tubing long enough to connect from the top of the needle to the fraction collection valve.

4. Follow the steps below to connect this line to the needle:
 - a. Use the 1/16 in flangeless fitting bolt and two-piece ferrule for the connection. Slide the fitting bolt onto the tubing as shown in [Figure D-4](#).

- b. Observe that one side of the small tan ferrule is beveled and one side is flat (see [Figure D-3](#)). **Hint:** The flat side appears shiny.



Figure D-3. Small Tan Ferrule (Enlarged)

- c. With the flat side of the small tan ferrule facing toward the fitting bolt, slide the ferrule onto the tubing. Then, slide the clear cone ferrule onto the tubing with the cone toward the flat ferrule and fitting bolt (see [Figure D-4](#)).

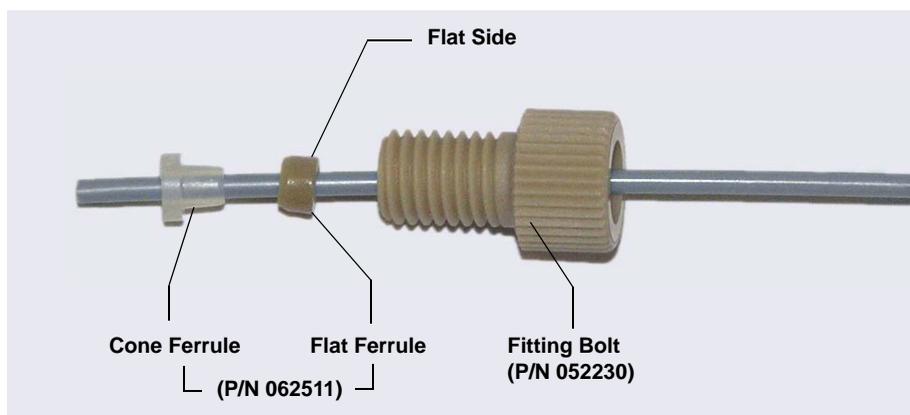


Figure D-4. Fitting for Needle Line

- d. Position the bolt and ferrules away from the end of the tubing (so they will not fall off when you insert the tubing into the needle holder).
 - e. Insert the tubing down into the center of the needle holder. When you insert the tubing, you should feel the tubing drop into a small

indentation inside the holder (see [Figure D-5](#)). If not, move the tubing slightly until it does.

- f. Slide the ferrules and bolt into the needle holder.

IMPORTANT

When connecting the line to the needle, make sure the line slides into the indentation inside the needle holder before tightening the fitting.

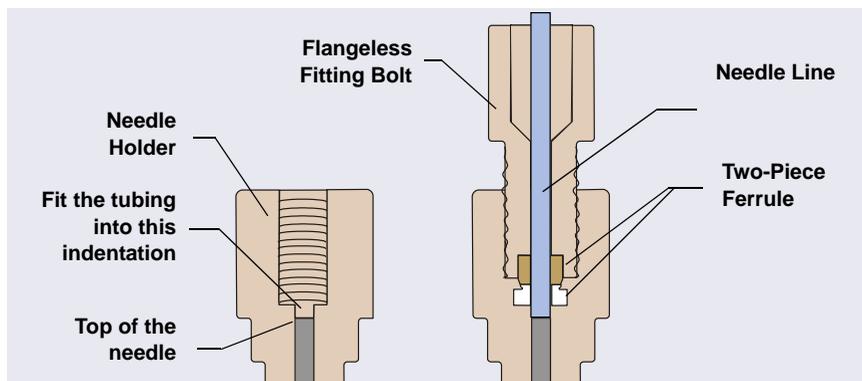


Figure D-5. Cross-Section of Needle Holder and Needle Line Fitting

- g. To prevent twisting of the needle, hold the needle with one hand and then tighten the fitting fingertight (see [Figure D-6](#)).

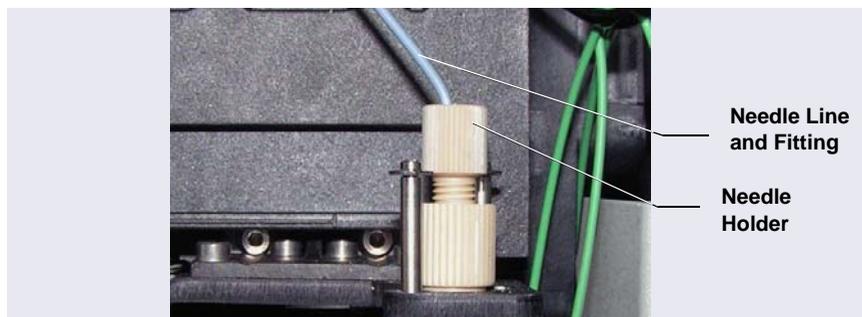


Figure D-6. Needle Line Connected to the Needle

5. Use a 10-32 fitting bolt and double-cone ferrule to connect the other end of the needle line to port **3** on the fraction collection valve.

6. Cut a length of 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777) long enough to connect the detector outlet to the fraction collection valve and at least 25 cm (10 in) long. Measure the length of the line. You will need this information to calculate the delay time (see the following note).

NOTE The line between the detector outlet and the fraction collection valve must be long enough to provide adequate delay time (6 sec or more) between the detector outlet and the valve. For example, a 25 cm (10 in) length of 0.75 mm (0.030 in) ID tubing has a tubing volume of about 116 μ L. At a flow rate of 1 mL/min, this length will create a delay time of 7 sec. You enter the delay time (or delay volume) when you set up a fraction collection program in Chromeleon 6.8 (see [Section D.3.4](#)).

7. Use 10-32 fitting bolts and double-cone ferrules to connect this line between the detector cell outlet and port **4** on the fraction collection valve.
8. Cut a length of 0.75 mm (0.030 in) ID green PEEK tubing long enough to reach from the fraction collection valve to the Dionex AS-AP waste port. This is a waste line.
9. Use a 10-32 fitting bolt and double-cone ferrule to connect one end of this line to port **5** on the fraction collection valve.
10. Route the waste line to the Dionex AS-AP waste port and insert the line into the round opening in the port (see [Figure D-7](#)). To ensure the waste lines do not interfere with needle arm movement, secure the excess tubing

with the flexible tubing tie in the slotted compartment next to the needle (see [Figure D-8](#)).

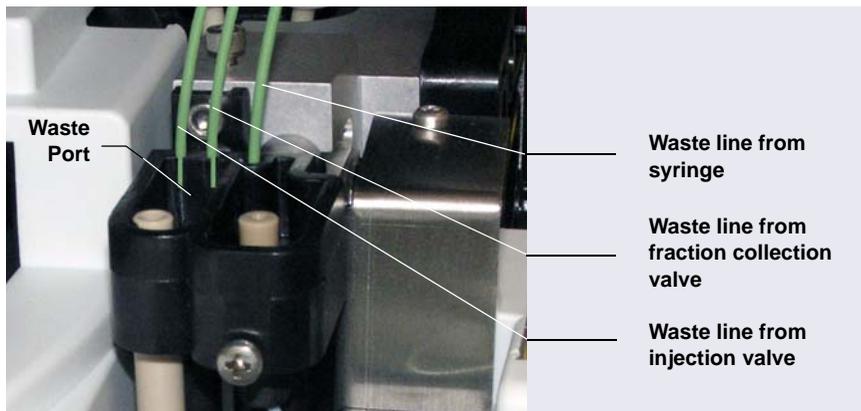


Figure D-7. Waste Lines Installed in the Waste Port

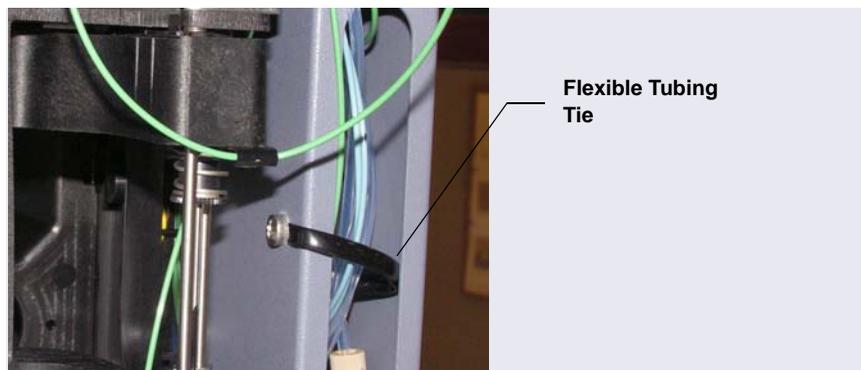


Figure D-8. Flexible Tubing Tie in Slotted Compartment

11. Cut a short length of 0.25 mm (0.010 in) ID black PEEK tubing. Use 10-32 fitting bolts and double-cone ferrules to connect this line between port 1 and port 6 on the fraction collection valve.

D.1.2 Plumbing the Valves for Pull Mode with Fraction Collection

[Figure D-4](#) illustrates the Dionex AS-AP plumbing schematic for fraction collection in pull mode.

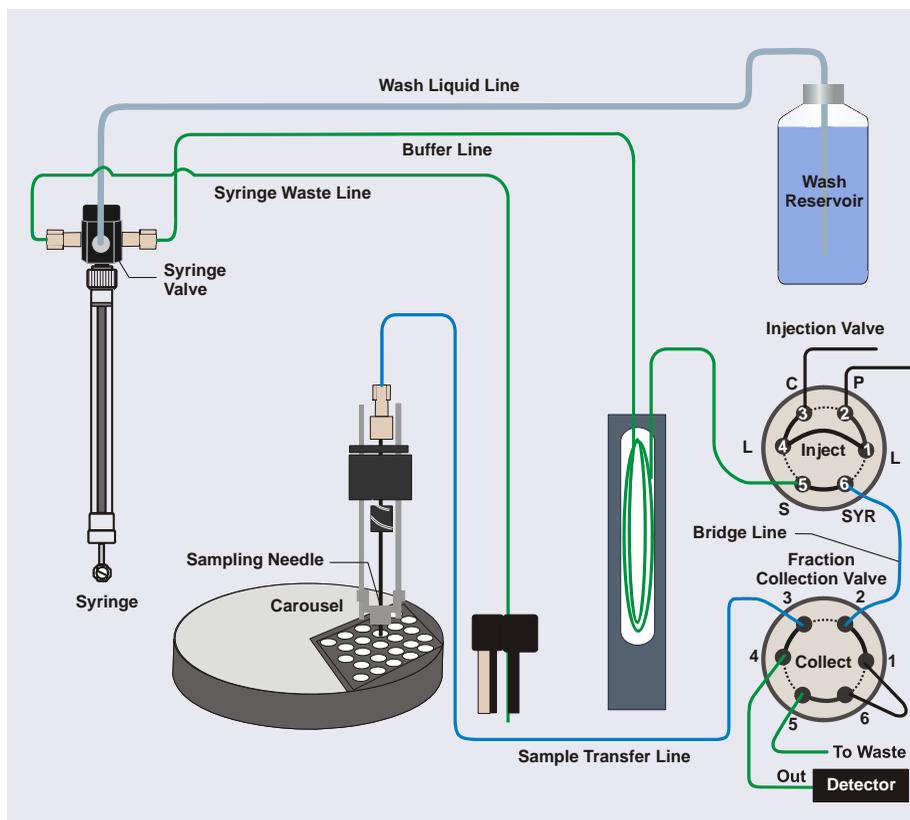


Figure D-9. Sampling Principle: Fraction Collection in Pull Mode

1. Locate the following items in the Dionex AS-AP Ship Kit (P/N 074929) or the plumbing kit provided with the valve (P/N 075527):
 - 0.25 mm (0.010 in) ID black PEEK tubing (P/N 042690)
 - 0.33 mm (0.013 in) ID blue PEEK tubing (P/N 049714)
 - 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777)
 - Six 10-32 fitting bolts (P/N 074449) and six double-cone ferrules (P/N 074373)

NOTE Use 10-32 fitting bolts (P/N 074449) and double-cone ferrules (P/N 074373) for all valve connections, described below. For tightening requirements, refer to the guidelines on [page 111](#).

2. If the injection valve is already plumbed for pull mode, disconnect the buffer line from port **SYR** (6). Also, disconnect the sample transfer line from port **S** (5).
3. Connect the buffer line to port **S** (5) on the injection valve.
4. Connect the sample transfer line to port **3** on the fraction collection valve.
5. Cut a length of 0.75 mm (0.030 in) ID green PEEK tubing (P/N 044777) long enough to connect the detector outlet to the fraction collection valve and at least 25 cm (10 in) long. Measure the length of the line. You will need this information to calculate the delay time (see the following note).

NOTE The line between the detector outlet and the fraction collection valve must be long enough to provide adequate delay time (6 sec or more) between the detector outlet and the valve. For example, a 25 cm (10 in) length of 0.75 mm (0.030 in) ID tubing has a tubing volume of about 116 μ L. At a flow rate of 1 mL/min, this length will create a delay time of 7 sec. You enter the delay time (or delay volume) when you set up a fraction collection program in Chromeleon 6.8 (see [Section D.3.4](#)).

6. Connect this line between the detector cell outlet and port **4** on the fraction collection valve.
7. Cut a length of 0.75 mm (0.030 in) ID green PEEK tubing long enough to reach from the fraction collection valve to the Dionex AS-AP waste port. This is a waste line. Connect one end of this line to port **5** on the fraction collection valve.
8. Route the waste line to the Dionex AS-AP waste port and insert the line into the round opening in the port (see [Figure D-7](#)). To ensure the waste lines do not interfere with needle arm movement, secure the excess tubing with the flexible tubing tie in the slotted compartment next to the needle (see [Figure D-8](#)).

9. Cut a length of 0.33 mm (0.013 in) ID blue PEEK tubing long enough to connect between the injection valve and the fraction collection valve. This is the bridge line. Measure the length of this line. You will need to enter the bridge line volume in the Chromeleon 6.8 configuration (see [Section D.2](#)).
10. Connect the bridge line between port **SYR** (6) on the injection valve and port **2** on the fraction collection valve.
11. Cut a length of 0.25 mm (0.010 in) ID black PEEK tubing about 15 cm (6 in) long. Connect this line between port **1** and port **6** on the fraction collection valve.

D.2 Setting Up Fraction Collection in Chromeleon 6.8

To use fraction collection with Chromeleon 6.8, the following software requirements must be met:

- Chromeleon 6.8 Chromatography Data System (version 6.80 DU10c or later) must be installed. Fraction collection is not available in Chromeleon 7.
- The fraction collection driver installed in the same timebase as the Dionex AS-AP in the Chromeleon 6.8 Server Configuration program.
- *One* of the following fraction collection licenses:

Basic Fraction Collection: Includes wizard-based program setup and fraction reporting.

Extended Fraction Collection: Includes basic fraction collection and additional functions, such as automatic sample purification using the associated post-acquisition steps, color-coded sample and fraction tracking, and sophisticated fractionation algorithms with peak shoulder detection.

Configuring Fraction Collection in Chromeleon 6.8

1. In the Chromeleon 6.8 Server Configuration program, configure the two high-pressure valves on the **Options** page in the Dionex AS-AP configuration properties dialog box (see [Figure D-10](#)). Under

Autosampler Valve(s), select **Inject** for the top valve and **Fraction** for the bottom valve.

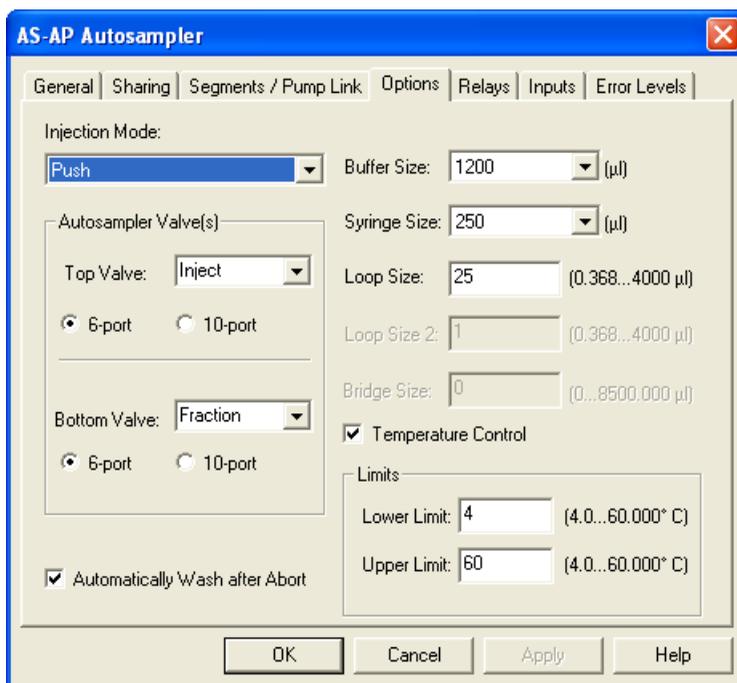


Figure D-10. Example Chromeleon 6.8 Dionex AS-AP Configuration Properties Dialog Box: Options Page

For pull mode only: In the **Bridge Size** box, enter the volume of the bridge line that connects the injection valve to the fraction collection valve. To estimate the volume of 0.33 mm (0.013 in) ID blue PEEK tubing, use a conversion factor of 0.86 µL/cm (2.2 µL/in).

NOTE If you install a different length bridge line at a later time, make sure you enter the correct **Bridge Size** for the new line. If you disconnect the fraction collection valve and use only the injection valve, set **Bridge Size** to 0.

2. In the Chromeleon 6.8 Server Configuration program, install the Fraction Collection driver in the same timebase in which the Dionex AS-AP is installed. In the **Add device to timebase** dialog box, the Fraction

Collector driver is listed under **Generic** in the **Manufacturers** list (see [Figure D-11](#)).

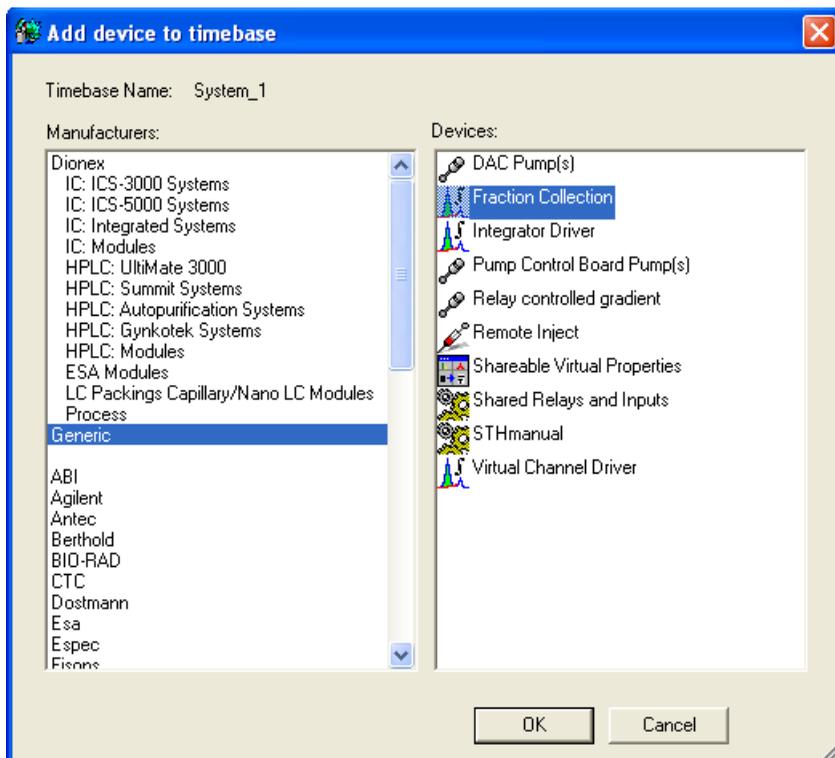


Figure D-11. Chromeleon 6.8 Server Configuration: Add device to timebase dialog box

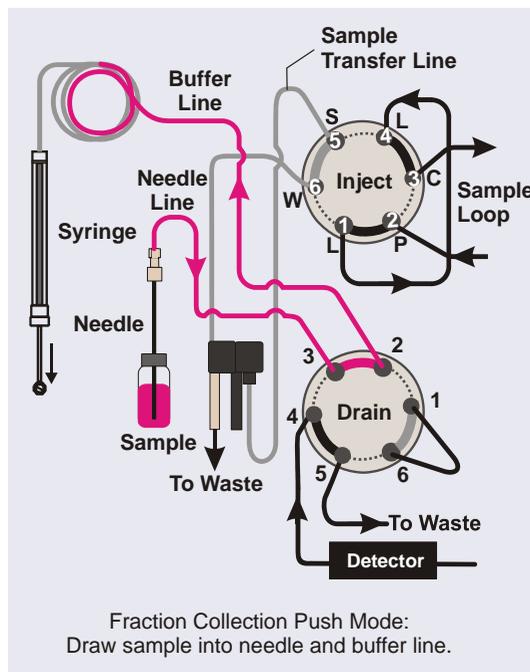
D.3 Performing Fraction Collection with the Dionex AS-AP

This section provides an overview of the principles of fraction collection with the Dionex AS-AP. Brief operating instructions are included. For details about performing fraction collection, refer to the Chromeleon 6.8 Help.

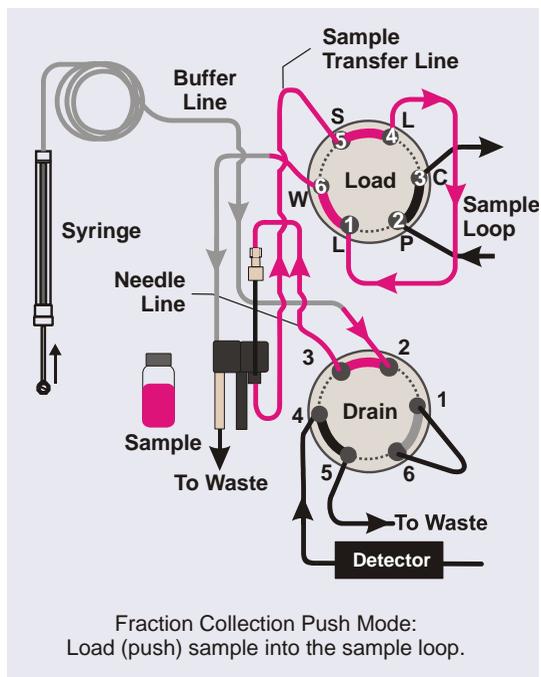
D.3.1 Sampling Principle for Fraction Collection in Push Mode

When configured for push mode and fraction collection, the Dionex AS-AP performs the following operations to sample from a vial and collect fractions:

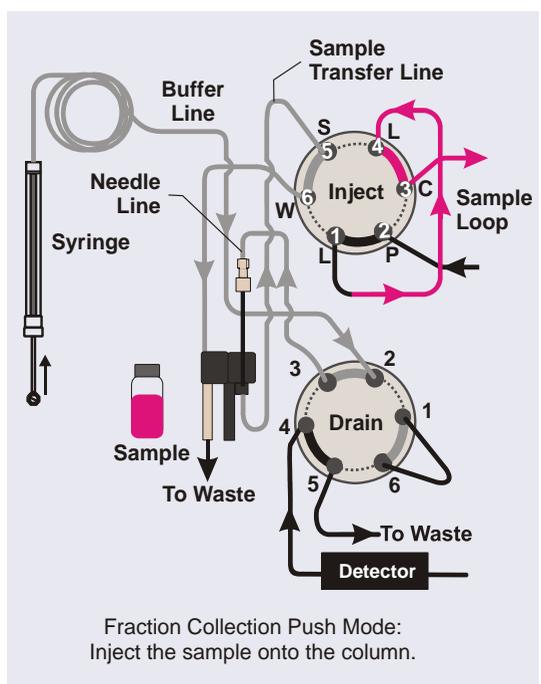
1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.
3. Lowers the needle into the vial.
4. With the fraction collection valve in the Drain position, draws the sample into the needle and buffer line.
5. Moves the needle to the injection port.



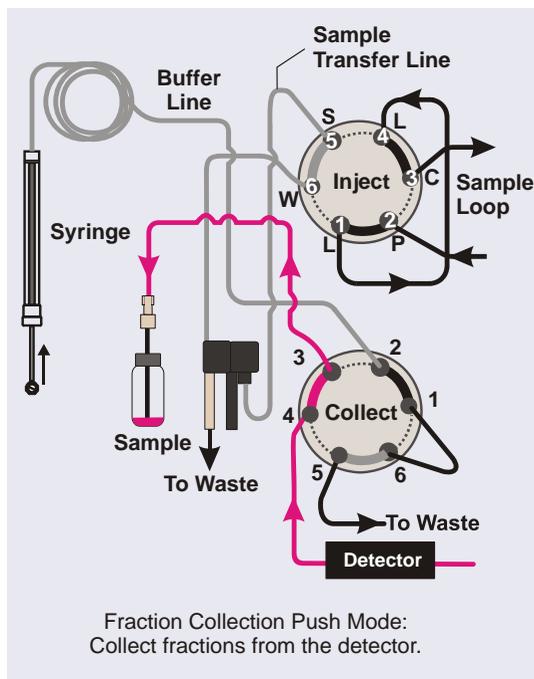
6. With the injection valve in the Load position and the fraction collection valve in the Drain position, the syringe pushes the sample out of the buffer line, through the needle and sample transfer line, and into the sample loop.



7. When the injection valve is switched to the Inject position, sample is swept out of the loop and delivered to the column. The fraction collection valve remains in the Drain position during injection.



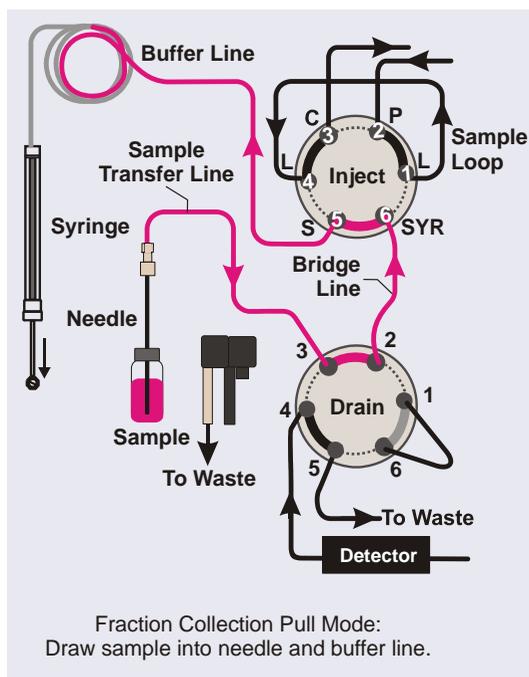
- After injection, the fraction collection valve is switched to the Collect position and the Dionex AS-AP collects fractions from the detector outlet line through the needle and into vials.



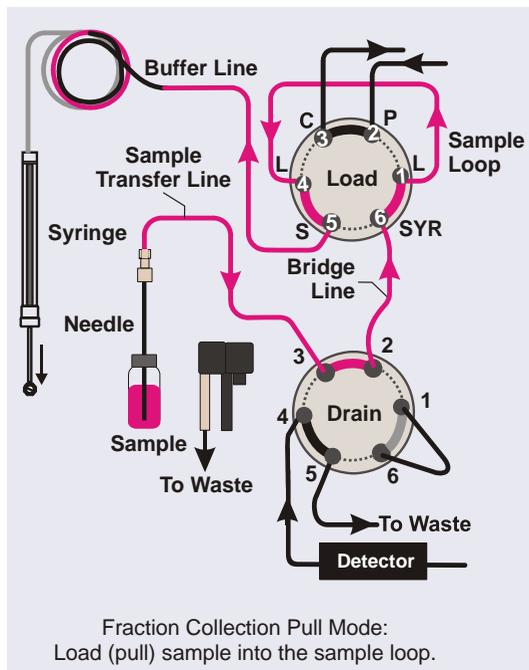
D.3.2 Sampling Principle for Fraction Collection in Pull Mode

When configured for pull mode and fraction collection, the Dionex AS-AP performs the following operations to sample from a vial and collect fractions:

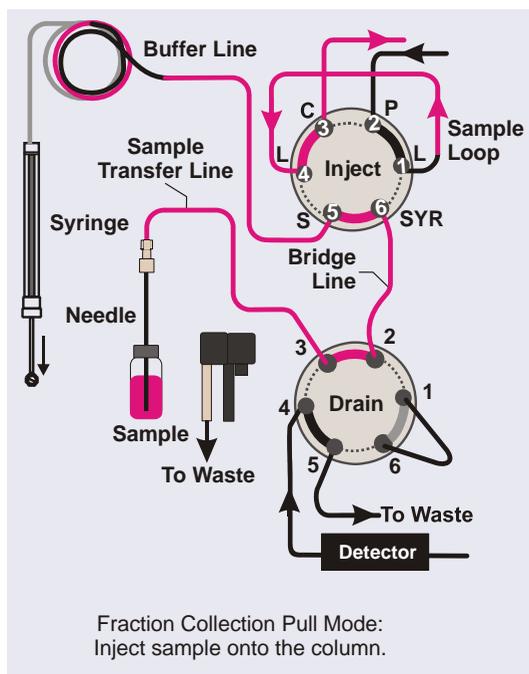
1. Rotates the carousel so that the vial to be sampled is positioned parallel to the sampling needle.
2. Moves the needle horizontally to position it over the vial.
3. Lowers the needle into the vial.
4. With the fraction collection valve in the Drain position and the injection valve in the Inject position, draws the sample into the needle, sample transfer line, bridge line, and buffer line.



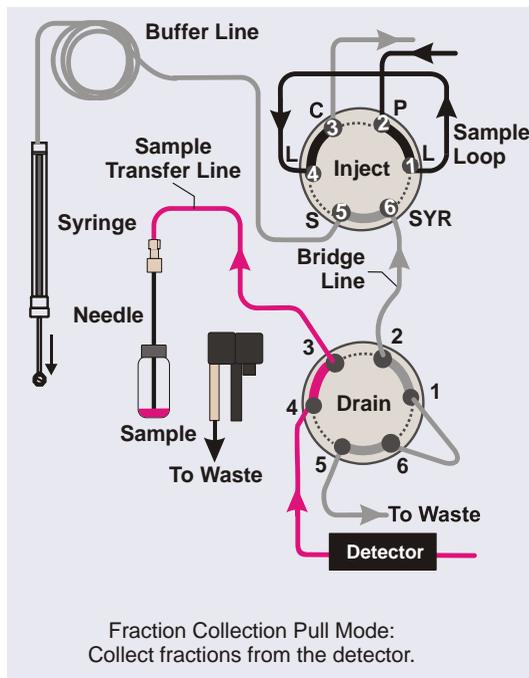
- When the injection valve is switched to the Load position, the syringe pulls the sample out of the needle, sample transfer line, bridge line, and buffer line, and into the sample loop. The fraction collection valve remains in the Drain position during loading.



- When the injection valve is switched to the Inject position, sample is swept out of the loop and delivered to the column. The fraction collection valve remains in the Drain position during injection.

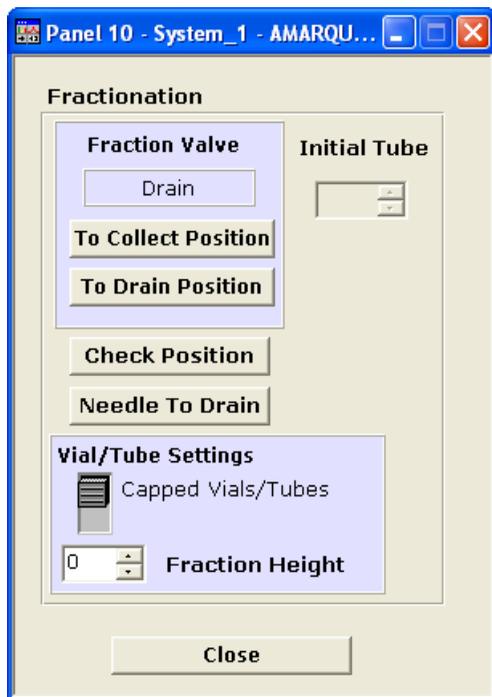


7. After injection, the fraction collection valve is switched to the Collect position and the Dionex AS-AP collects fractions from the detector outlet line through the needle and into vials.



D.3.3 Manual Control

When the Dionex AS-AP is configured for fraction collection, the Chromeleon 6.8 panel tabset includes a **Fractionation** panel that provides commands for manual control of certain functions (for example, switching the fraction collection valve position). To open the panel, click **Fractionation** on the **Autosampler** Control panel.



D.3.4 Programmed Control

When the Dionex AS-AP is configured for fraction collection, the Chromeleon 6.8 Program Wizard includes tab pages for determining how and when fractions are collected. The fraction collection wizard pages are included with the wizard pages for the other devices (pump, detector, and so on) in the timebase.

Selecting When Fractions are Collected

The Fraction Collection: General Options page (see [Figure D-12](#)) provides options for selecting when to collect fractions.

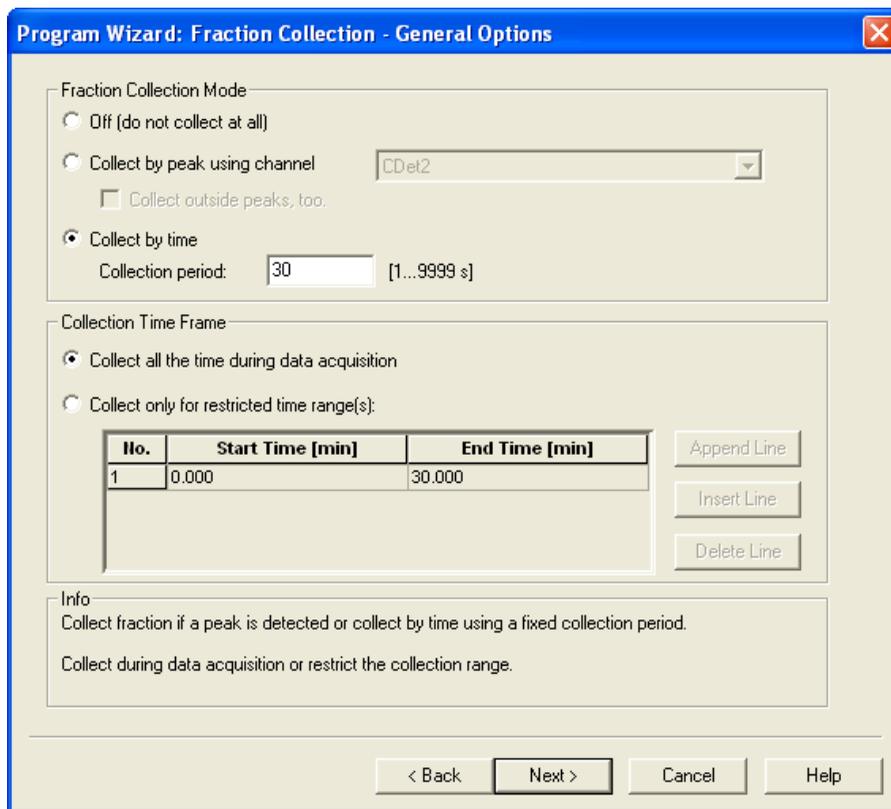


Figure D-12. Chromeleon 6.8 Program Wizard:
Fraction Collection: General Options

NOTE For details about the options on a wizard page, click the **Help** button.

You can choose to collect fractions when a peak is detected or for a specified time period. You can also specify the time range or ranges during data acquisition at which to collect fractions. Additional options for controlling collection are available on subsequent pages in the wizard.

Entering the Delay Time

On the Fraction Collection: Delay and Detector Offset Options page (see [Figure D-13](#)), enter the **Delay time** (the time required for fluid to travel from the detector outlet to the fraction collection valve). Alternatively, you can enter the **Delay volume** (the volume of the tubing connecting the detector outlet and the fraction collection valve). If you enter a **Delay volume**, Chromeleon 6.8 will calculate the delay time based on the flow rate entered in the program.

NOTE To estimate the volume of 0.75 mm (0.030 in) ID PEEK tubing (green), use a conversion factor of 0.4.6 $\mu\text{L}/\text{cm}$ (11.6 $\mu\text{L}/\text{in}$).

Program Wizard: Fraction Collection - Delay and Detector Offset Options

Delay

Delay time: [0.0...9999.0 s]

Delay volume: [0...100000.0 μl]

The delay - measured in s or μl - is defined between the first detector and the collection device.

Detector Delay Offsets

Detector Name	Delay Time Offset [s]
CDet2	0.0

< Back Next > Cancel Help

Figure D-13. Chromeleon 6.8 Program Wizard:
Fraction Collection: Delay and Detector Offset Options



After you complete the wizard, you can modify the program using the Program Editor. Open the program in the editor and then click the **Fraction Collection** device in the list to see the fraction collection tab pages.

E • Reducing Contamination

Use the following steps to reduce ionic contamination levels in the AS-AP.

1. When handling any system components, wear clean, powder-free gloves, preferably made of a non-colored nitrile material.¹ Wash the outside of the gloves in clean DI water and air dry. After washing the gloves, minimize handling of any surface other than system components.
2. Use ASTM Type 1 (18 megohm-cm) filtered and deionized (DI) water to clean all components (as described below) and to fill the wash liquid reservoir.
3. Use a polystyrene wash liquid reservoir. Polystyrene reservoirs are available from third-party suppliers.² Rinse the reservoir three to five times with DI water to clean it.
4. Fill the reservoir with fresh DI water every one to two days.
5. Use 0.75 mm (0.030 in) ID PEEK, green tubing between the reservoir and the syringe valve. The tubing is provided in the Dionex AS-AP Ship Kit (P/N 074929). The standard length for the line is 76 cm (30 in).
6. Before connecting the green tubing to the reservoir, follow the steps below to clean the fittings and tubing:
 - a. To clean new fittings, fill a separate polystyrene reservoir with DI water and soak the fittings for at least 24 hours.
 - b. Fill a separate polystyrene reservoir with DI water. Swish at least 15 cm (6 in) of one end of the green tubing in the DI water for 30 to 60 sec to clean it.
 - c. Insert this cleaned end of tubing into the wash reservoir. Use the cap from the reservoir provided in the Dionex AS-AP Ship Kit.
 - d. Install the cleaned fittings on the other end of the tubing.

-
1. Examples: VWR[®] CERTICLEAN[®] Class 100 Nitrile Gloves, Catalog No. 40101-(220-228); VWR[®] CERTICLEAN[®] Class 10 Nitrile Gloves, Catalog No. 40101-(352-358); Ansell Nitrilite[®] Cleanroom Gloves, Catalog No. 93-311.
 2. Example: Nalgene[®] Labware, Catalog No. 455-1000.

- e. Attach a syringe to the other end of the tubing and pull wash liquid through the tubing. Remove the syringe, direct the end of the tubing to waste, and let about 100 mL of DI water drip through the tubing.
- f. Connect the tubing to the middle (front) port of the syringe valve. For connection instructions, see [Section 5.7](#).
7. Use the **Wash Needle and Fluidics** button on the ePanel (in Chromeleon 7) or Control panel (in Chromeleon 6.8) to run a manual wash cycle. Enter a wash volume of 5,000 μL . If necessary, remove each fitting and wash the end of the fitting tube, the fitting bolt, and ferrule in a clean polystyrene reservoir filled with fresh DI water. Repeat the manual wash as required.
8. Use only 10 mL Thermo Scientific Dionex PolyVials™ (polystyrene) and blue septa (PN 074228, package of 100). For an even cleaner alternative to the blue septa, PTFE (polytetrafluoroethylene) sealing disks (P/N 074927) are available. PTFE sealing disks should only be used for one injection per vial, because the sealing disk does not reseal after the first injection.
9. Soak vials and septa or sealing disks in a clean polystyrene reservoir filled with DI water for a few days or up to one week or more. For best results, use a continuous DI water flush. If a continuous flush is unavailable, change the DI water twice a day (morning and evening).
10. Use stainless steel tweezers to remove the vials and septa from the soaking reservoir. Do not touch the septa with gloves. Touch the vials with gloves only on the outside of the vials.
11. Set up the instrument method (in Chromeleon 7) or program (in Chromeleon 6.8) to wash before and after injection by setting the **Inject Wash** mode to **Both** (see [Section 3.4.4](#)). This minimizes the time between the wash process and the injection.
12. Keep the carousel closed to minimize any environmental contamination.
13. When replacing buffer lines and sample loops, use tubing assemblies provided by Thermo Fisher Scientific. These buffer lines and loops are precision cut and will wash out more quickly than those made with standard laboratory tools. To wash these tubing assemblies:

- a. Remove the wash reservoir line from the syringe valve and use couplers to connect the new buffer line and/or sample loop to the wash reservoir line.
- b. Pull wash fluid through the connected assemblies and then let 100 mL drip through them to waste. Uncouple the assemblies and install them in the autosampler.
- c. Rewash the autosampler as described in [Step 7](#).

F • Reordering Information

Part Number	Item
Vials, Well Plates, and Trays	
055058	Vials, 10 mL polystyrene, with caps and septa (package of 100)
074228	Vials, 10 mL polystyrene, with caps and septa for capillary systems or trace analysis applications (package of 100)
074927	Sealing disks, PTFE, for 10 mL vials
055427	Vials, 1.5 mL glass, with caps and septa (package of 100)
079812	Vials, 1.5 mL polypropylene, with caps and septa (package of 100)
055428	Vials, 0.3 mL polypropylene, with caps and septa (package of 100)
066332	Well plates, 96 micro-well, 0.5 mL round (U-shaped) wells (package of 10) (not suitable for IC applications)
066333	Well plates, 96 micro-well, 0.45 mL conical (V-shaped) wells (package of 20) (not suitable for IC applications)
066334	Well plates, 96 deep-well, 2 mL wells (package of 5) (suitable for IC applications where ion concentration is above 1 ppm)
066335	Well plate covers for 0.45 mL and 0.5 mL well plates (package of 10)
066330	Well plate covers for 2 mL well plates (package of 10)
074936	Tray for 0.3 mL or 1.5 mL vials, 40-vial capacity Tray for micro well plates, 96-well capacity
074938	Tray for 10 mL vials, 19-vial capacity
074939	Tray for deep well plates, 96-well capacity
069877	Tray (wedge-shaped), for 10 mL vials, 8-vial capacity

Part Number	Item
Syringes	
074305	Syringe, 100 μ L
074306	Syringe, 250 μ L
074307	Syringe, 1000 μ L
074308	Syringe, 5000 μ L
Tubing and Fittings	
NOTE When ordering tubing, order the required length (in inches).	
044777	Tubing, 0.75 mm (0.030 in) ID PEEK, green
049714	Tubing, 0.33 mm (0.013 in) ID PEEK, blue
052112	Tubing, 1.55 mm (0.062 in) ID PFA, colorless
042690	Tubing, 0.25-mm (0.010-in) ID PEEK, black
074994	Buffer line, 500 μ L, tubing assembly
074989	Buffer line, 1200 μ L, tubing assembly
075520	Buffer line, 8500 μ L, tubing assembly
057934	Fitting nut, 1/8 in flangeless (short), tan
048949	Ferrule, 1/8 in flangeless, yellow
052230	Fitting nut, 1/16 in flangeless, tan
071358	Fitting nut, 1/16 in flangeless (short), tan
062511	Ferrule, two-piece (clear cone and tan flat)
074449	Fitting bolt, high-pressure, 10-32, blue
074373	Ferrule, high-pressure, 10-32 double-cone, blue
062980	Fitting bolt, 10-32, black
062978	Ferrule, split-cone, black
074322	Fitting bolt, 10-32, short thumb head, black

Part Number	Item
Valves	
074123	6-port valve with mounting bracket
074122	10-port valve with mounting bracket
070209	6-port valve with cables (no mounting bracket)
070208	10-port valve with cables (no mounting bracket)
Kits and Accessories	
075008	Dionex AS-AP Simultaneous Injection Kit
075000	Dionex AS-AP Preventive Maintenance Kit
075973	Valve Rebuild Kit (for 6-port high-pressure valves)
079054	Valve Rebuild Kit (for 10-port high-pressure valves)
075010	Degas tee kit (for online degassing of wash liquid)
074923	Dionex AS-AP Sample Conductivity and pH Accessory
075529	pH electrode for the Sample Conductivity and pH Accessory
Miscellaneous Items	
069914	Sampling needle
055075	Drain tube, 122 cm (48 in)
074982	Drain tube extension, 20 cm (8 in) (for sample temperature control)
960777	USB cable, 6 ft
923686	12-position connector plug (for relay connections)
924133	8-position connector plug (for TTL connections)
043598	Twisted pair of wires (for relay and TTL connections)
074976	J-clip bracket (for needle alignment)
062581	Reservoir, 2 L
954763	Fuse, 4 A IEC 60127-2 fast-blow

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