



# **AS-HV Autosampler Operator's Manual**

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## **PRINTING HISTORY**

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## 1.1 Overview

The Dionex AS-HV Autosampler is a random access robotic device that can be commanded to execute a series of liquid handling steps. The AS-HV can hold up to 250 mL of sample and, through the use of a sample loading pump, deliver sample to an ion chromatography (IC) system or other analyzer. Sample loading pump options include a syringe pump, piston pump, or peristaltic pump (for details, refer to [Section 2.4](#)).

The AS-HV is designed to accommodate a variety of accessories, including a sample rack, a standards rack, and a rinse reservoir. The standard configuration for the AS-HV includes the following components:

- A 24-position sample rack that accommodates 250 mL Nunclon sample flasks
- An 11-position standards rack for loading of standards and/or samples
- A PEEK™ sampling needle for aspirating sample from sample containers
- A sampling needle guide that prevents the PEEK sampling needle from bending or flexing as it pierces a septum
- A rack location mat that houses the sample rack and ensures alignment of the sampling needle over each vial
- A built-in rinse station (consisting of a peristaltic pump and a 150 mm reservoir that circulates rinse fluid) that can be used to clean the sampling needle between samples
- A spill tray for secondary containment of samples
- An RS-232 cable for communication with a PC (personal computer)

The AS-HV is usually controlled remotely from a PC running Microsoft® Windows® XP or Windows® 2000 operating system and Dionex Chromeleon® Chromatography Management System software. The AS-HV communicates with the PC via the RS-232 interface. Limited remote control is also available, using relay signals.

### 1.2 About This Manual

- Chapter 1 Introduction** An overview of the AS-HV; includes a brief description of the standard AS-HV configuration and the software required for operation. An explanation of the conventions used in this manual (including safety-related information).
- Chapter 2 Description** Descriptions of physical aspects of the AS-HV, including mechanical components and the LEDs, controls and connectors on the side panel; an explanation of sample loading modes; and an introduction to Chromeleon software.
- Chapter 3 Operation and Maintenance** Procedures to complete before beginning operation, instructions for creating Chromeleon programs for AS-HV control, and routine preventive maintenance requirements.
- Chapter 4 Troubleshooting** Minor problems that may occur during operation, with step-by-step procedures for how to isolate and eliminate the cause of each problem.
- Chapter 5 Service** Step-by-step instructions for routine service and parts replacement procedures for the AS-HV.
- Appendix A Specifications** Specifications and installation site requirements for the AS-HV.
- Appendix B Installation** Installation instructions for the AS-HV.
- Appendix C Error Messages and Codes** Chromeleon Audit Trail error messages and AS-HV **ERROR** indicator codes, along with an explanation of the possible cause of each problem and the corrective action to take.
- Appendix D Reordering Information** Spare parts for the AS-HV.

## 1.2.1 Safety Messages and Notes

This manual contains warnings and precautionary statements that can prevent personal injury and/or damage to the AS-HV 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, may result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate 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.**

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 the user to an unexpected result of an action, suggest how to optimize instrument performance, etc.**

## 1.3 Safety Labels

The TUV GS and cTUVus Mark safety labels and the CE Mark label on the AS-HV indicate that the AS-HV is in compliance with the following standards and directives: EN 61010-1:2001 (safety), CAN/CSA-C22.2 No. 61010-1:2004 (safety), UL 61010-1:2004 (safety), EN 61326 1997 + A1:1998 + A2:2001 (EMC), Low-Voltage Equipment Directive 73/23/EEC, and EMC Directive 89/336/EEC.

These symbols appear on the AS-HV or on AS-HV labels:



Alternating current



Protective conductor terminal



Power supply is on



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

### 2.1 AS-HV Overview

[Figure 2-1](#) is an overview of the main features of the AS-HV Autosampler.

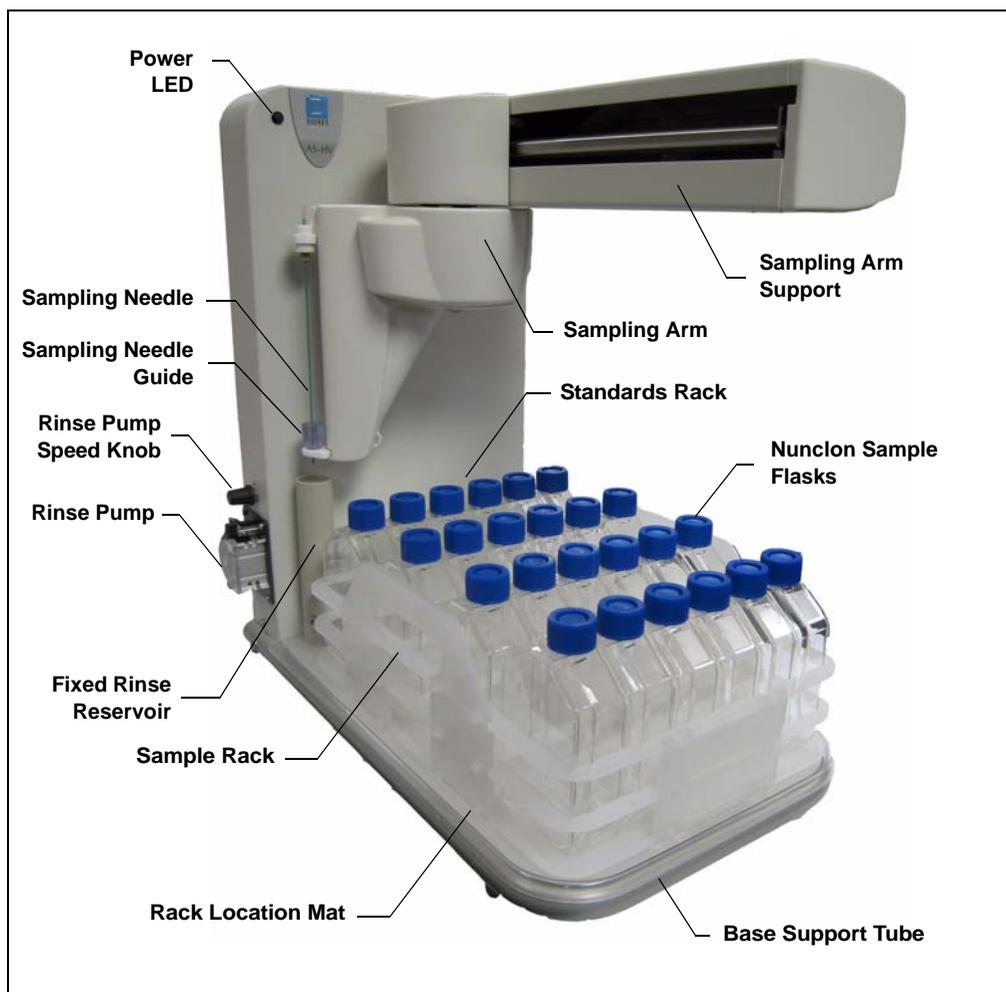


Figure 2-1. AS-HV Autosampler

### Power LED

The power LED lights when power to the AS-HV is turned on, and should remain lit as long as the main power supply is operational. If the LED fails to light when the power is turned on, refer to [Section 4.4](#) for troubleshooting help.

**NOTE** The power switch is located on the AS-HV side panel (see [Section 2.2](#)).

### Sample Rack

The sample rack houses the sample containers. The AS-HV is shipped with a 24-position sample rack (P/N 064233) designed to accommodate 250 mL Nunclon sample flasks (flasks: P/N 064053, pkg. of 50; caps and septa: P/N 064235; pkg. of 50).

All sample container caps contain a split septum that allows the PEEK sampling needle to pierce the cap, while also maintaining sample integrity and minimizing sample evaporation.

**Optional:** A 15-position sample rack (P/N 064234) that accommodates 250 mL narrow-mouth Nalgene® bottles (bottles: P/N 064236, pkg. of 72; caps and septa: P/N 064232, pkg. of 72).

### Rack Location Mat

The rack location mat (P/N 064250) is mounted on the spill tray. The mat houses the sample rack and provides calibration coordinates for properly aligning the sampling needle over a sample container.

### Spill Tray

The spill tray (P/N 064251) provides secondary containment for sample containers in the autosampler.

### Standards Rack

Standards and/or samples can be loaded onto the standards rack. The AS-HV is shipped with an 11-position standards rack (P/N 064253).

**Optional:** A 6-position standards rack (P/N 064252).

### Sampling Needle

The sampling needle is used to aspirate sample from sample containers.

The AS-HV is shipped with a PEEK Sampling Needle Kit (P/N 064511). The kit includes the sampling needle (a piece of specially pre-bent 0.8-mm (0.030-in) ID PEEK tubing), fittings, and mounting hardware.

The PEEK tubing is not only the sampling needle, but the point at which the sample is introduced to the IC. This transfer mechanism minimizes contamination that can be caused by fittings, extra tubing, and manual sample handling.

**Optional:** A Sampling Needle Kit–PTFE Lined and Sleeved (P/N 064056) containing a stainless steel needle that is lined and sleeved with PTFE (polytetrafluoroethylene).

### Sampling Needle Guide

The AS-HV is shipped with a sampling needle guide (P/N 064519). The guide serves two purposes:

- To ensure that the PEEK sampling needle does not bend or flex as it pierces the septum in the sample container cap.
- To ensure that the sample container is not lifted out of the sample rack during sampling.

### Rinse Station

The rinse station cleans the sampling needle between samples. During the cleaning cycle, the needle is inserted into the rinse fluid, fluid is drawn and then dispensed through the needle, and the dispensed fluid is directed to waste. The rinse station consists of:

- A 150 mm reservoir of rinse fluid. Dionex recommends using ASTM Type I (or better) filtered, deionized water as the rinse fluid.
- A variable-speed peristaltic pump that provides a supply of fresh rinse fluid to the reservoir. The potentiometer knob fitted above the pump is used to adjust the flow rate (see [Section 3.2.3](#)).

If an external rinse source is available, the reservoir can be connected directly to this source and the peristaltic pump can be replumbed for operation as the sample loading pump. For more information, refer to [Section 2.4.4](#).

## 2.2 AS-HV Side Panel

This section describes (from top to bottom) the components located on the right side panel of the AS-HV.

### ERROR Indicators



If a fault occurs, the **ERROR** indicators light to display a binary error code (in blue) that identifies the fault. For example, the error code *0110* indicates that Error 6 (an X-axis position error) has occurred. Refer to [Section C.2](#) for an explanation of all of the error codes.

### RESET Switch



Pressing the **RESET** switch returns the AS-HV to its initial start-up sequence. The reset procedure identifies problems with autosampler movement in the X-, Theta-, and Z-axes (see [Figure 3-1](#)). Successful completion of the reset procedure confirms that the motors operate and the action of the carriages is correct.

A small pointed device is required to depress the recessed switch.

### DIP-A DIP Switches

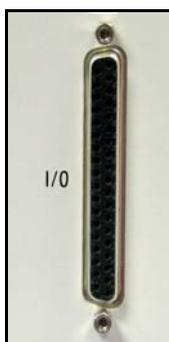


The DIP switches are numbered 1 to 8 (from top to bottom). SW5 sets the baud rate (the only communication parameter that can be set on the AS-HV).

The table below lists the DIP switch functions and default settings. The switch positions are indicated as 0 = Off (Up/Open) or 1= On (Down/Closed).

DIP Switch	Default Setting	Description
SW1	Off	Self-test mode
SW2	Off	Reserved
SW3	Off	Reserved
SW4	Off	Reserved
SW5	On	Baud rate
SW6	Off	Mode selection
SW7	Off	Mobile rinse station expiration timer
SW8	Off	Wash select MRS/FWR (mobile rinse station/fixed rinse reservoir)

### I/O Port

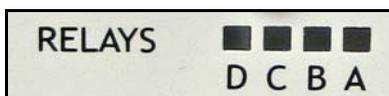


The I/O port provides eight contact closure inputs and four relay outputs.

The autosampler has four internal relays (A, B, C, and D). Normally open and normally closed contact pairs are available on the external I/O connector.

Relay A is reserved for control of the internal peristaltic pump. Relay B is reserved for control of an external relay-controlled pump operating as the sample loading pump. The relays can be controlled through commands programmed in Chromeleon.

### RELAY Status Indicators



These indicators light (yellow) to indicate the state of the internal relays (A, B, C, and D). When a relay is energized, the corresponding indicator is lit.

The relay outputs can be used to connect and control low power devices. These outputs should be limited to loads of 1 amp or less. The eight digital inputs available on the autosampler allow monitoring of electrical signals between 0 and +24 volts.

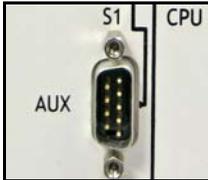
### System Status Indicators



These indicators light (yellow) to identify certain autosampler conditions. For details, see the table below.

Status Indicator	Description	Indication
<b>S1</b>	Programmable behavior LED	ON when programmed
<b>AUX</b>	Auxiliary instrument port activity LED	ON when a byte is sent or received on Auxiliary Instrument Port, then OFF
<b>HOST</b>	Host interface port activity LED	ON when a byte is sent or received on Host Interface Port, then OFF
<b>CPU</b>	Central processor unit (CPU) activity LED	OFF for 10 seconds, then ON for 1 second

## AUX (Auxiliary Communications) Port



The **AUX** port provides a standard RS-232 interface connection from the AS-HV to the optional syringe pump or AXP pump. The port supports a baud rate of 9600 and operates as connected DCE (Data Computer Equipment); the pumps operate as DTE (Data Terminal Equipment). The RS-232 cable required to connect the pump to the **AUX** port is provided in the pump Ship Kit.

## HOST (Host Communications) Port



The **HOST** port provides a connection from the AS-HV to a serial port on the Chromeleon PC. The AS-HV Ship Kit (P/N 064051) includes an RS-232 cable (P/N 060683) for this connection.

If a serial port is not available on the PC, order the optional RS-232-to-USB cable (P/N 064261) and use this cable to connect the autosampler to a USB port on the PC.

## Power Entry



The power entry incorporates the AS-HV main power switch and the fuse compartment.

The AS-HV operates from input voltages over a range of 100 to 240 VAC, 50 to 60 Hz power, and requires a grounded, single-phase power source. The typical input power is 75 W and the maximum line draw is 1.8 amps at 110 VAC (when the power is turned on). The appropriate line voltage and frequency are selected automatically.



**SHOCK HAZARD**—To avoid electrical shock, use a grounded receptacle. Do not operate the AS-HV 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 AS-HV and is easily accessible.



Operation at AC input levels outside of the specified operating voltage range may damage the AS-HV.



**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.



**STROMSCHLÄGGEFAHR**—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.



**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.

### Fuse Compartment

The fuse compartment contains two slow-blow fuses rated at 5 amps (P/N 064248). For instructions on how to replace the fuses, refer to [Section 5.5](#).



For continued protection against risk of fire or shock, replacement fuses must be the type and rating specified in this manual.



Pour maintenir la protection contre les risques d'incendie ou d'électrocution, remplacez toujours les fusibles par des fusibles du même type et du même calibre.



Zum Schutz vor Feuer und Stromschlägen müssen beim Sicherungswechsel immer Sicherungen des gleichen Typs und mit gleicher Leistung verwendet werden.

## 2.3 Sample Loading Modes

The AS-HV supports two sample loading modes:

- In the *push* mode, sample enters the sample loading pump and is then pushed into the sample loop or concentrator column.
- In the *pull* mode, sample is pulled into the sample loop or concentrator column via the sample loading pump.

The sample loading mode is determined by the components that are installed and the plumbing connections; for schematics showing typical configurations, refer to [Appendix B](#).

### Sample Overlap

To reduce the time between injections, some Dionex devices, including the AS-HV, support overlapping sample preparation. This means that, while data collection and analysis for the current sample are still in progress, the AS-HV can perform sample preparation steps for the next sample. When the autosampler finishes the overlapped functions, the Chromeleon program waits, if necessary, to finish the currently running sample. Then, the remaining commands in the overlapped sample's program are executed.

Sample overlap is enabled in the Chromeleon Program Wizard (see [Section 3.2.4](#)).

## 2.4 Sample Loading Pumps

This section provides a brief overview of the sample loading pump options for the AS-HV:

- A syringe pump (see [Section 2.4.1](#))
- A single-piston pump—the AXP Pump (see [Section 2.4.2](#))
- An external peristaltic pump—the MASTERFLEX® C/L® Pump System (see [Section 2.4.3](#))
- An internal peristaltic pump (see [Section 2.4.4](#))
- A relay-controlled pump (see [Section 2.4.5](#))

### 2.4.1 Syringe Pump

The syringe pump (P/N 064506) contains a stepper-motor driven syringe and a three-way distribution valve to aspirate and dispense measured quantities of liquid. A control cable connects the syringe pump to the **AUX** and **I/O** ports on the AS-HV side panel (see [Section 2.2](#)).

When coupled with the syringe pump, the AS-HV is capable of both concentrator and loop loading in the push or pull mode (see [Section 2.3](#)). This configuration provides maximum flexibility in terms of Chromeleon control and flow precision.

To ensure optimal performance when doing concentrator loading with the syringe pump, follow these guidelines:

- All points in the system that will be aspirated should be plumbed with 1.0-mm (0.040-in) ID PEEK tubing (P/N 054410).
- Push mode only: Dionex does not recommend using the push mode with the syringe pump. If you do use the push mode, make sure the backpressure does not exceed 0.41 MPa (60 psi).
- Pull mode only: If the Dionex TCC-XLP1 concentrator column is installed, the maximum flow rate is 0.5 mL/min and the backpressure should not exceed 0.10 MPa (15 psi).
- Pull mode only: If the Dionex UTAC-XLP1 concentrator column is installed, the maximum flow rate is 1.0 mL/min and the backpressure should not exceed 0.10 MPa (15 psi).

### 2.4.2 AXP Pump

The single-piston AXP pump (P/N 064507) can deliver from 0.01 to 10.00 mL/min of a single solution or eluent. A serial cable connects the AXP pump to the **AUX** port on the AS-HV side panel (see [Section 2.2](#)). The AXP pump is controlled via Chromeleon.

When coupled with the AXP pump, the AS-HV is capable of concentrator and sample loop loading in the push or pull mode (see [Section 2.3](#)). Some users may prefer to configure the pump as a “pull” device in order to minimize the contamination that can result when the sample comes into contact with check valves and seals.

**However, Dionex does not recommend using the pull mode for concentrator loading.** Piston pumps can cavitate and lose prime unless there is a continuous flow of liquid through the pump. With the AXP pump, these problems are most likely to occur when performing concentrator loading in the pull mode.

To ensure optimal performance when doing concentrator loading with the AXP pump, follow these guidelines:

- Any Dionex concentrator column (or guard column used as a concentrator column) may be installed for loading in the push mode. Select the flow rate recommended for your concentrator column. All points in the system that will be aspirated should be plumbed with 1.0-mm (0.040-in) ID PEEK tubing (P/N 054410).

When doing sample loop loading with the AXP pump, follow these guidelines:

- Pull mode only: The maximum flow rate is 0.75 mL/min. The backpressure should not exceed 0.07 MPa (10 psi).

**NOTE** An electronic copy of the *AXP/AXP-MS Metering Pump Operator's Manual* (Document No. 031897) is provided on the Dionex Reference Library CD-ROM. Before beginning operation with the pump, familiarize yourself with the content of the manual.

### 2.4.3 External Peristaltic Pump

The external peristaltic pump (P/N 064508) is a MASTERFLEX C/L Pump System. A relay cable connects the AS-HV to the terminal strip on the pump's rear panel.

When coupled with the external peristaltic pump, the AS-HV is capable of sample loop loading in either the push or pull mode (see [Section 2.3](#)). This configuration is typically used to load sample when a large sample loop is installed.

**NOTE To minimize potential sample contamination, Dionex recommends using the pull mode with the external peristaltic pump.**

To ensure optimal performance when doing loop loading with the external peristaltic pump, follow these guidelines:

- All points in the system that will be aspirated should be plumbed with 1.0-mm (0.040-in) ID PEEK tubing (P/N 054410).
- To ensure that the proper sample volume is loaded, measure the flow rate after replacing any component in the flow path. It is advisable to measure the flow rate periodically, as flow rates may fluctuate over time as the columns and peristaltic pump tubing age.
- Push mode only: The backpressure should not exceed 0.10 MPa (15 psi).
- Pull mode only: The maximum flow rate is 1.75 mL/min. The backpressure should not exceed 0.07 MPa (10 psi).

**NOTE A printed copy of the *MASTERFLEX C/L Pump System Operator's Manual* is shipped with the pump. Before beginning operation with the pump, familiarize yourself with the content of the manual.**

### 2.4.4 Internal Peristaltic Pump

The AS-HV rinse station includes a built-in peristaltic pump that provides a supply of fresh rinse fluid to the reservoir (see [page 7](#)). The pump is controlled through Relay A.

If the rinse station is connected directly to an external rinse source, the peristaltic pump can be replumbed for use as the sample loading pump in either the push or pull mode (see [Section 2.3](#)). For replumbing instructions, refer to [Section B.3.12](#).

To ensure optimal performance when using the internal peristaltic pump for sample loading, the delivery pressure should be less than 0.03 MPa (5 psi).

### 2.4.5 Relay-Controlled Pump

An external relay-controlled pump from a third-party vendor can be used for sample loading in either the push or pull mode (see [Section 2.3](#)). The pump is controlled through Relay B.

A relay cable connects the pump to the **I/O** port on the AS-HV side panel (see [Section 2.2](#)). Note that the pump is supported by Chromeleon, although only through relay control.

If you have a question regarding the use of third-party pumps with the AS-HV, please contact Dionex. In the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

## 2.5 Chromeleon Software

Chromeleon software is required for control of AS-HV operation. Two modes of software control are available: direct control and automated control.

- With *direct control*, the user selects operating parameters and commands from the Chromeleon menu bar, toolbars, and AS-HV Control panels. Direct control commands are executed as soon as they are entered.
- With *automated control*, the user creates a program (sometimes called a PGM file) that contains a list of commands that will be performed at specified times for automated operation of the AS-HV. You can create program files automatically, using the Program Wizard, or manually, by modifying an existing program.

In addition to general commands for device control, Chromeleon includes many commands specifically for the AS-HV and the sample loading pumps (see [Table 2-1](#) through [Table 2-4](#)).

You can select these commands from the default Control panel or the Commands dialog box. To open the dialog box, press F8 or select **Control > Command**.

Command	Function
FlushAspirateSpeed*	Specifies the speed at which the sampling needle is filled with rinse fluid.
RinseVolume	Specifies the volume of rinse fluid used to wash the sampling needle.
SampleAspirateSpeed*	Specifies the speed at which the syringe draws sample from the sample container.
SyringeAspirate	The syringe pump aspirates the specified volume of liquid through the sampling needle.
SyringeDispense	The syringe pump dispenses the specified volume of liquid through the sampling needle.
SyringeReset	Resets the syringe pump to the initial position.
SyringeSize	Reports the volume of the syringe (read-only).
SyrPumpPosition	Reports the position of the syringe pump plunger (read-only).
SyrPumpStatus	Reports whether the syringe pump is busy and whether an error condition has been detected (read-only).

*Table 2-1. Chromeleon Commands for the Syringe Pump*

Command	Function
ValvePosition	Sets the position of the distribution valve in the syringe pump.
WashPortDispenseSpeed*	Specifies the speed at which rinse fluid is dispensed through the sampling needle.
WasteDispenseSpeed*	Specifies the speed at which liquid is directed to waste.

\* There are six syringe speeds, and each speed has 10 levels. The flow rate varies, depending on the command and the speed setting. For details, refer to the tables in [“Sampler Options Screen: Syringe Pump Version” on page 27](#).

*Table 2-1. Chromeleon Commands for the Syringe Pump (Continued)*

Command	Function
AxpCurrentSetup	Reports the AXP pump configuration and the status of several operating parameters (read-only). To view details, click the plus sign beside this command.
AxpState	Turns the AXP pump on and off.
Flow	Sets the flow rate for the AXP pump.
Pressure.LowerLimit*	Sets the lower pressure limit for the AXP pump.
Pressure.UpperLimit*	Sets the upper pressure limit for the AXP pump.
Pressure.Value*	Reports the current AXP pump pressure (read-only).
RinseVolume	Specifies the volume of rinse fluid used to wash the sample loop, sampling needle, and sample loading path.

\* To display this command, click the plus sign beside the Pressure command.

*Table 2-2. Chromeleon Commands for the AXP Pump*

Command	Function
InternalPumpOff*	Turns off the internal peristaltic pump.
InternalPumpOn*	Turns on the internal peristaltic pump.
IntPumpDirection*	Specifies the direction of operation for the internal peristaltic pump.
Flow	Sets the flow rate of the internal peristaltic pump.
RinseVolume	Specifies the volume of rinse fluid used to wash the sample loop, sampling needle, and sample loading path.

\* This command is not available unless the internal peristaltic pump is selected as the **Sample Loading Pump** in the AS-HV Properties dialog box (see [Section B.3.16](#)).

*Table 2-3. Chromeleon Commands for the Internal Peristaltic Pump*

Command	Function
Flow	Sets the flow rate of the relay-controlled pump.
RinseVolume	Specifies the volume of rinse fluid used to wash the sample loop, sampling needle, and sample loading path.

*Table 2-4. Chromeleon Commands for the Relay-Controlled Pump*



## 3 • Operation and Maintenance

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The AS-HV Autosampler is designed for use with IC (ion chromatography) and HPLC (high-performance liquid chromatography) systems and should not be used for any other purpose. Operation of the AS-HV in a manner not specified by Dionex may result in personal injury.

If you have a question regarding appropriate usage, please contact Dionex before proceeding. In the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

### 3.1 Safety Guidelines



WARNING

**SHOCK HAZARD**—To avoid electrical shock, use a grounded receptacle. Do not operate the AS-HV or connect it to AC power mains without an earthed ground connection.



CAUTION

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



CAUTION

Operation at AC input levels outside of the specified operating voltage range may damage the AS-HV.



AVERTISSEMENT

**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.



MISE EN GARDE

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



WARNUNG

**STROMSCHLAGEFAHR**—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.

- Always stay clear of the sampling arm during operation. Although the AS-HV is designed to stop running as soon as the arm encounters an obstruction, the arm can move fast and injury may occur if a user is struck. For added protection, place the optional Plexiglas® trace analysis cover (P/N 064052) over the autosampler (see [Section B.3.7](#)).



To avoid injury, always maintain a safe distance from the sampling arm during operation.



Afin d'éviter toute blessure, maintenez vous toujours à distance de sécurité du bras robotique pendant son déplacement.



Um Verletzungen zu vermeiden, behalten Sie immer eine sichere Entfernung vom Probenarm während Betriebs bei.

## 3.2 Getting Ready to Run

### 3.2.1 Filling Sample Containers and Loading the Racks

1. Fill the Nunclon sample flasks (P/N 064053, pkg. of 50) or Nalgene bottles (P/N 064236, pkg. of 72) with sample.
2. Install the caps and septa (Nunclon sample flask caps and septa: P/N 064235, pkg. of 50; Nalgene bottle caps and septa: P/N 064232, pkg. of 72) as follows:
  - a. Turn one of the sample container caps upside down. Place a septum, white side facing down, in the cap. Push the septum fully into the cap. (This prevents the septum from falling into the sample container when pierced by the sampling needle.)
  - b. Repeat [Step a](#) for the required number of caps.

- c. Place the caps on the sample containers. After checking that the white side of the septum faces up, tighten each cap loosely. **Overtightening the caps may twist the septa, making them unusable.**
3. Load the sample containers into the sample rack and/or standards rack in the order required for the application.

#### 3.2.2 Turning On the Power

1. Turn on the AS-HV main power switch.

At power-up, the AS-HV automatically begins an initialization sequence in which the sampling needle moves through the extent of the autosampler's working envelope. Upon completing the initialization sequence, the needle returns to the home position above the fixed rinse reservoir. During initialization (see [Figure 3-1](#)):

- The needle raises to the full extremes of the Z-axis.
- The needle travels to the full extremes of the X-axis.
- The needle travels to the full extremes of the Theta-axis.

**IMPORTANT**

If the sampling needle fails to initialize successfully, refer to [Section 4.3](#) for troubleshooting assistance.

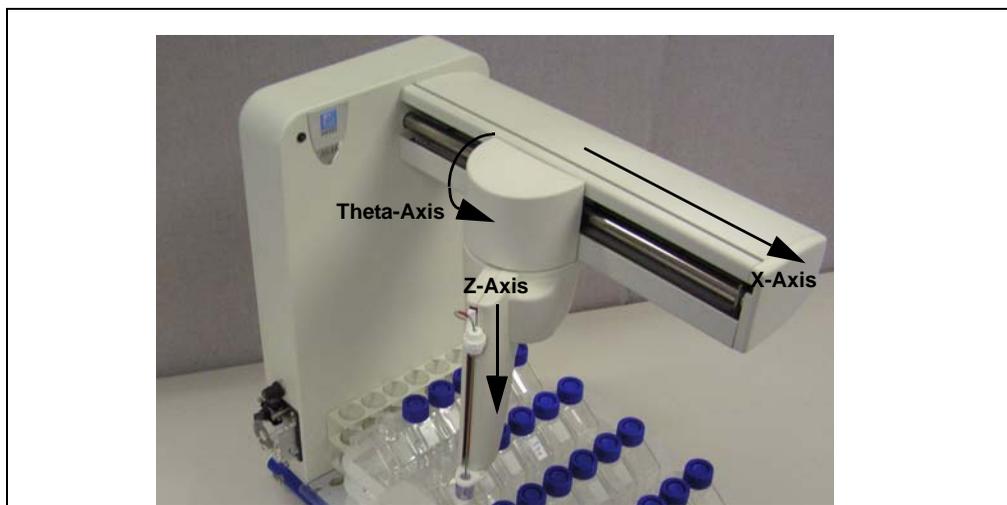


Figure 3-1. Mechanical Axes

### 3.2.3 Selecting the Rinse Pump Speed

Use the potentiometer knob above the rinse pump to set the flow rate for the application (see [Figure 3-2](#)).

The default speed is nominally set to obtain a minimum speed of 40 rpm and a maximum of 100 rpm.

When pumping viscous fluids, run at a slow speed.



*Figure 3-2. Rinse Pump Speed Control Knob*

**NOTE** When the rinse pump is not in use, release the track occlusion arm; this will extend the life of the bridge tubing (see [Figure B-4](#)).

### 3.2.4 Creating a Chromeleon Program

A Chromeleon program (sometimes called a PGM file) is a list of control commands—to be executed at specified times—created by the user for automated operation of the AS-HV. There are two ways to create programs:

- Automatically, using the Program Wizard
- Manually, by modifying an existing program

This section provides an overview of how to create a program with the Program Wizard. For detailed instructions, refer to the Chromeleon Help or user's guide.

#### To create a program:

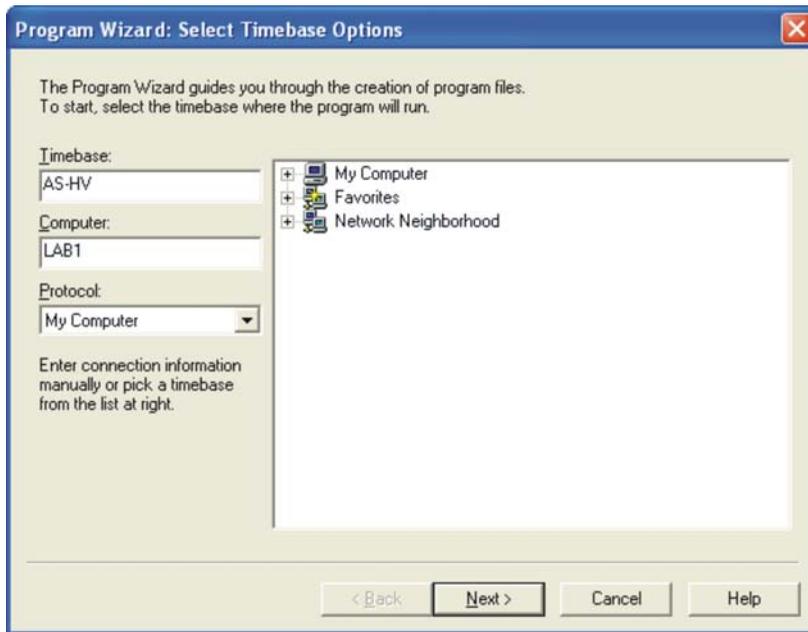
1. Start the Chromeleon Server, if it is not already running:

If the Chromeleon Server icon on the Windows taskbar is crossed out in red , the Server is not running. Start the Server by right-clicking the icon and selecting **Start Server**. When the server is running, the icon is gray .

If the Server Monitor icon is not on the taskbar, click **Start** on the taskbar and select **All Programs** (or **Programs**, depending on the operating system) > **Chromeleon** > **Server Monitor**. Click **Start** to start the server.

2. To start the Chromeleon client, click **Start** on the Windows taskbar and select **All Programs** (or **Programs**) > **Chromeleon** > **Chromeleon**.
3. Select **File** > **New**.  
A dialog box appears.
4. Select **Program File** and click **OK**.

The initial Program Wizard screen is displayed.



5. Select the **Timebase** where the program will run.
6. Click **Next** to continue.

If the selected timebase includes other devices, Program Wizard screens for these devices are displayed before the AS-HV screens. On each screen, select the required parameters and click **Next** until the **Sampler Options** screen is displayed.

7. There are three versions of the **Sampler Options** screen. The version that appears now depends on the sample loading pump selected in the Server Configuration (see [Section B.3.16](#)).

All versions of the **Sampler Options** screen include the **Needle Height** control and the **Options** group box. In addition, each screen includes a group box with special controls for the selected pump.

## Sampler Options Screen: Syringe Pump Version

When the sample loading pump is the syringe pump, this screen is displayed:

Program Wizard: Sampler Options

Needle Height: 60 [0...160 mm]

Syringe Pump

Rinse Volume: 1.00 [0.01...10.00 ml]

Aspirate Speed from Flush Bottle: 5 [1...10]

Dispense Speed to Wash Port: 5 [1...10]

Aspirate Speed from Sample Container: 5 [1...10]

Dispense Speed to Waste Bottle: 5 [1...10]

Options

Valve Control

Load/Inject Valve Using: Relay\_A

Injection Duration: 3 [0.1 ...30 min]

Sample Overlap

Delay Before Processing Next Sample: 3.5 [0.1 ...30 min]

< Back Next > Cancel Help

Select the **Needle Height**.

Select the **Rinse Volume**.

Select the syringe speed for the remaining parameters in the **Syringe Pump** group box. There are two syringe speeds (fast and slow), and each speed has 10 levels. The actual speed depends on multiple factors; for details, refer to the following sections.

#### *“Fast” Syringe Speed*

The syringe operates at the “fast” speed for **Aspirate Speed from Flush Bottle** and **Dispense Speed to Waste Bottle** (see [Table 3-1](#)).

In the default AS-HV configuration, liquid moves through *large* bore tubing during these operations. When selecting a speed setting, be sure to take into account the tubing bore.

Table 3-1. "Fast" Syringe Speed Settings

Speed Setting	Top Speed (steps/sec)	Flow Rate (mL/min)
1	800	10.0
2	1200	15.0
3	1600	20.0
4	2000	25.0
5	2400	30.0
6	2800	35.0
7	3200	40.0
8	3600	45.0
9	4000	50.0
10	4800	60.0

**"Slow" Syringe Speed**

The syringe operates at the "slow" speed for **Dispense Speed to Wash Port** and **Aspirate Speed from Sample Container**. The actual speed depends on the parameter, the speed setting, the sample loading type, and the sample loading mode (see [Table 3-4](#) for an overview).

In the default AS-HV configuration, liquid moves through *smaller* bore tubing during these operations. When selecting a speed setting, be sure to take into account the tubing bore.

Table 3-2. Overview of "Slow" Syringe Speed Settings

Sample Loading Type/ Sample Loading Mode	Dispense Speed to Wash Port	Aspirate Speed from Sample Container
Sample loop/Push	See <a href="#">Table 3-3</a>	See <a href="#">Table 3-4</a>
Sample loop/Pull	See <a href="#">Table 3-3</a>	See <a href="#">Table 3-4</a>
Concentrator column/ Push	See <a href="#">Table 3-4</a>	See <a href="#">Table 3-4</a>
Concentrator column/ Pull	See <a href="#">Table 3-5</a>	See <a href="#">Table 3-6</a>

*Table 3-3. "Slow" Syringe Speed Settings: Wash Port Dispense Speed for Sample Loop/Push or Pull Mode*

<b>Speed Setting</b>	<b>Top Speed (steps/sec)</b>	<b>Flow Rate (mL/min)</b>
1	80	1.00
2	160	2.00
3	200	2.50
4	240	3.00
5	280	3.50
6	320	4.00
7	360	4.50
8	400	5.00
9	440	5.50
10	480	6.00

*Table 3-4. "Slow" Syringe Speed Settings: Sample Aspirate Speed for Sample Loop/Push or Pull Mode or Concentrator Column/Push Mode*

<b>Speed Setting</b>	<b>Top Speed (steps/sec)</b>	<b>Flow Rate (mL/min)</b>
1	32	0.40
2	64	0.80
3	96	1.20
4	128	1.60
5	160	2.00
6	192	2.40
7	224	2.80
8	256	3.20
9	288	3.60
10	320	4.00

*Table 3-5. "Slow" Syringe Speed Settings: Wash Port Dispense Speed for Concentrator Column/Push or Pull Mode*

<b>Speed Setting</b>	<b>Top Speed (steps/sec)</b>	<b>Flow Rate (mL/min)</b>
1	40	0.50
2	80	1.00
3	100	1.25
4	120	1.50
5	140	1.75
6	160	2.00
7	180	2.25
8	200	2.50
9	220	2.75
10	240	3.00

*Table 3-6. "Slow" Syringe Speed Settings: Sample Aspirate Speed for Concentrator Column/Pull Mode*

<b>Speed Setting</b>	<b>Top Speed (steps/sec)</b>	<b>Flow Rate (mL/min)</b>
1	8	0.10
2	16	0.20
3	24	0.30
4	32	0.40
5	40	0.50
6	48	0.60
7	56	0.70
8	64	0.80
9	72	0.90
10	80	1.00

To enable control of the injection valve by another device in the timebase, select the **Valve Control** check box. When the check box is selected, the following options are enabled:

- **Load/Inject Valve Using:** Select the injection valve or relay/TTL device that will control sample loading and injection.
- **Injection Duration:** Specify for how long injection occurs. (This setting is ignored unless you select **Sample Loop** as the sample loading type in the Server Configuration (see [Section B.3.16](#)).

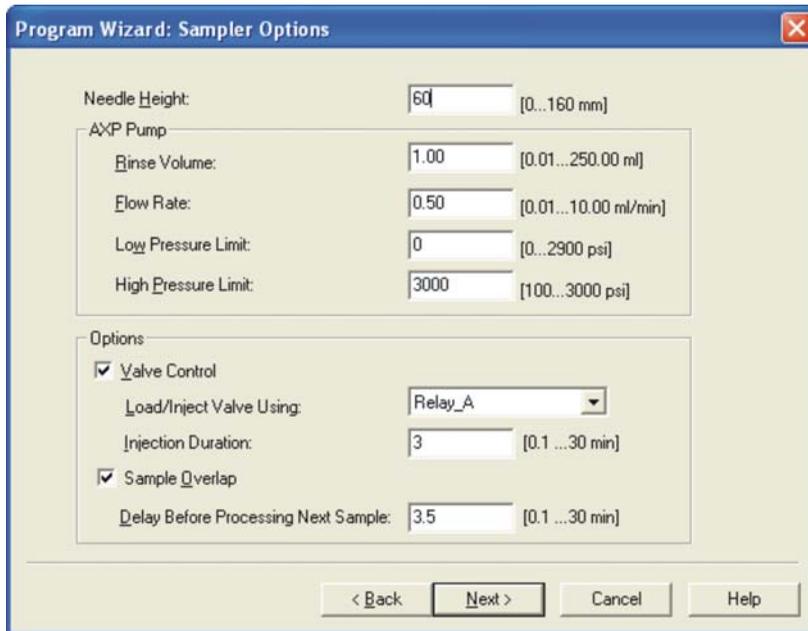
**NOTE** For sample overlap programs, the **Injection Duration** must be less than the **Delay Before Processing Next Sample** (see below).

To enable sample overlap (see [Section 2.3](#)), select the **Sample Overlap** check box. When the check box is selected, the following option is enabled:

- **Delay Before Processing Next Sample:** Specify for how long the Chromeleon program waits in order to finish the currently running sample before executing the remaining commands in the program.

## Sampler Options Screen: AXP Pump Version

When the sample loading pump is the AXP pump, this screen is displayed:



Select the **Needle Height**.

Select the **Rinse Volume**.

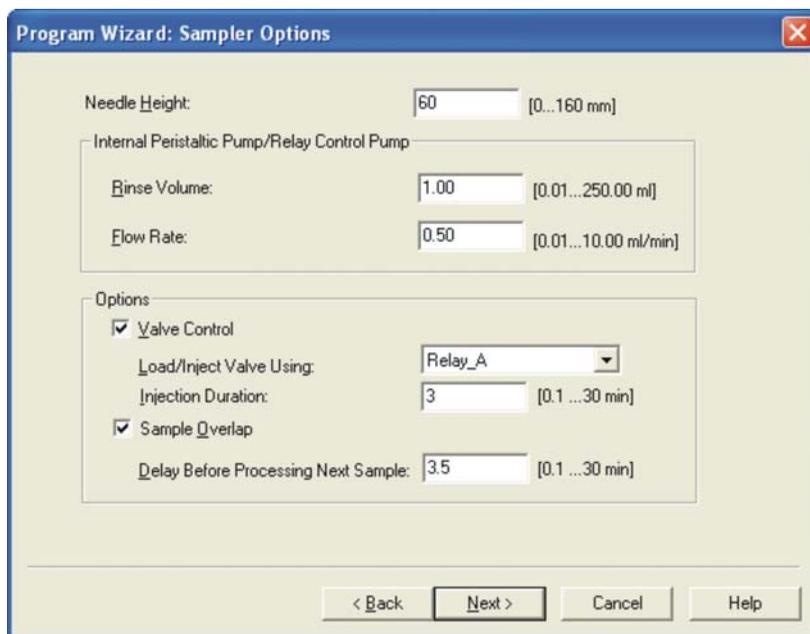
In the **AXP Pump** group box:

- Select the **Rinse Volume**.
- Select the **Flow Rate**.
- Set the **Low Pressure Limit**. The maximum value is the current upper pressure limit setting (in psi) minus 100; the minimum value is 0.
- Set the **High Pressure Limit**. The maximum value is 3000; the minimum value is the current lower pressure limit setting (in psi) plus 100.

Select the desired settings in the **Options** group box; for details, refer to [page 31](#).

#### Sampler Options Screen: Internal Peristaltic Pump or Relay-Controlled Pump Version

When the sample loading pump is either the internal peristaltic pump or a relay-controlled pump, this screen is displayed:



Select the **Needle Height**.

Select the **Rinse Volume**.

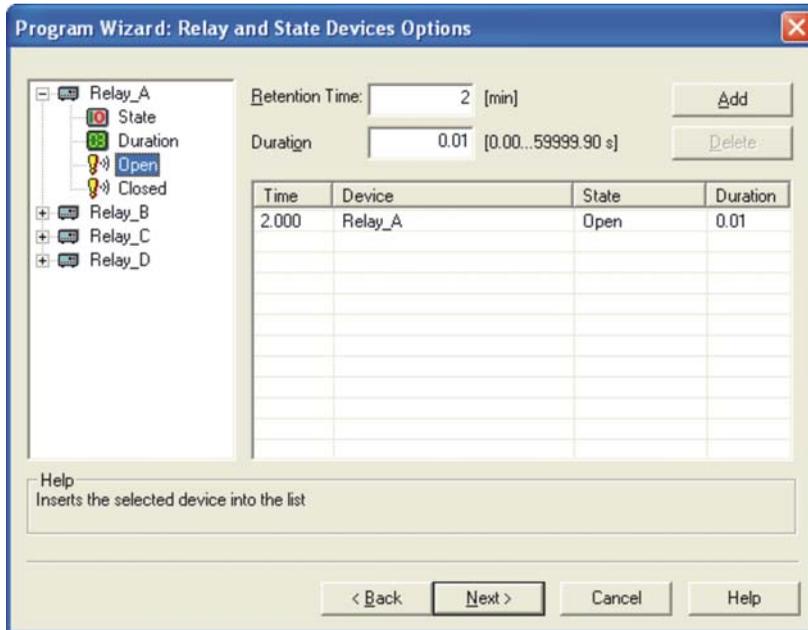
In the **Internal Peristaltic Pump/Relay-Controlled Pump** group box:

- Select the **Rinse Volume**.
- Select the **Flow Rate**.

Select the desired settings in the **Options** group box; for details, refer to [page 31](#).

- When you finish selecting parameters on the **Sampler Options** screen, click **Next** to continue.

The following screen is displayed.



**NOTE** If you have already selected these parameters on the device page for a particular module, the list box on the Relay and State Devices Options page already contains this information. If you change any settings here, Chromeleon will automatically copy the changes to the appropriate device page.

- The window on the left lists the devices in the selected timebase. Select a device from the list, and then click the plus sign to the left of the device name to view the device states.

10. Specify the **State** or **Duration** for the selected device:
  - Clicking **State** specifies a simple switch command. Select **Open** or **Closed** from the drop-down list box.
  - Clicking a state description sets the device to the selected state and lets you specify a **Duration**. Enter the duration of the selected state in the edit box.

**NOTE Relays A and B are reserved for internal use and cannot be selected.**

11. To add the following information to the list box, click **Add**:
  - **Retention Time** value
  - Name of the selected **Device**
  - **State** or **Duration** value

Chromeleon will automatically organize all entries in the list box in chronological order.

To remove an entry from the list box, select the entry and click **Delete**. (All entries in the list box will automatically be reorganized.)

12. Click **Next** to continue.

The following screen is displayed.



13. (Optional) Type a descriptive **Title** for the program.
14. Select one of the following options:
  - To save the program without first reviewing it, select **Save the program immediately**. Clicking **Finish** opens a dialog box in which you can save the program.
  - To review the program before saving it, select **Review the program in a new window**. Clicking **Finish** opens the program in the Program Editor. Use the Program Editor to review the program and to manually edit it, if necessary. When you finish, exit the Program Editor. This displays a prompt asking whether the program should be saved; clicking **Yes** opens a dialog box in which you can save the program.

### 3.3 Routine Maintenance

This section describes routine maintenance procedures that the user can perform for the AS-HV and the syringe pump. Any maintenance procedures for the AS-HV and the syringe pump that are not described here must be performed by Dionex personnel. For maintenance procedures for other sample loading pumps, refer to the respective product manual.

To contact Dionex in the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

**NOTE** The AS-HV has no lubrication requirements. Do not apply lubrication to the sampling arm or any other components.

#### 3.3.1 Daily Maintenance

- Wipe up all spills immediately, especially spills of corrosive liquids.
- Inspect the syringe pump for leaks, and correct any problems.
- Flush the syringe pump thoroughly with distilled or deionized water after each use and when the pump is not in use.

**NOTE** Do not allow the syringe pump to run dry for more than a few cycles.

- Check for air bubbles in the syringe(s) and tubing and remove any bubbles that appear (see [Section B.3.17](#)).
- Replace the rinse fluid. Dionex recommends using ASTM Type I (or better) filtered, deionized water as the rinse fluid.
- To ensure correct drainage, the end of the waste line should not be submerged in waste liquid. 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.**

### 3.3.2 Weekly Maintenance

- Check the tubing connected to the internal peristaltic pump. If the tubing is crimped or blocked, replace it (rinse line: 2.06-mm (0.08-in) ID Santoprene® tubing, P/N 064521; sample line: 0.64-mm (0.03-in) ID Santoprene tubing, P/N 064825). Crimped or blocked tubing can cause unexpected changes in the flow rate.

### 3.3.3 Monthly Maintenance

- Clean the fluid path of the syringe pump to remove precipitates (for example, salts) and eliminate bacterial growth. For instructions, see [Section 5.1](#).

### 3.3.4 Periodic Maintenance

- Clean the AS-HV external covers, spill tray, rack location mat, and accessories with a damp soft cloth and diluted mild detergent.
- When operating the syringe pump in the push mode, check the backpressure to confirm that it is less than 0.41 MPa (60 psi). This prevents damage to the distribution valve.
- Replace the syringe pump inlet and outlet tubing and valve as required. The frequency of replacement will depend on the duty cycle, fluids used, and instrument maintenance.

## 4 • Troubleshooting

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This chapter is a guide to troubleshooting minor problems that may occur during operation of the AS-HV Autosampler. Turn to the section of this chapter that best describes the operating problem or symptom that you have observed. Each section lists possible causes of the problem or symptom.

If necessary, refer to the following sections of this manual for more information:

- [Section C.1](#) contains a description of error messages that may be reported by Chromeleon software and details about how to troubleshoot them.
- [Section C.2](#) contains a description of error codes that may be displayed by the AS-HV **ERROR** indicators and details about how to troubleshoot them.

If you are unable to solve a problem by following the instructions here, contact Dionex Technical Support. In the U.S., call 1-800-346-6390. Outside the U.S., call the nearest Dionex office.

### 4.1 Liquid Leaks

#### 4.1.1 Leaking Fitting

Locate the source of the leak and tighten (or replace) the liquid line connection. For tightening requirements, refer to *Installation of Dionex Liquid Line Fittings* (Document No. 031432). The manual is on the Dionex Reference Library CD-ROM (P/N 053891).

#### 4.1.2 Leaking Syringe

**Possible Causes:**

- Cracked syringe
- Damaged seal
- Loose fitting
- Loose syringe

## Actions:

- Check for a crack in the syringe. If the syringe is cracked, it must be replaced (see [Section 5.2](#)).
- Check the seal for scratches, deformation, or other damage. If the seal is damaged, the syringe must be replaced (see [Section 5.2](#)).
- If the syringe is not cracked and the seal is not damaged, check that the syringe is tightened. To tighten, hold the syringe at the top and bottom fittings and turn it clockwise (as viewed from the top) (see [Figure 4-1](#)). Tighten fingertight only; do not overtighten.

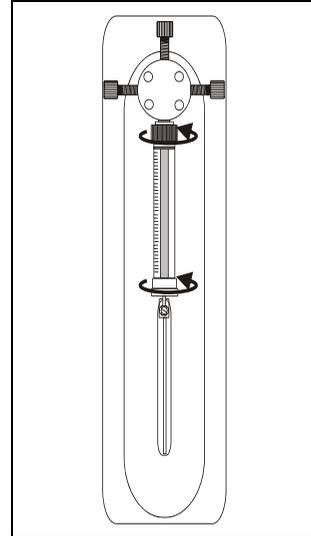


Figure 4-1. Tightening the Syringe

### 4.1.3 Leaking Waste Line (Fixed Rinse Reservoir)

- Check that the waste line is pushed tightly onto the drip tray fitting and that it is not elevated at any point after it exits the AS-HV.
- Check that the waste line is not crimped or otherwise blocked.
- To ensure correct drainage, make sure the end of the waste line is not submerged in waste liquid.
- Check the volume of liquid in the waste container; empty as 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.

## 4.2 Sampling Arm Jams

If the sampling arm becomes jammed, the following events occur:

- The AS-HV error control system locks the motor drive.
- The **ERROR** indicators on the AS-HV side panel display an error code (see [Table C-1](#)).
- The error is reported to Chromeleon and recorded in the Audit Trail.

### Corrective action:

1. Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.)
2. If the autosampler initializes correctly but the sampling arm becomes jammed again, check into these possible causes:
  - The arm may have hit an obstacle while moving into position.
  - The arm may have stopped because it failed to reach a position within the defined limits of the intended position. (Movement errors of less than 1 mm will cause a jam.)
  - If the mechanical movement has so much excessive friction that the arm has difficulty in moving, it will cause the drive to stop.
  - The position of the arm may have been moved without being actively driven by the autosampler.

If you are unable to eliminate the cause of the jam, contact Dionex for assistance.

### 4.3 Initialization Sequence Fails

If the AS-HV fails to complete the initialization sequence by driving the sampling arm (see [Section 3.2.2](#)), the following events occur:

- The **ERROR** indicators on the AS-HV side panel display error code *0101* (see [Table C-1](#)).
- The error is reported to Chromeleon and recorded in the Audit Trail.

#### Corrective action:

1. Turn off the AS-HV power.



To avoid injury, turn off the power to prevent the sampling arm from inadvertently moving while you are manually checking each axis.



Afin d'éviter toute blessure par suite du déplacement inopiné du bras robotique, couper l'alimentation secteur pendant le contrôle manuel des axes.



Um Verletzungen zu vermeiden, schalten Sie das Gerät bitte immer aus, während Sie die Achsen manuell überprüfen, damit sich der Probenarm nicht unbeabsichtigt bewegt.

2. Check each axis (see [Figure 3-1](#)) manually for correct travel to determine whether there is any mechanical obstruction.
3. If you do not find any mechanical obstructions, turn on the AS-HV power. If the autosampler again fails to initialize, contact Dionex for assistance.

## 4.4 Power LED Fails to Light

### To troubleshoot:

1. Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.)
2. If the AS-HV initializes but the power LED still fails to light, the indicator is faulty and should be replaced. Contact Dionex for assistance.

If the AS-HV fails to initialize and the power LED still fails to light, the power supply fuse may have blown or the internal power supply may be faulty. Contact Dionex for assistance.

**NOTE The AS-HV electronics cannot be serviced by the user. All repairs of the electronics components must be performed by Dionex personnel.**

## 4.5 CPU Activity LED Fails to Light

### To troubleshoot:

1. Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.)
2. If the AS-HV initializes but the **CPU** LED still fails to light, the indicator is faulty and should be replaced. Contact Dionex for assistance.

If the AS-HV fails to initialize and the LED still fails to light, the internal power supply or the main PC board may have malfunctioned. Contact Dionex for assistance.

**NOTE The AS-HV electronics cannot be serviced by the user. All repairs of the electronics components must be performed by Dionex personnel.**

### 4.6 Power Supply Fails

If the green power indicator on the front of the AS-HV and/or the system status indicator LEDs on the AS-HV side panel fail to light when expected, it may indicate that the AS-HV power supply is not operational.

#### Corrective action:

1. Check that the power cable is connected to the AS-HV power entry and that the power switch is turned on.
2. Check the fuses. If a fuse is blown, replace *both* fuses with new 5 amp slow-blow fuses (P/N 064248). For fuse replacement instructions, refer to [Section 5.5](#).



For continued protection against risk of fire or shock, replacement fuses must be the type and rating specified here.



Pour maintenir la protection contre les risques d'incendie ou d'électrocution, remplacez toujours les fusibles par des fusibles du même type et du même calibre.



Zum Schutz vor Feuer und Stromschlägen müssen beim Sicherungswechsel immer Sicherungen des gleichen Typs und mit gleicher Leistung verwendet werden.

3. If the autosampler still fails to power up, contact Dionex for assistance.

**NOTE** Access to the power supply unit and components requires removal of the main housing. Do not attempt to access these components. All repairs of the electronics must be performed by Dionex personnel.

## 4.7 Cavitation in the Syringe

Cavitation in the syringe may occur when the syringe pump is operating in the pull mode.

**To troubleshoot:**

1. The flow rate may be too high. Reduce the flow rate.
2. The concentrator column may be plugged. Refer to the column manual for troubleshooting assistance. Column manuals are provided on the Dionex Reference Library CD-ROM (P/N 053891).



This chapter describes routine service procedures that the user can perform for the AS-HV Autosampler and the syringe pump. All procedures for the AS-HV and the syringe pump that are not described here must be performed by Dionex personnel. (For service procedures for other sample loading pumps, refer to the respective product manual.)

To contact Dionex in the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

**NOTE All repairs of the AS-HV electronics must be performed by Dionex personnel.**

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

**IMPORTANT**

**Substituting non-Dionex parts may impair the performance of the AS-HV, thereby voiding the product warranty. Refer to the warranty statement in the Dionex Terms and Conditions for more information.**

### 5.1 Cleaning the Syringe Pump

To remove precipitates (salts, etc.) and eliminate bacterial growth, clean the fluid path of the syringe pump monthly.

1. Make a solution of 10% methanol (MeOH) by adding one part of MeOH to nine parts of deionized water. Dionex recommends using ASTM Type I (or better) filtered, deionized water.
2. Prime the pump with the 10% MeOH and allow the solution to remain in the pump, with the syringe fully lowered, for 30 minutes.
3. After the 30-minute period, remove the reagent tubing from the 10% MeOH solution and cycle all the fluid from the syringe and tubing into a waste container.
4. Prime the pump a minimum of 10 cycles with distilled or deionized water.

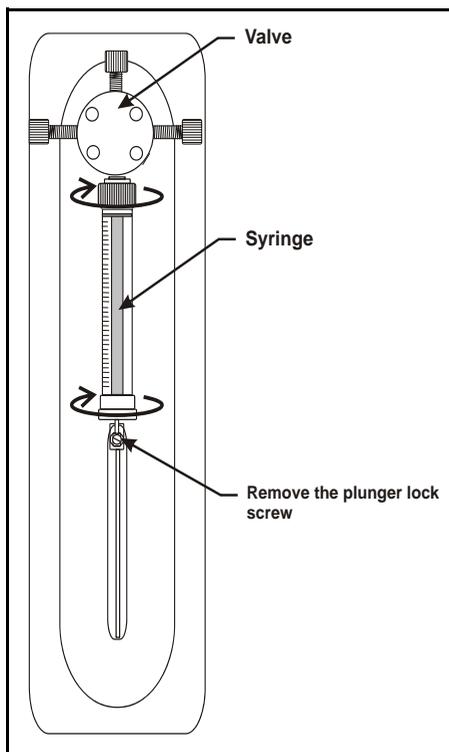
## 5.2 Replacing the Sample Syringe

Follow the instructions here to install a new 10 mL syringe (P/N 064224) in the syringe pump.

### 5.2.1 Removing the Existing Syringe

Refer to [Figure 5-1](#) when removing the existing syringe.

1. Remove the liquid from the syringe.
2. Remove the plunger lock screw.
3. In Chromeleon, select **SyringeAspirate** in the Commands dialog box. Select the maximum **Volume** (i.e., the size of the installed syringe) and click **OK** to lower the plunger drive.
4. Unscrew the syringe from the valve.



*Figure 5-1. Removing the Syringe*

## 5.2.2 Filling the New Syringe and Removing Bubbles

### Method A

1. Fill a container with isopropyl alcohol. Place the threaded end of the syringe into the container and slowly pull liquid into the syringe.
2. If air bubbles are present, pull the syringe plunger up and then push down rapidly with short movements to dislodge the bubbles. Repeat until all bubbles are dislodged.
3. Draw a full syringe volume up by slowly pulling out the plunger.
4. Keep the syringe in the liquid and slowly push the syringe plunger until the bubble(s) exit the syringe. Then, fill the syringe.
5. Remove the syringe from the liquid. While holding it vertically, push a small amount of liquid out the top to make sure no air remains.

### Method B

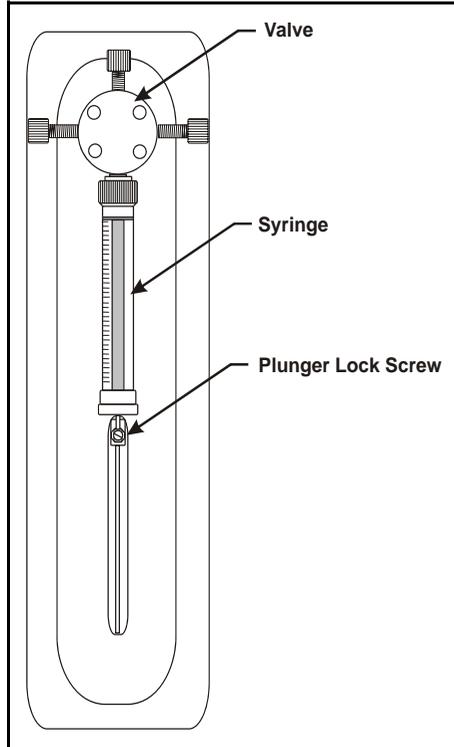
1. Fill a container with isopropyl alcohol. Place the threaded end of the syringe into the container and slowly pull liquid into the syringe.
2. Remove the syringe from the liquid and hold it with the threaded end up under a stream of deionized water.
3. Push the syringe plunger up and pull down until the bubbles are removed.

### 5.2.3 Installing the New Syringe

Refer to [Figure 5-2](#) when installing the new syringe.

1. Screw the new syringe into the valve.
2. Pull the syringe plunger down to the plunger holder assembly.
3. Screw the syringe plunger into place.
4. Slide the plunger lock screw through the plunger buttons and fasten to the carriage.

**NOTE** Make sure the plunger lock screw is securely tightened and the plunger button is free to move on the plunger lock screw.



*Figure 5-2. Installing the New Syringe*

### 5.2.4 Initializing the New Syringe

1. Turn off the AS-HV power, wait 10 seconds, and turn on the power again.
2. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.

This moves the syringe plunger down slightly, into its initial position (see [Figure 5-3](#)).

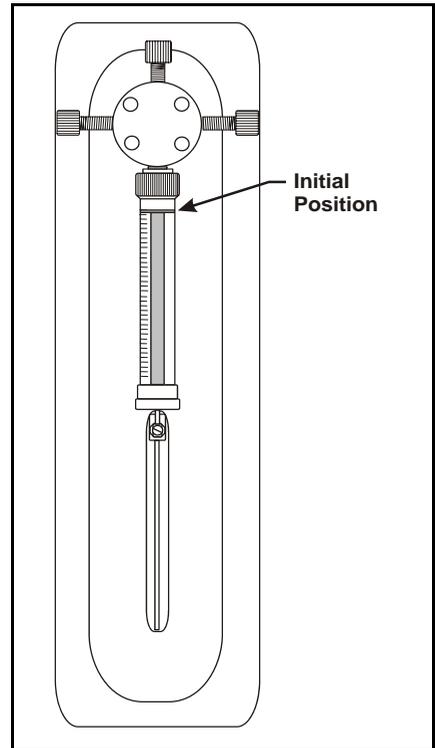


Figure 5-3. Initializing the New Syringe

## **5.3 Replacing the Sampling Needle**

### **5.3.1 Removing the Existing Sampling Needle**

1. In Chromeleon, select **NeedleHome** in the Commands dialog box and click **OK**.
2. Turn off the AS-HV power switch.



To avoid injury, always turn off the power to the AS-HV before installing or removing the sampling needle.



Afin d'éviter toute blessure, couper impérativement l'alimentation secteur avant d'installer ou de démonter l'aiguille de prélèvement.



Um Verletzungen zu vermeiden, schalten Sie den AS-HV bitte immer aus, ehe Sie die Probennadel installieren oder deinstallieren.

3. Disconnect the power cord from the AS-HV power entry.
4. Remove the tubing from the tube anchors on the sampling arm (see [Figure 5-6](#)).
5. Cut off the tie wrap that secures the tubing through the eyelet underneath the sampling arm housing (see [Figure 5-5](#)).
6. Unscrew the mounting nut on the Z-axis slide and pull the sampling needle mounting block out of the slide (see [Figure 5-4](#)).

### 5.3.2 Installing the New Sampling Needle

1. Move the Z-axis slide to the top of the carriage (see [Figure 5-4](#)).

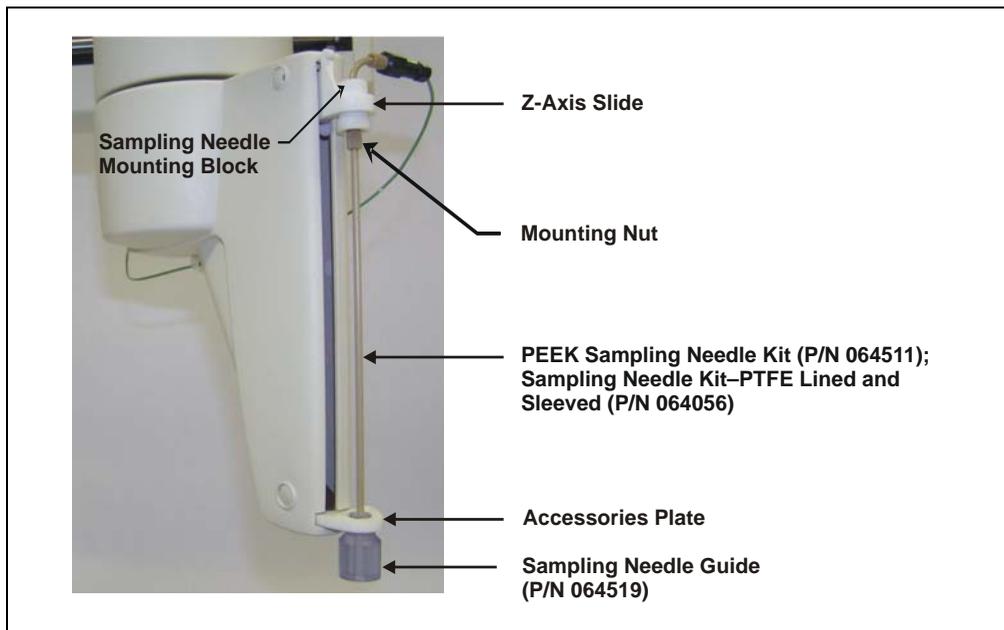


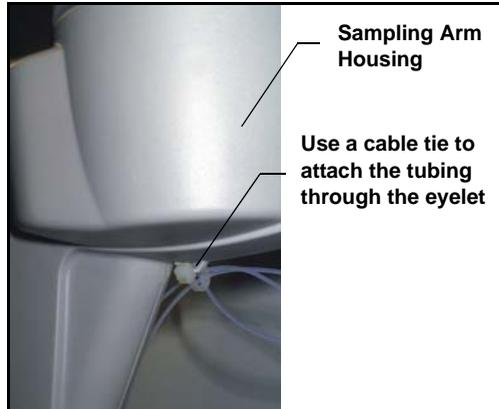
Figure 5-4. Installing the Sampling Needle

2. Slide the sampling needle mounting block into the Z-axis slide, ensuring that the new sampling needle (PEEK Sampling Needle Kit, P/N 064511; Sampling Needle Kit-PTFE Lined and Sleeved, P/N 064056) passes through the accessories plate, and secure the mounting block with the knurled mounting nut (see [Figure 5-4](#)).
3. Screw the sampling needle guide (P/N 064519) onto the underside of the accessories plate.

**NOTE** The sampling needle guide ensures that the PEEK needle does not bend or flex as it pierces the septum in the sample container cap.

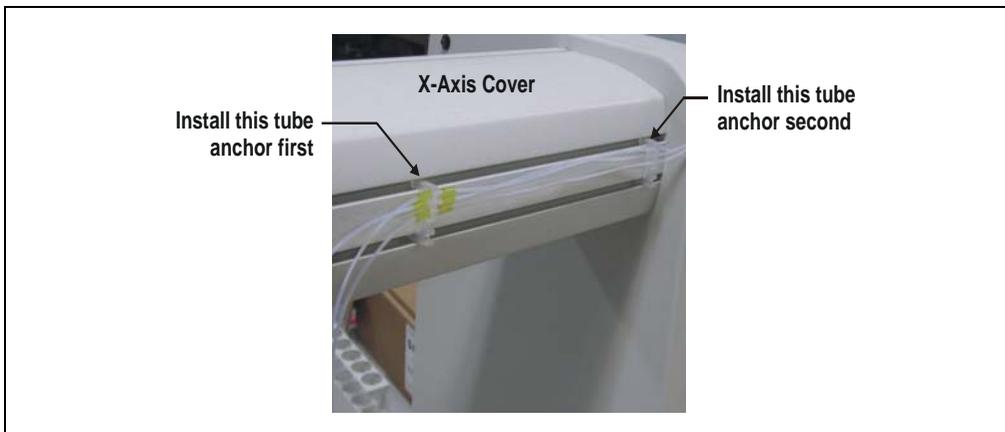
4. Route the tubing to the right, around the sampling arm housing.

- Using a cable tie, attach the tubing through the eyelet on the underside of the housing (see [Figure 5-5](#)). Leave a loop of about 10 mm (0.39 in) in the cable tie.



*Figure 5-5. Attaching the Cable Tie to the Tubing*

- Locate one tube anchor along the X-axis cover, about 18 cm (7 in) from the column case. Locate the second tube anchor toward the back, about 11.4 cm (4.5 in) from the column case (see [Figure 5-6](#)).



*Figure 5-6. Attaching the Tubing to the Middle Tube Anchor*

- Attach the tubing to the middle tube anchor (the anchor installed first), using the two tube markers (see [Figure 5-6](#)).
- Route the tubing along the side of the X-axis arm. Anchor the tubing in position, spacing the tube anchors so as to minimize the route to the IC (or other analyzer). When you finish, adjust the length of the sample line to the analyzer.

## 5.4 Replacing the Syringe Pump Distribution Valve

### 5.4.1 Removing the Existing Valve

1. Remove as much fluid as possible from the system by cycling the syringe pump and using air as the system fluid.
2. Initialize the syringe pump in Chromeleon to ensure that the valve motor shaft is in the correct position:
  - a. Turn off the power, wait 10 seconds, and turn on the power again.
  - b. In the Commands dialog box, select **SyringeReset** and click **OK**.
3. Remove the syringe and tubing. Set the syringe aside in a safe place.
4. Remove the socket head screws on the front of the valve, and then remove the valve from the pump (see [Figure 5-7](#)). **Do not remove the spacer.**

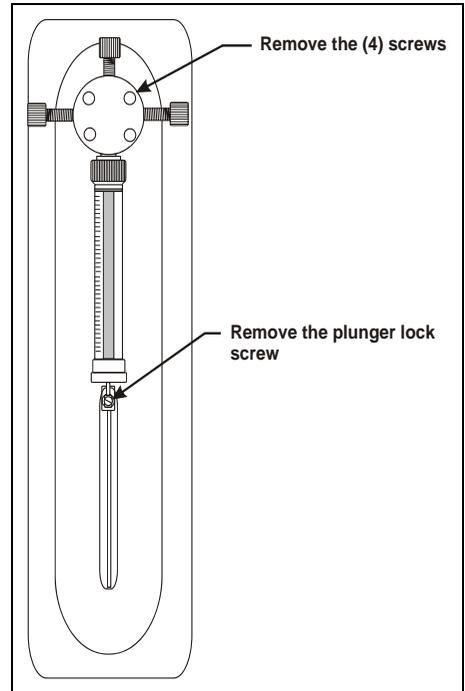


Figure 5-7. Removing the Syringe Pump Valve

## 5.4.2 Installing the New Valve

1. Place the new valve (P/N 064227) on the front panel so that the screw holes line up. The valve coupler fitting mates to the valve motor shaft. The shaft should be in the correct position; if it is not, reinitialize the pump.
2. Replace the valve screws, but do not tighten completely.
3. In the Commands dialog box, select **SyringeReset** and click **OK**.
4. Install the syringe and pull the syringe plunger until it is above the carriage. Align the valve, using the plunger as a guide, and tighten from one-quarter to one-half turn after the screws contact the valve body.
5. Pull the syringe plunger all the way into the carriage and secure by tightening the plunger lock screw.

**NOTE** When viewed from the side, the valve syringe port is slightly offset compared to the other three ports.

## 5.5 Replacing the Main Power Fuses

1. Turn off the AS-HV power switch.
2. Disconnect the power cord from the power entry on the AS-HV side panel.



**HIGH VOLTAGE**—Disconnect the main power cord from its source and also from the AS-HV side panel.



**HAUTE TENSION**—Débranchez le cordon d'alimentation principal de la prise secteur et du panneau latéral de l'AS-HV.



**HOCHSPANNUNG**—Ziehen Sie das Netzkabel aus der Steckdose und auch aus der Netzbuchse auf dem Seitenteil des AS-HV.

3. Use a thin blade screwdriver to unclip the cover of the fuse compartment (see [Figure 5-8](#)).

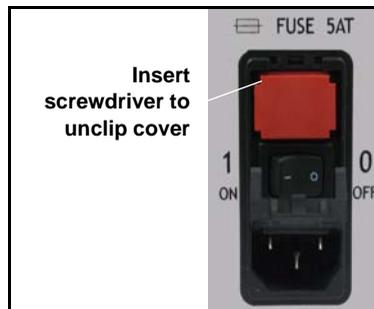


Figure 5-8. Opening the Fuse Compartment

4. Slide the fuse holder out of the input panel (see [Figure 5-9](#)).

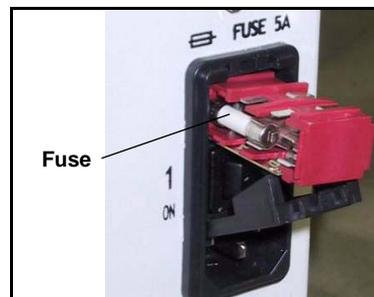


Figure 5-9. Removing the Fuse Holder

5. Remove the fuses from the fuse holder and replace with new 5 amp slow-blow fuses (P/N 064248). Dionex recommends always replacing both fuses.
6. Slide the fuse compartment back into the unit and clip the cover into place.
7. Reconnect the power cord and turn on the power.



## A.1 Electrical

<b>Main Power</b>	100 to 240 VAC, 50 to 60 Hz, 1.8 A (no manual voltage or frequency adjustment required) Typical input power: 75 W Maximum line draw: 1.8 A at 110 VAC at power-up
<b>Fuse</b>	Two 5 amp slow-blow fuses (P/N 064248)

## A.2 Environmental

<b>Operating Temperature</b>	10 to 35 °C (50 to 95 °F)
<b>Operating Humidity</b>	8% to 80% relative humidity, noncondensing

## A.3 Physical

<b>Dimensions</b>	Height: 51 cm (20 in) Width: 28.5 cm (11.2 in) Depth: 49 cm (19 in) Minimum clearance behind the AS-HV: 15 cm (6 in)
<b>Weight</b>	15 kg (33.1 lb)

### A.4 General

<b>Sample Capacity</b>	With 250 mL Nunclon sample flasks: 24 With 250 mL narrow-mouth Nalgene bottles: 15
<b>Sample Protection</b>	Pre-split septum with cap and/or Plexiglas protective cover
<b>Sample Container Size</b>	Up to 250 mL
<b>Maximum Injection Volume</b>	Application-dependent; up to 250 mL
<b>Minimum Sample Volume</b>	Injection valve-dependent; nominally, 50 $\mu$ L
<b>Number of Injections per Vial</b>	Variable
<b>Injection Type</b>	Full sample loop or concentrator column
<b>Injection Valve</b>	None
<b>Injector Precision</b>	Injection valve-dependent; nominal values are: Sample loop: <0.5% Concentrator column: <2.0%
<b>Injector Carryover</b>	Injection valve-dependent; nominal values are: Sample loop: <0.1% Concentrator column: <0.2%
<b>Sample Loading</b>	Push or pull
<b>Software Control</b>	Chromeleon software

### B.1 Facility Requirements

- Make sure the AS-HV installation site meets the electrical and environmental specifications listed in [Appendix A](#).
- The AS-HV should be installed on a sturdy workbench. Allow at least 51 cm (20.1 in) of free space behind the AS-HV for connections and ventilation.

### B.2 Unpacking the AS-HV

1. Open the AS-HV shipping carton. Remove the AS-HV and place it on the workbench.
2. Unpack all items included in the shipping carton, place them in a convenient location, and check them against the packing list. Report any discrepancies to Dionex immediately.
3. Check the shipping carton for any external signs of damage. If the carton shows any sign of damage, contact Dionex immediately.

**IMPORTANT**

**Save the shipping carton for later use. Should it be necessary to return the AS-HV during the warranty period, Dionex recommends repacking the autosampler in the original shipping carton.**

4. Repeat the steps above for any additional shipping cartons.

## **B.3 Installing the AS-HV**

### **B.3.1 Installing the Spill Tray**

A spill tray (P/N 064251) is installed in the AS-HV at the factory. If the spill tray becomes separated from the autosampler during shipping, follow the procedure below to reinstall the tray.

1. Check that the alignment pins protrude above the base support tube (see [Figure B-1](#)).
2. Position the spill tray so that the two alignment pins at the rear of the base support tube fit into the slots in the spill tray.
3. Lower the spill tray until the front edge rests on the front of the base support tube.
4. Verify that the spill tray is secured in place by trying to move it from side to side; the tray should not move at all.



*Figure B-1. Installing the Spill Tray*

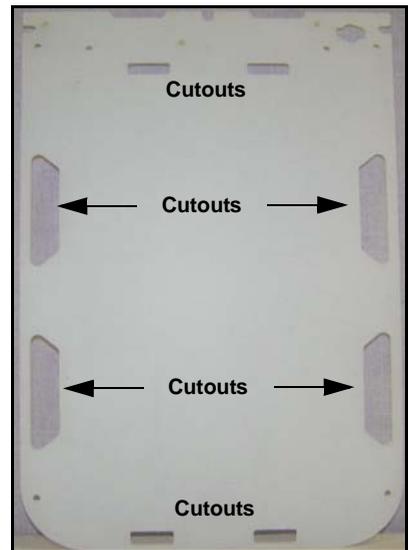
### B.3.2 Installing the Rack Location Mat

A rack location mat (P/N 064250) is mounted on the spill tray at the factory. If the rack location mat becomes separated from the AS-HV during shipping, follow the procedure below to reinstall the mat.

1. Note the cutouts in the sides and the rear of the rack location mat (see [Figure B-2](#)).

The cutouts are designed to slot over the raised locating tabs that are molded into the spill tray; this ensures proper alignment.

2. Position the rack location mat over the spill tray. Check that the slot for the rinse reservoir is located on the left side of the mat, and then press the mat onto the locating tabs.
3. Verify that the rack location mat fits firmly in place by trying to move it from side to side; the mat should not move at all. If the mat does not fit properly, contact Dionex for assistance.

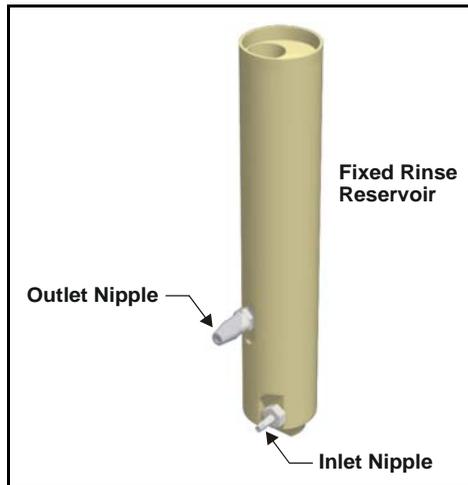


*Figure B-2. Rack Location Mat*

### **B.3.3 Installing the Fixed Rinse Reservoir**

The Fixed Rinse Reservoir Kit (P/N 064520) includes the rinse reservoir, as well as tubing required for the inlet and outlet connections.

1. Verify that the rack location mat is securely installed (see [Section B.3.2](#)).
2. Insert the rinse reservoir into the opening provided in the rear left-hand side of the rack location mat.
3. Rotate the rinse reservoir clockwise 90 degrees until it locks into position. The inlet and outlet nipples on the reservoir should be facing the left-hand side of the AS-HV (see [Figure B-3](#)).
4. Verify that the rinse reservoir is seated correctly by checking that it is perpendicular and is firmly attached to the rack location mat.

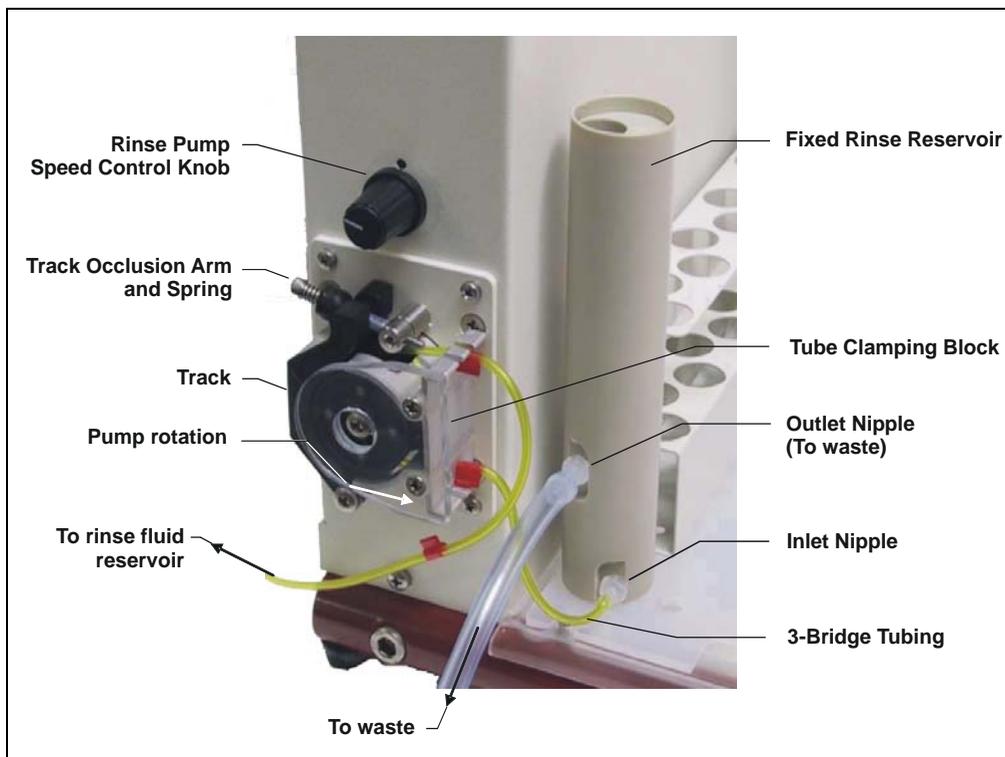


*Figure B-3. Fixed Rinse Reservoir*

5. Attach the 5-mm (0.20-in) ID polypropylene tubing (P/N 064485) to the outlet nipple. Place the other end of the tubing in a waste container.
6. Attach the 2.5-mm (0.10-in) ID polypropylene tubing (P/N 064486) to the inlet nipple. This tubing will be connected to the rinse pump in [Section B.3.4](#).

### B.3.4 Connecting the Rinse Pump

This section explains how to load tubing into the rinse pump. Refer to [Figure B-4](#) as you work.



*Figure B-4. Rinse Pump Tubing Connections*

1. Release the track by disengaging the track occlusion arm.
2. Feed the 2.06-mm (0.08-in) ID Santoprene tubing (P/N 064521) into the suction side (top) of the tubing clamp.
3. Locate the first tubing bridge into the appropriate lower tubing bridge holder. Feed the tubing around the rotor and locate the center tubing bridge into the top bridge holder. Make sure there are no twists or kinks in the tubing after loading, as these will shorten the life of the tubing.

4. Reposition the track over the rotor and fix by slotting the track occlusion pin back into the track slot.

**NOTE** Compressing the spring on the track occlusion pin will increase the suction height and performance against backpressure.

5. Connect the delivery line to the inlet nipple of the fixed rinse reservoir (see [Figure B-3](#)). Keep the delivery line as short as possible.
6. Connect the suction line to the reservoir containing rinse fluid. Keep the suction line as short as possible.

**NOTE** Dionex recommends using ASTM Type I (or better) filtered, deionized water as the rinse fluid.

### To remove tubing from the rinse pump:

- Release the track by disengaging the track occlusion arm.
- Remove both tubing bridges from their location slots and remove the tubing from the pump head.

## B.3.5 Installing the Standards Rack

The AS-HV is shipped with an 11-position standards rack (P/N 064253) (see [Figure B-5](#)). An optional 6-position standards rack (P/N 064252) is available, also.

1. Check the rack location mat for the location of the three mounting holes that are closest to the AS-HV chassis. (The holes may be positioned at the rear and/or the front of the mat.)

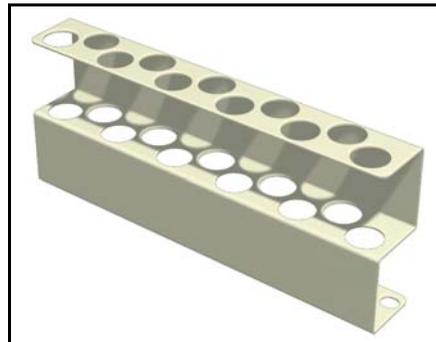


Figure B-5. Standards Rack (11-position)

2. Push a mounting stud (provided with the standards rack) into each of the mounting holes.
3. Position the standards rack over the three mounting studs and push the rack firmly onto the mounting studs to secure it into place.

### **B.3.6 Installing the Sample Rack**

The AS-HV is shipped with a 24-position sample rack (P/N 064233). An optional 15-position sample rack (P/N 064234) is available, also.

Place the sample rack on top of the rack location mat in the autosampler.

### **B.3.7 Installing the Trace Analysis Cover (Optional)**

The Plexiglas trace analysis cover is shipped as a ready-to-assemble kit (P/N 064052). Use the sliding door in the cover for access when loading or removing racks.

1. Follow the instructions provided in the kit to assemble the cover.
2. Place the assembled cover over the AS-HV.
3. The cover has provision for an optional purge connection and/or an exhaust outlet to remove corrosive or solvent fumes. Dionex recommends using helium or nitrogen at very high purity (99.999%) as the purge gas.

## B.3.8 Installing the Sampling Needle

The AS-HV is shipped with a PEEK Sampling Needle Kit (P/N 064511). An optional Sampling Needle Kit–PTFE Lined and Sleeved (P/N 064056) is available, also.

1. Check that the power to the AS-HV is off.



To avoid injury, always turn off the power to the AS-HV before installing or removing the sampling needle.



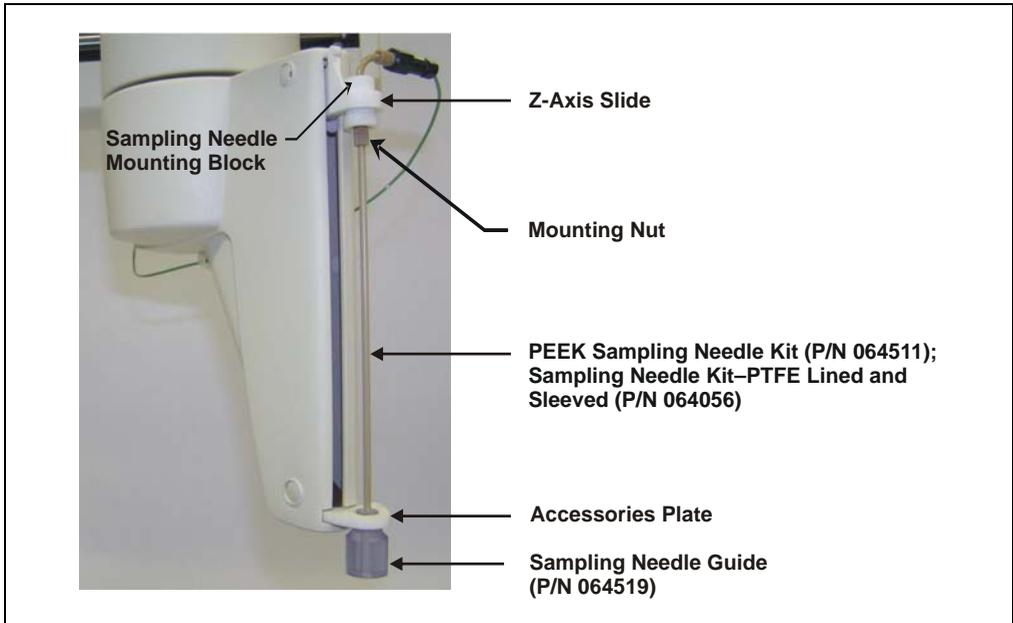
Afin d'éviter toute blessure, couper impérativement l'alimentation secteur avant d'installer ou de démonter l'aiguille de prélèvement.



Um Verletzungen zu vermeiden, schalten Sie den AS-HV bitte immer aus, ehe Sie die Probenadel installieren oder deinstallieren.

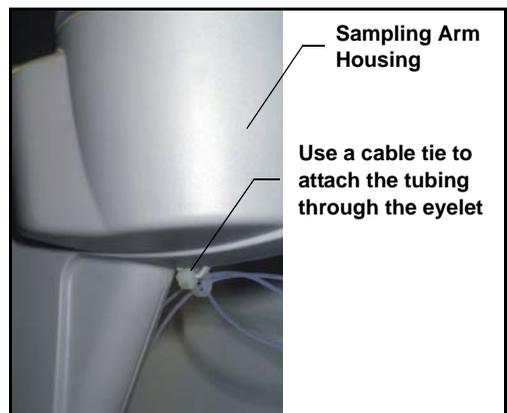
2. Manually rotate the sampling arm so that it can be easily worked on.
3. Move the Z-axis slide to the top of the carriage (see [Figure B-6](#)).
4. Slide the sampling needle mounting block into the Z-axis slide, ensuring that the sampling needle (PEEK Sampling Needle Kit, P/N 064511; Sampling Needle Kit–PTFE Lined and Sleeved, P/N 064056) passes through the accessories plate, and secure it with the knurled mounting nut (see [Figure B-6](#)).
5. Screw the sampling needle guide (P/N 064519) onto the underside of the accessories plate.

**NOTE** The sampling needle guide ensures that the PEEK needle does not bend or flex as it pierces the septum in the sample container cap.



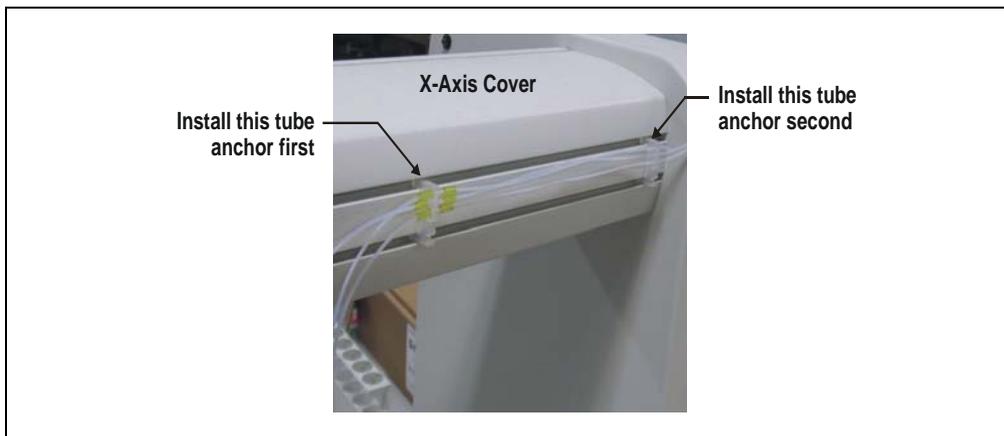
*Figure B-6. Installing the Sampling Needle*

6. Route the tubing to the right, around the sampling arm housing.
7. Using a cable tie, attach the tubing through the eyelet on the underside of the housing (see [Figure B-7](#)). Leave a loop of about 10 mm (0.39 in) in the cable tie.



*Figure B-7. Attaching Tubing to the Cable Tie*

8. Locate one tube anchor along the X-axis cover, about 18 cm (7 in) from the column case. Locate the second tube anchor toward the back, about 11.4 cm (4.5 in) from the column case (see [Figure B-8](#)).



*Figure B-8. Attaching the Tubing to the Middle Tube Anchor*

9. Attach the tubing to the middle tube anchor (the anchor installed first) using the two tube markers (see [Figure B-8](#)).
10. Route the tubing along the side of the X-axis arm. Anchor the tubing in position, spacing the tube anchors so as to minimize the route to the IC (or other analyzer). When you finish, adjust the length of the sample line to the analyzer.

### B.3.9 Connecting the Syringe Pump (Optional)

The syringe pump assembly (P/N 064526) consists of the syringe pump, 10 mL syringe, and three-way distribution valve in a housing. The pump assembly is shipped with a syringe pump kit (P/N 064506) that includes the following parts:

Part Number	Item	Quantity
052112	PFA (perfluoroalkoxy) tubing, 1.57-mm (0.062-in) ID	6.10 m (240 in)
052267	1/4-28 x 1/8-in flangeless nut	4
048949	1/8-in flangeless ferrule fitting	4
042806	1/4-28 x 10-32 coupler	1
043275	10-32 double-cone bolt	2
043276	Double-cone ferrule fitting	2
054410	PEEK tubing, 1.0-mm (0.040-in) ID	12.7 cm (5 in)
064518	Waste bottle assembly, 1 liter	1
064517	Flush bottle assembly, 1 liter	1
042806	1/4-28 x 10-32 coupler	1
064525	Syringe pump stand	1
064526	Syringe pump assembly	1
062590	ICS-3000 EO bottle holder assembly	1
053891	Dionex Reference Library CD-ROM	1

1. Place the ICS-3000 EO bottle holder assembly near the AS-HV on the lab bench. Place the syringe pump in the bottle holder.
2. Connect the syringe pump cable from the pump to the **AUX** and **I/O** ports on the AS-HV side panel.
3. Connect the liquid lines as required for either the push mode (see [Figure B-9](#)) or the pull mode (see [Figure B-10](#)).
4. When you finish the plumbing connections, go on to [Section B.3.14](#).

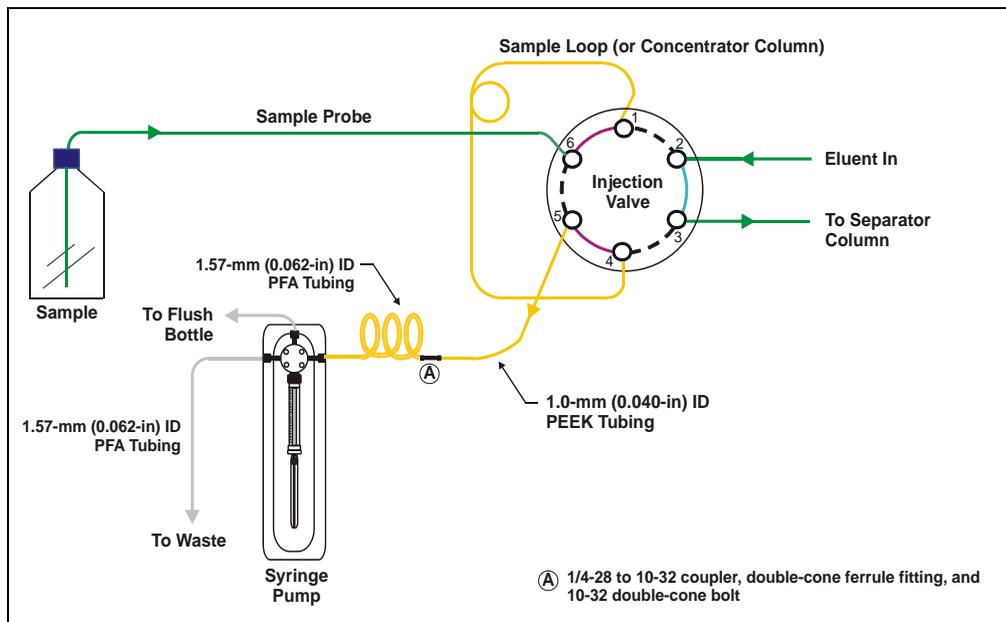


Figure B-9. Syringe Pump Flow Schematic: Push Mode

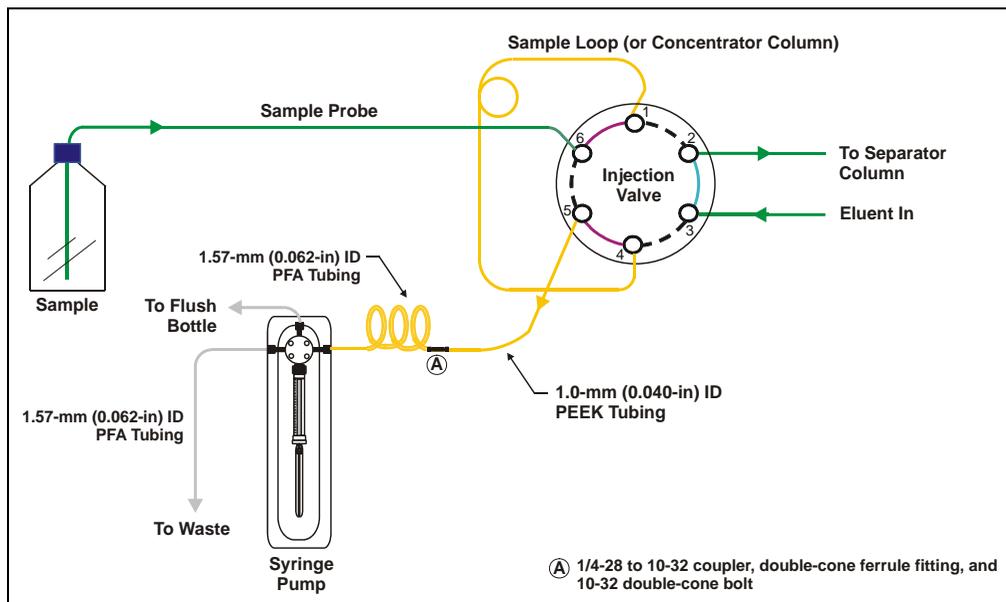


Figure B-10. Syringe Pump Flow Schematic: Pull Mode

### B.3.10 Connecting the AXP Pump (Optional)

The AXP pump with Ship Kit (P/N 064507) includes the following parts:

Part Number	Item	Quantity
063978	AXP pump assembly	1
042806	1/4-28 x 10-32 coupler	1
043275	10-32 double-cone bolt	4
043276	Double-cone ferrule fitting	4
054410	PEEK tubing, 1.0-mm (0.040-in) ID	50.8 cm (20 in)
044221	PEEK tubing, 0.13-mm (0.005-in) ID	50.8 cm (20 in)
053891	Dionex Reference Library CD-ROM	1

1. Place the AXP pump near the AS-HV on the lab bench.
2. To operate the pump as a standalone device, connect it directly to a serial port on the Chromeleon PC, using the RS-232 cable (P/N 060683) shipped with the AS-HV.

If a serial port is not available, use the optional RS-232-to-USB cable (P/N 064261) to connect the pump to a USB port on the PC.

**NOTE** The driver provided with the RS-232-to-USB cable must be installed on the PC before the cable is attached to the USB port.

3. To control the pump through the AS-HV, connect the RS-232 cable (P/N 060683) shipped with the AXP to the **AUX** port on the side panel of the autosampler.

**NOTE** To support sample overlap (see [“Sample Overlap” on page 12](#)), the AXP must be connected to the **AUX** port.

4. Connect the liquid lines as required for either the push mode (see [Figure B-11](#)) or the pull mode (see [Figure B-12](#)).
5. When you finish the plumbing connections, go on to [Section B.3.14](#).

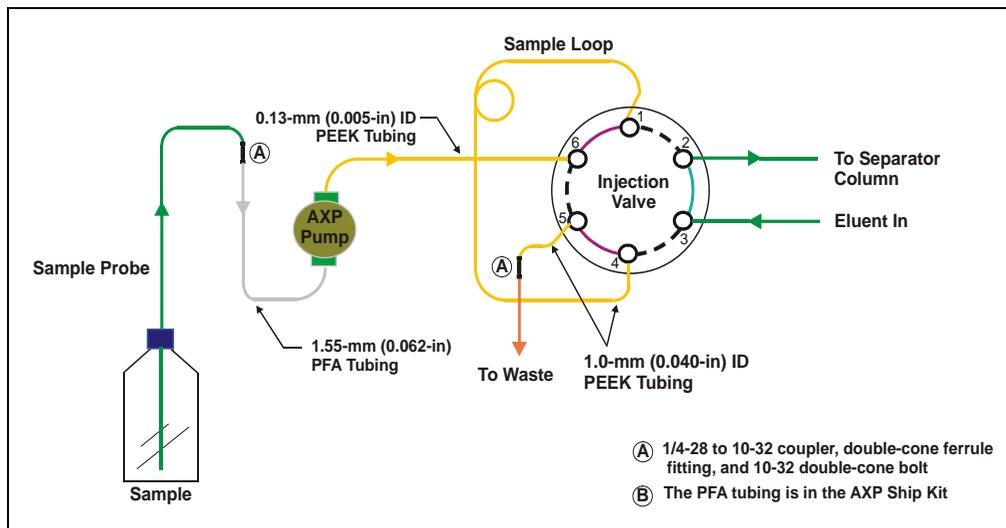


Figure B-11. AXP Pump Flow Schematic: Push Mode

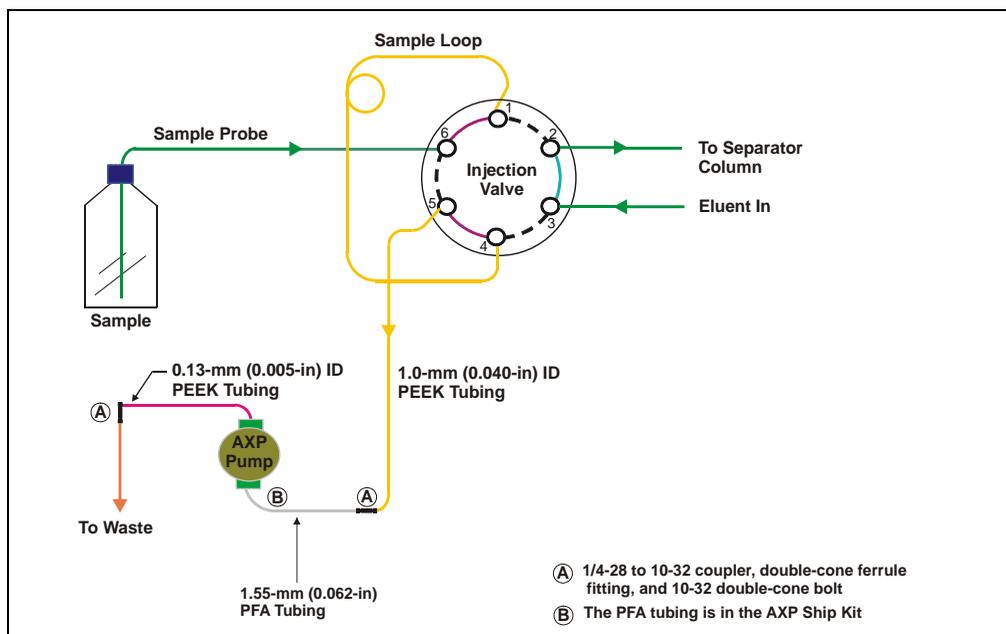


Figure B-12. AXP Pump Flow Schematic: Pull Mode

### **B.3.11 Connecting the External Peristaltic Pump (Optional)**

The external peristaltic pump kit (P/N 064508) includes the following parts:

<b>Part Number</b>	<b>Item</b>	<b>Quantity</b>
064320	External peristaltic pump	1
064350	External relay cable	1
037431	10-32 to 1/16-in barbed fitting	2
043275	10-32 double-cone bolt	4
043276	Double-cone ferrule fitting	4
054410	PEEK tubing, 1.0-mm (0.040-in) ID	1.02 m (40 in)
042627	10-32 to 10-32 coupler	2
056755	O-ring	2
053891	Dionex Reference Library CD-ROM	1

1. Place the pump near the AS-HV on the lab bench.
2. Remove the shorting bar from the pump, if present.
3. Connect the relay cable from the AS-HV side panel to terminals 3 and 4 on the pump's rear panel terminal strip.
4. Connect the liquid lines as required for either the push mode (see [Figure B-13](#)) or the pull mode (see [Figure B-14](#)).
5. When you finish the plumbing connections, go on to [Section B.3.14](#).

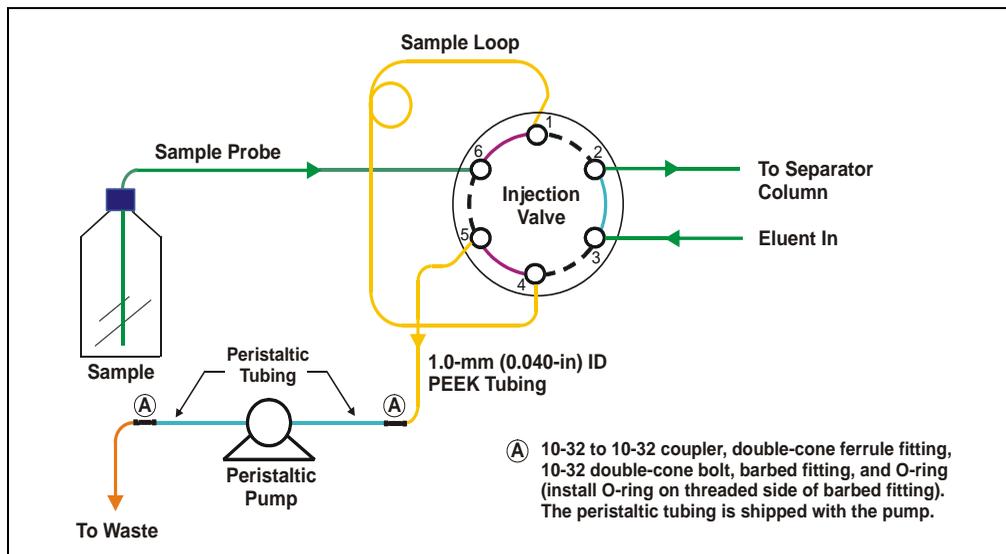


Figure B-13. Peristaltic Pump Flow Schematic: Pull Mode

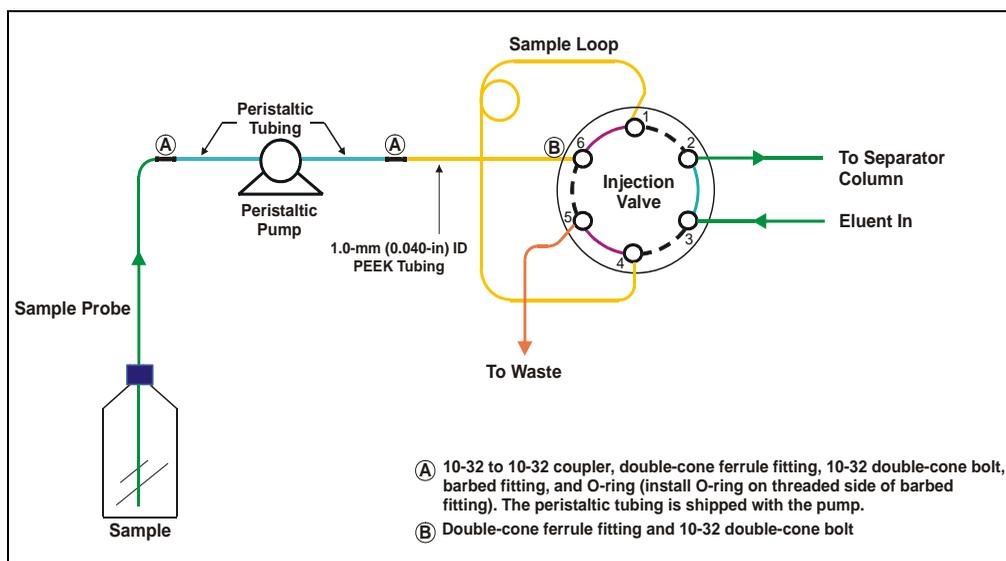


Figure B-14. Peristaltic Pump Flow Schematic: Push Mode

### **B.3.12 Connecting the Internal Peristaltic Pump (Optional)**

The internal peristaltic pump (i.e., the AS-HV rinse pump) can be used for sample loading if the rinse station is connected directly to an external deionized water source.

**NOTE** When using an external rinse source, the delivery pressure should be less than 0.03 MPa (5 psi).

1. Connect the peristaltic tubing from the rinse reservoir to a deionized water source.
2. Connect the liquid lines to the pump as required for the push mode (see [Figure B-13](#)) or the pull mode (see [Figure B-14](#)).
3. When you finish the plumbing connections, go on to [Section B.3.14](#).

### **B.3.13 Connecting a Relay-Controlled Pump (Optional)**

An external relay-controlled pump from a third-party vendor can be used for sample loading. Refer to the pump manual for detailed installation instructions.

1. Place the relay-controlled pump near the AS-HV on the lab bench.
2. Connect the relay cable (P/N 064350) from the pump to Relay B on the AS-HV side panel.
3. When you finish the plumbing connections, go on to [Section B.3.14](#).

### B.3.14 Connecting the AS-HV to the Chromeleon PC

Before proceeding, verify that Chromeleon is installed on the PC. Refer to *Installing the Chromeleon Chromatography Management System with a Dionex Ion Chromatograph (IC)* (Document No. 031883) for detailed instructions.

1. Connect the RS-232 cable (P/N 060683) between the **HOST** port on the AS-HV side panel and a serial port on the computer.

If a serial port is not available on the PC, use the optional RS-232-to-USB cable (P/N 064261) to connect the **HOST** port to a USB port on the computer.

**NOTE** The driver provided with the RS-232-to-USB cable must be installed on the PC before the cable is attached to the USB port.

2. Check that the correct serial port parameters have been set:

Baud rate:	19200
Data bits:	8
Parity:	None
Stop bits:	1
Handshake:	Off

3. Check that DIP switch SW5 on the AS-HV side panel is in the On (Down) position. This position sets the baud rate to 19200.

All other DIP switches should be in the Off (Up) position. For a description of the DIP switch functions, refer to [Section 2.2](#).

### **B.3.15 Connecting the Power Cord**



**SHOCK HAZARD**—To avoid electrical shock, use a grounded receptacle. Do not operate the AS-HV 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 AS-HV and is easily accessible.



Operation at AC input levels outside of the specified operating voltage range may damage the AS-HV.



**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.



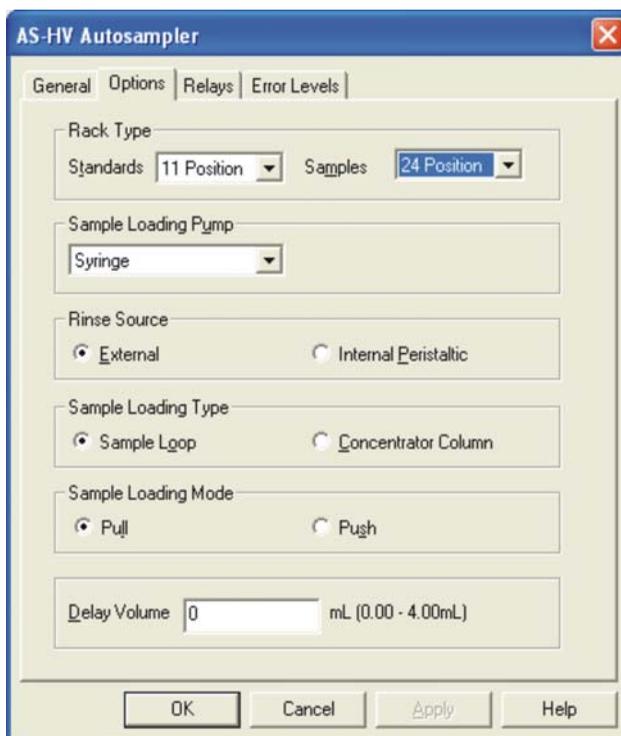
Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

1. Connect the power cord from the AS-HV side panel to a grounded power source. The AS-HV power supply is auto-sensing; thus, no manual adjustment is required to select the line voltage.
2. Turn on the power switch on the AS-HV side panel.

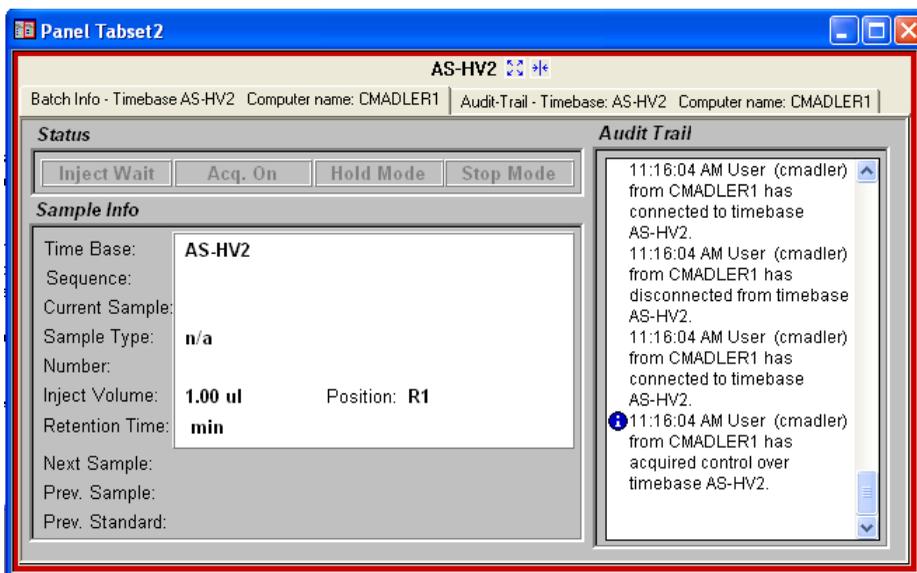
### B.3.16 Configuring the AS-HV in Chromeleon

Follow the guidelines below to add the AS-HV to a Chromeleon timebase and connect it to a Control panel. Refer to *Installing the Chromeleon Chromatography Management System with a Dionex Ion Chromatograph (IC)* (Document No. 031883) for detailed instructions. In summary:

- Turn on the computer power and log onto Windows XP or Windows 2000 as an administrator.
- Start the Chromeleon Server, if it is not already running.
- Start the Chromeleon Server Configuration program. Add the AS-HV to an existing timebase or create a new timebase.
- In the AS-HV Properties dialog box (see below), specify the rack types installed in the AS-HV, the sample loading pump, and other properties.



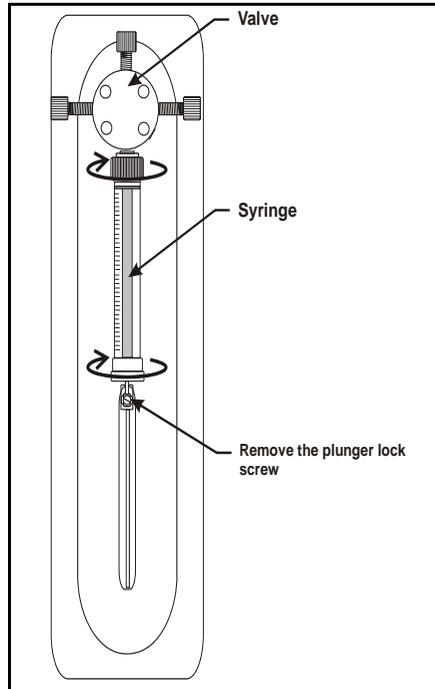
- After configuring the AS-HV, start the Chromeleon client.
- Click the **Default Panel Tabset** toolbar button to display a set of Control panels for the devices in the timebase.



### **B.3.17 Removing Bubbles from the Syringe**

Disregard this section if a syringe pump is not installed.

1. Fill a container with isopropyl alcohol.
2. Unscrew and remove the plunger lock screw (see [Figure B-15](#)).
3. Hold the syringe at the top and bottom and unscrew it from the valve.
4. Pull the syringe plunger up and push down rapidly with short movements to dislodge the bubbles. Repeat until all bubbles are dislodged.
5. Place the threaded end of the syringe into the isopropyl alcohol and slowly pull out the plunger to draw a full syringe volume into the syringe.



*Figure B-15. Removing the Syringe*

6. Keeping the syringe in the liquid, slowly push the syringe plunger until the bubble(s) exits the syringe. Then, fill the syringe.
7. Alternatively, fill the syringe with isopropyl alcohol and then remove the syringe from the liquid. Hold the syringe with the threaded end up under a stream of deionized water. Push the syringe plunger up and pull down until the bubble is removed.
8. Remove the syringe from the liquid. While holding it vertically, push a small amount of liquid out the top to make sure there is no air present.
9. Position the syringe under the valve.

10. Holding the syringe at the top and bottom, screw it back into the valve and tighten fingertight.
11. Align the syringe piston with the connecting screw mount on the syringe drive.
12. Insert the plunger lock screw removed in [Step 2](#) and tighten fingertight.



## C • Error Messages and Codes

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- [Section C.1](#) describes error messages that may be reported by Chromeleon software and provides guidelines for troubleshooting problems.
- [Section C.2](#) describes error codes that may be displayed by the AS-HV **ERROR** indicators and provides guidelines for troubleshooting problems.

**NOTE** All firmware upgrades and repairs of electronics components must be performed by Dionex personnel.

### C.1 Audit Trail Messages

The AS-HV firmware periodically checks the status of certain operating parameters. If a problem is detected, it is reported to Chromeleon and displayed in the Audit Trail.

Each error message is preceded by an icon that identifies the seriousness of the underlying problem (see the table below). You can change the severity level assigned to a problem whenever appropriate.

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

[Table C-1](#) lists the Chromeleon error messages and their default severity levels. For troubleshooting assistance, refer to the page indicated in the table.

Alarms and Error Conditions	Default Severity Level	See
After PrepareNextSample, no further sampler commands are supported.	Abort	<a href="#">page 88</a>
AS-HV configuration memory checksum error.	Abort	<a href="#">page 88</a>
AS-HV device error->disconnect.	Abort	<a href="#">page 89</a>
AS-HV EEPROM read error.	Abort	<a href="#">page 89</a>
AS-HV EEPROM write error.	Abort	<a href="#">page 89</a>
AS-HV profile length too large.	Abort	<a href="#">page 89</a>
AS-HV program memory checksum error.	Abort	<a href="#">page 88</a>
AS-HV RAM test error.	Abort	<a href="#">page 90</a>
Axis initialization error.	Abort	<a href="#">page 90</a>
AXP pump communication error->disconnect.	Abort	<a href="#">page 90</a>
AXP pump lower pressure limit fault.	Abort	<a href="#">page 91</a>
AXP pump motor stall fault.	Warning	<a href="#">page 91</a>
AXP pump upper pressure limit fault.	Abort	<a href="#">page 91</a>
Command timed out.	Abort	<a href="#">page 92</a>
Communication error->disconnect.	Error	<a href="#">page 92</a>
Configuration value out of range.	Warning	<a href="#">page 93</a>
Envelope error.	Abort	<a href="#">page 93</a>
Invalid command.	Warning	<a href="#">page 93</a>
Invalid configuration variable.	Warning	<a href="#">page 94</a>
Invalid number of parameters.	Warning	<a href="#">page 95</a>
Invalid parameter or command.	Warning	<a href="#">page 95</a>
Invalid position.	Error	<a href="#">page 96</a>
Invalid volume.	Error	<a href="#">page 96</a>
Missing AXP pump pressure high limit in the PGM.	Abort	<a href="#">page 96</a>
Missing AXP pump pressure limits in the PGM.	Warning	<a href="#">page 97</a>
Missing AXP pump pressure low limit in the PGM.	Abort	<a href="#">page 96</a>
Parameter out of range.	Warning	<a href="#">page 97</a>
Parameter out of range; check syringe position.	Abort	<a href="#">page 97</a>
Please enter all parameters.	Abort	<a href="#">page 98</a>

*Table C-1. Chromeleon Error Messages*

Alarms and Error Conditions	Default Severity Level	See
PrepareNextSample can only be issued once per program.	Abort	<a href="#">page 98</a>
PrepareNextSample cannot be used in a manual program.	Abort	<a href="#">page 98</a>
PrepareNextSample may only be specified after the Inject command.	Abort	<a href="#">page 99</a>
Sample number error.	Abort	<a href="#">page 99</a>
Syringe pump command overflow.	Abort	<a href="#">page 99</a>
Syringe pump communication error->disconnect.	Abort	<a href="#">page 100</a>
Syringe pump initialization error.	Abort	<a href="#">page 100</a>
Syringe pump internal failure error.	Abort	<a href="#">page 101</a>
Syringe pump invalid command.	Abort	<a href="#">page 101</a>
Syringe pump invalid operand.	Abort	<a href="#">page 102</a>
Syringe pump not initialized error.	Abort	<a href="#">page 100</a>
Syringe pump plunger move not allowed.	Abort	<a href="#">page 103</a>
Syringe pump plunger overload error.	Abort	<a href="#">page 103</a>
Syringe pump valve overload error.	Abort	<a href="#">page 103</a>
Theta-axis movement error.	Abort	<a href="#">page 105</a>
Theta-axis position error.	Abort	<a href="#">page 105</a>
The high pressure limit must be at least 100 psi higher than the low limit.	Abort	<a href="#">page 104</a>
The pump is not a Dionex AXP pump.	Abort	<a href="#">page 104</a>
The sampler is busy; can't interrupt processing now.	Abort	<a href="#">page 104</a>
There is no pressure board present.	Abort	<a href="#">page 106</a>
Timed move error.	Abort	<a href="#">page 106</a>
Too many errors—device will be disconnected.	Warning	<a href="#">page 106</a>
X-axis movement error.	Abort	<a href="#">page 105</a>
X-axis position error.	Abort	<a href="#">page 105</a>
Z-axis movement error.	Abort	<a href="#">page 105</a>
Z-axis position error.	Abort	<a href="#">page 105</a>

Table C-1. Chromeleon Error Messages (Continued)



**After PrepareNextSample, no further sampler commands are supported.**

**Cause:**

If a Chromeleon program includes the **PrepareNextSample** command, it must be the last AS-HV command in the program.

**To troubleshoot:**

Delete any AS-HV commands that appear after **PrepareNextSample**.



**AS-HV configuration memory checksum error.**



**AS-HV program memory checksum error.**

**Cause:**

A problem with the AS-HV firmware.

**To troubleshoot:**

Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.) If the message appears again, the AS-HV firmware and/or variables must be reloaded. Contact Dionex for assistance.



**AS-HV device error->disconnect.**

**Cause:**

Chromeleon is unable to communicate with the autosampler.

**To troubleshoot:**

1. Check that the cable between the AS-HV and the Chromeleon PC is firmly connected and screwed into place.
2. Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.)
3. Stop the Chromeleon server; after 30 seconds, restart the server. If the message appears again, contact Dionex for assistance.



**AS-HV EEPROM read error.**



**AS-HV EEPROM write error.**

**Cause:**

A problem with the AS-HV electronics.

**To troubleshoot:**

Contact Dionex for assistance.



**AS-HV profile length too large.**

**Cause:**

The AS-HV firmware selected values for the stepper motor parameters that are too large for the amount of available memory.

**To troubleshoot:**

Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.) If the message appears again, contact Dionex for assistance.



### **AS-HV RAM test error.**

#### **Cause:**

The RAM failed the data validation test performed when the AS-HV power is turned on.

#### **To troubleshoot:**

The main PC board should be replaced. Contact Dionex for assistance.

**NOTE** The AS-HV electronics cannot be serviced by the user. All repairs of the electronics components must be performed by Dionex personnel.



### **Axis initialization error.**

#### **Cause:**

The sampling arm failed to travel the required distance along one or more axes during the AS-HV initialization sequence.

#### **To troubleshoot:**

Follow the troubleshooting steps in [Section 4.2](#) and [Section 4.3](#).



### **AXP pump communication error->disconnect.**

#### **Cause:**

A communication failure between the AXP pump and the AS-HV.

#### **To troubleshoot:**

1. Check that the serial cable between the AXP pump and the **AUX** port on the AS-HV side panel is firmly connected.
2. Initialize the AS-HV to verify that it is in a working state. (Turn off the power, wait 10 seconds, and turn on the power again.)



**AXP pump lower pressure limit fault.**

**Cause:**

The AXP pump pressure has fallen below the low pressure limit setting.

**To troubleshoot:**

Verify that the low pressure limit setting is within the correct range. The maximum value is the current upper pressure limit setting minus 100 psi; the minimum value is 0. The value must be expressed as four digits; for example, for 50 psi, enter *0050*.



**AXP pump motor stall fault.**

**Cause:**

The AXP pump motor can stall if the flow path connected to the pump's outlet becomes plugged, if the pressure exceeds the maximum pressure rating of the pump, or if the mechanism jams.

**To troubleshoot:**

Refer to the AXP pump manual for corrective action.



**AXP pump upper pressure limit fault.**

**Cause:**

The AXP pump pressure exceeds the upper pressure limit setting.

**To troubleshoot:**

Verify that the upper pressure limit setting is within the correct range. The maximum value is 3000 psi; the minimum value is the current lower pressure limit setting plus 100 psi. The value must be expressed as four digits; for example, for 400 psi, enter *0400*.



## Command timed out.

### Cause:

An AS-HV firmware command was not executed within the time allotted for its completion. This indicates either a mechanical problem or a communication problem.

### To troubleshoot:

Follow the troubleshooting steps in [Section 4.2](#) and [Section 4.3](#).



## Communication error->disconnect.

### Cause:

A communication failure between the AS-HV and the Chromeleon PC.

### To troubleshoot:

1. Check that the cable between the AS-HV and the PC is firmly connected and screwed into place.
2. Check that the correct serial port parameters have been set for the AS-HV and the Chromeleon PC (see [Section B.3.14](#)).
3. Initialize the AS-HV to verify that it is in a working state. (Turn off the power, wait 10 seconds, and turn on the power again.)
4. Send some commands from Chromeleon to the AS-HV; while the commands are being sent, observe the **HOST** LED on the AS-HV:

If the **HOST** LED flashes while commands are being sent, it confirms that the AS-HV has received a character from the PC. The AS-HV always responds when a carriage return (the **Enter** key) is received, regardless of the success of the message. This confirms that the baud rate is correct.

If the **HOST** LED does not flash while commands are being sent, confirm that the AS-HV is functioning by watching for the **CPU** LED to flash. If the **CPU** LED does not start flashing within 10 to 15 seconds, press the **Reset** button to implement the reset sequence

and then wait until the **CPU** LED flashes. If this is successful, try again to send commands from Chromeleon to the AS-HV. If the **HOST** LED still fails to flash, contact Dionex for assistance.



### **Configuration value out of range.**

#### **Cause:**

A problem with the AS-HV firmware.

#### **To troubleshoot:**

The AS-HV firmware cannot be serviced by the user. Contact Dionex for assistance.



### **Envelope error.**

#### **Cause:**

A problem with the AS-HV firmware or electronics resulted in the sampling arm being commanded to move to a position outside of its operating envelope.

#### **To troubleshoot:**

Initialize the AS-HV. (Turn off the power, wait 10 seconds, and turn on the power again.) If the message appears again, contact Dionex for assistance.



### **Invalid command.**

#### **Cause:**

The AS-HV firmware received an unrecognized command.

#### **To troubleshoot:**

1. Verify that Chromeleon release 6.80 (or later) is installed; software releases prior to this do not support the AS-HV.
2. Check that the cable between the AS-HV and the Chromeleon PC is firmly connected and screwed into place.

3. Check that the DIP switches on the AS-HV side panel are set correctly (see [Section 2.2](#)).
4. Check that the AS-HV and the Chromeleon PC have the same serial port parameters. Refer to [Section B.3.14](#) for the correct settings.
5. Initialize the AS-HV to verify that it is in a working state. (Turn off the power, wait 10 seconds, and turn on the power again.)
6. Send some commands from Chromeleon to the AS-HV; while the commands are being sent, observe the **HOST LED** on the AS-HV:

If the **HOST LED** flashes while commands are being sent, it confirms that the AS-HV has received a character from the PC. The AS-HV always responds when a carriage return (the **Enter** key) is received, regardless of the success of the message. This confirms that the baud rate is correct.

If the **HOST LED** does not flash while commands are being sent, confirm that the AS-HV is functioning by watching for the **CPU LED** to flash. If the **CPU LED** does not start flashing within 10 to 15 seconds, press the **Reset** button to implement the reset sequence and then wait until the **CPU LED** flashes. If this is successful, try again to send commands from Chromeleon to the AS-HV. If the **HOST LED** still fails to flash, contact Dionex for assistance.



### Invalid configuration variable.

#### Cause:

The AS-HV firmware detected an invalid setting for a configuration variable in Chromeleon.

#### To troubleshoot:

1. Check that the AS-HV and the Chromeleon PC have the same serial port parameters. Refer to [Section B.3.14](#) for the correct settings.
2. Check that the cable between the AS-HV and the PC is firmly connected and screwed into place.
3. Initialize the AS-HV to verify that it is in a working state. (Turn off the power, wait 10 seconds, and turn on the power again.)

4. Send some commands from Chromeleon to the AS-HV; while the commands are being sent, observe the **HOST LED** on the AS-HV:

If the **HOST LED** flashes while commands are being sent, it confirms that the AS-HV has received a character from the PC. The AS-HV always responds when a carriage return (the **Enter** key) is received, regardless of the success of the message. This confirms that the baud rate is correct.

If the **HOST LED** does not flash while commands are being sent, confirm that the AS-HV is functioning by watching for the **CPU LED** to flash. If the **CPU LED** does not start flashing within 10 to 15 seconds, press the **Reset** button to implement the reset sequence and then wait until the **CPU LED** flashes. If this is successful, try again to send commands from Chromeleon to the AS-HV. If the **HOST LED** still fails to flash, contact Dionex for assistance.



### **Invalid number of parameters.**

#### **Cause:**

Chromeleon has received an AS-HV firmware command it is unable to interpret.

#### **To troubleshoot:**

Stop the Chromeleon server; after 30 seconds, restart the server. If the message appears again, contact Dionex for assistance.



### **Invalid parameter or command.**

#### **Cause:**

The AXP pump has received an AS-HV firmware command it is unable to interpret.

#### **To troubleshoot:**

Stop the Chromeleon server; after 30 seconds, restart the server. If the message appears again, contact Dionex for assistance.



### **Invalid position.**

#### **Cause:**

You selected an invalid position number for the sample rack or standards rack.

#### **To troubleshoot:**

Enter a valid position number:

- The AS-HV supports a 6-position standards rack and an 11-position standards rack. Valid position numbers for the racks are S1 to S6 or S1 to S11, respectively.
- The AS-HV supports a 15-position sample rack and a 24-position sample rack. Valid position numbers for the racks are R1 to R15 or R1 to R24, respectively.



### **Invalid volume.**

#### **Cause:**

You entered an invalid injection volume.

#### **To troubleshoot:**

Enter a value from 0.01 to 250 mL.



### **Missing AXP pump pressure high limit in the PGM.**



### **Missing AXP pump pressure low limit in the PGM.**

#### **Cause:**

You created a Chromeleon program in which one of the pressure limit settings required for the AXP pump is missing.

#### **To troubleshoot:**

Always specify both an upper and lower pressure limit for the AXP in your programs.



**Missing AXP pump pressure limits in the PGM.**

**Cause:**

You created a Chromeleon program that does not include pressure limit settings for the AXP pump.

**To troubleshoot:**

Always specify both an upper and lower pressure limit for the AXP in your programs.



**Parameter out of range.**

**Cause:**

You entered a parameter that is outside the range allowed by Chromeleon.

**To troubleshoot:**

Enter a valid setting for this parameter.



**Parameter out of range; check syringe position.**

**Cause:**

The **Volume** entered for **SyringeAspirate** or **SyringeDispense** in the Commands dialog box exceeds the amount of sample in the syringe.

**To troubleshoot:**

Check the sample volume in the syringe, and then enter the correct volume.



### **Please enter all parameters.**

#### **Cause:**

You failed to enter one of more of the required parameters for the **SyringeAspirate** or **SyringeDispense** command.

#### **To troubleshoot:**

To execute the **SyringeAspirate** command, you must specify both the source of the sample to be aspirated and the volume of the syringe installed in the syringe pump.

To execute the **SyringeDispense** command, you must specify both the destination for the sample to be dispensed and the volume of the syringe installed in the syringe pump.



### **PrepareNextSample can only be issued once per program.**

#### **Cause:**

The Chromeleon program contains more than one **PrepareNextSample** command for the AS-HV.

#### **To troubleshoot:**

Delete all but one **PrepareNextSample** command from the program.



### **PrepareNextSample cannot be used in a manual program.**

#### **Cause:**

You selected the **PrepareNextSample** command in the Chromeleon Commands dialog box.

#### **To troubleshoot:**

Always use the Program Wizard to create sample overlap programs.



**PrepareNextSample may only be specified after the Inject command.**

**Cause:**

The **PrepareNextSample** command cannot be executed until after the sample has been injected.

**To troubleshoot:**

Edit the Chromeleon program so that **PrepareNextSample** appears after the **Inject** command.



**Sample number error.**

**Cause:**

You selected a sample position number that is invalid.

**To troubleshoot:**

Enter a valid position number. The AS-HV supports both a 15-position sample rack and a 24-position sample rack. Valid position numbers for the racks are R1 to R15 or R1 to R24, respectively.



**Syringe pump command overflow.**

**Cause:**

The syringe pump is receiving new Chromeleon commands before a previous command has been executed.

**To troubleshoot:**

Allow enough time for each command in the program to be executed before the next command starts.



### **Syringe pump communication error->disconnect.**

#### **Cause:**

A communication problem between the AS-HV and the syringe pump.

#### **To troubleshoot:**

1. Check that the cable between the syringe pump and the AS-HV **I/O** port is firmly connected and screwed into place.
2. Initialize the syringe pump (until the pump has been successfully initialized, it will not accept commands):
  - a. Turn off the power, wait 10 seconds, and turn on the power again.
  - b. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.



### **Syringe pump initialization error.**

#### **Cause:**

This error usually occurs when the initialization sequence cannot be performed correctly.

#### **To troubleshoot:**

1. Check for blockages and loose connections.
2. Initialize the syringe pump (until the pump has been successfully initialized, it will not accept commands):
  - a. Turn off the power, wait 10 seconds, and turn on the power again.
  - b. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.
3. If pump cannot be initialized, contact Dionex for assistance.



### Syringe pump internal failure error.

**Cause:**

A problem with the AS-HV firmware or electronics.

**To troubleshoot:**

Contact Dionex for assistance.



### Syringe pump invalid command.

**Cause:**

A communication failure between the AS-HV and the Chromeleon PC. or between the AS-HV and the syringe pump.

**To troubleshoot:**

1. Check that the DIP switches on the AS-HV are set correctly (see [Section 2.2](#)).
2. Check that the AS-HV and the Chromeleon PC have the same serial port parameters. Refer to [Section B.3.14](#) for the correct settings.
3. Check that the cable between the AS-HV and the PC is firmly connected and screwed into place.
4. Initialize the AS-HV to verify that it is in a working state. (Turn off the power, wait 10 seconds, and turn on the power again.)
5. Send some commands from Chromeleon to the AS-HV; while the commands are being sent, observe the **HOST** LED on the AS-HV:

If the **HOST** LED flashes while commands are being sent, it confirms that the AS-HV has received a character from the PC. The AS-HV always responds when a carriage return (the **Enter** key) is received, regardless of the success of the message. This confirms that the baud rate is correct.

If the **HOST** LED does not flash while commands are being sent, confirm that the AS-HV is functioning by watching for the **CPU** LED to flash. If the **CPU** LED does not start flashing within 10 to

15 seconds, press the **Reset** button to implement the reset sequence and then wait until the **CPU LED** flashes. If this is successful, try again to send commands from Chromeleon to the AS-HV. If the **HOST LED** still fails to flash, contact Dionex for assistance.



### **Syringe pump invalid operand.**

#### **Cause:**

The syringe pump has received an AS-HV firmware command it is unable to interpret.

#### **To troubleshoot:**

Stop the Chromeleon server; after 30 seconds, restart the server. If the message appears again, contact Dionex for assistance.



### **Syringe pump not initialized error.**

#### **Cause:**

The syringe pump failed to initialize.

#### **To troubleshoot:**

1. Check for tubing blockages and loose connections. Tighten and/or replace fittings and tubing as required.
2. Initialize the syringe pump (until the pump has been successfully initialized, it will not accept commands):
  - a. Turn off the power, wait 10 seconds, and turn on the power again.
  - b. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.



### **Syringe pump plunger move not allowed.**

#### **Cause:**

The syringe pump valve may have become frozen in between positions. When this occurs, the plunger movement in progress is terminated

#### **To troubleshoot:**

Contact Dionex for assistance.



### **Syringe pump plunger overload error.**

#### **Cause:**

Excessive backpressure is blocking movement of the syringe plunger.

#### **To troubleshoot:**

Initialize the syringe pump (until the pump has been successfully initialized, it will not accept commands):

- a. Turn off the power, wait 10 seconds, and turn on the power again.
- b. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.



### **Syringe pump valve overload error.**

#### **Cause:**

Blockage or excessive backpressure is causing the syringe valve drive to lose increments.

#### **To troubleshoot:**

Initialize the syringe pump (until the pump has been successfully initialized, it will not accept commands):

- a. Turn off the power, wait 10 seconds, and turn on the power again.

- b. In Chromeleon, select **SyringeReset** in the Commands dialog box and click **OK**.

**NOTE** If this error message appears repeatedly, the valve should be replaced. Contact Dionex for assistance.



**The high pressure limit must be at least 100 psi higher than the low limit.**

**Cause:**

The AXP high pressure limit is outside the allowable range.

**To troubleshoot:**

The maximum value for the AXP upper pressure limit setting is 3000 psi; the minimum value is the current lower pressure limit setting plus 100 psi. The value must be expressed as four digits; for example, for 400 psi, enter *0400*.



**The pump is not a Dionex AXP pump.**

**Cause:**

Your AXP pump was not purchased from Dionex, and therefore cannot communicate with Chromeleon.

**To troubleshoot:**

Contact Dionex if you would like to order a Dionex AXP pump.



**The sampler is busy; can't interrupt processing now.**

**Cause:**

This error occurs if you attempt to start a new batch while sample preparation is underway, or if a command is issued while a previous command is running.

**To troubleshoot:**

Allow enough time for the AS-HV to complete the actions in progress before issuing any new commands.

 **Theta-axis movement error.**

 **X-axis movement error.**

 **Z-axis movement error.**

**Cause:**

The sampling arm moved along the specified axis without being commanded to move.

**To troubleshoot:**

Follow the troubleshooting steps in [Section 4.2](#) and [Section 4.3](#).

 **Theta-axis position error.**

 **X-axis position error.**

 **Z-axis position error.**

**Cause:**

Although the axis motor was commanded to move, the sampling needle failed to reach the desired position.

**To troubleshoot:**

Follow the troubleshooting steps in [Section 4.3](#) and [Section 4.2](#).



### **There is no pressure board present.**

#### **Cause:**

The AXP pump pressure board is missing.

#### **To troubleshoot:**

Contact Dionex for assistance.

**NOTE** The pump electronics cannot be serviced by the user. All repairs of the electronics components must be performed by Dionex personnel.



### **Timed move error.**

#### **Cause:**

The time allotted for the sampling arm movement has been exceeded. This indicates a problem with the AS-HV firmware.

#### **To troubleshoot:**

Contact Dionex for assistance.



### **Too many errors—device will be disconnected.**

#### **Cause:**

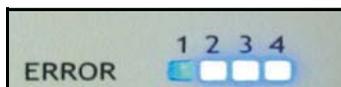
Chromeleon is unable to communicate with the AXP pump.

#### **To troubleshoot:**

Check that the serial cable between the AXP pump and the **AUX** port on the AS-HV side panel—or between the pump and the Chromeleon PC—is firmly connected and screwed into place.

## C.2 AS-HV ERROR Indicator Codes

Several types of errors result in an error code being displayed on the **ERROR** LEDs on the AS-HV side panel. For example, the error code *0100* is displayed when a RAM test error occurs. Refer to [Table C-1](#) for an explanation of each error code.



LED 1	LED 2	LED 3	LED 4	Error	Description	See
0	0	0	0	0	No error	N/A
0	0	0	1	1	Main PC board error	Contact Dionex
0	0	1	0	2	Program memory checksum error	<a href="#">page 88</a>
0	0	1	1	3	Configuration memory checksum error	<a href="#">page 88</a>
0	1	0	0	4	RAM test error	<a href="#">page 90</a>
0	1	0	1	5	Axis initialization error	<a href="#">page 90</a>
0	1	1	0	6	X-axis position error	<a href="#">page 105</a>
0	1	1	1	7	Theta-axis position error	<a href="#">page 105</a>
1	0	0	0	8	Z-axis position error	<a href="#">page 105</a>
1	0	0	1	9	Reserved	N/A
1	0	1	0	10	Reserved	N/A
1	0	1	1	11	X-axis movement error	<a href="#">page 105</a>
1	1	0	0	12	Theta-axis movement error	<a href="#">page 105</a>
1	1	0	1	13	Z-axis movement error	<a href="#">page 105</a>
1	1	1	0	14	Reserved	N/A
1	1	1	1	15	Reserved	N/A

Table C-1. AS-HV Error Indicator Codes



## D • Reordering Information

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Part Number	Item
<i>Sample Containers and Caps</i>	
064053	Nunclon sample flasks, 250 mL (pkg. of 50)
064235	Caps and septa for Nunclon sample flasks (pkg. of 50)
064236	Nalgene bottles, narrow-mouth, 250 mL (pkg. of 72)
064232	Caps and septa for narrow-mouth Nalgene bottles (pkg. of 72)
<i>Sampling Needles</i>	
064511	Sampling Needle Kit; includes 0.8-mm (0.030-in) ID PEEK sampling needle (unified)
064056	Sampling Needle Kit; includes 0.8-mm (0.030-in) ID stainless steel needle lined and sleeved with PTFE
064519	Sampling needle guide
<i>Sample Racks</i>	
064233	Sample rack, 24-position; for Nunclon sample flasks
064234	Sample rack, 15-position; for narrow-mouth Nalgene bottles
064250	Rack location mat
<i>Standards Racks</i>	
064252	Standards Rack Kit with 6-position rack
064253	Standards Rack Kit with 11-position rack
<i>Sample Loading Pumps</i>	
064506	Syringe pump
064227	Distribution valve, three-way
064224	Sample syringe, 10 mL
064507	AXP pump
064508	External peristaltic pump
064521	Internal peristaltic pump rinse line: 2.06-mm (0.08-in) ID Santoprene tubing
064825	Internal peristaltic pump sample line: 0.64-mm (0.03-in) ID Santoprene tubing

Part Number	Item
-------------	------

*Electronics*

064248	Fuse, 5 amp slow-blow
060683	RS-232 cable
064261	RS-232-to-USB cable
064350	Relay cable for external pump

*Miscellaneous*

064052	Trace analysis cover
064251	Spill tray
064520	Fixed Rinse Reservoir Kit
064486	Fixed rinse reservoir inlet line: 2.5-mm (0.10-in) ID polypropylene tubing
064485	Fixed rinse reservoir outlet line: 5-mm (0.20-in) ID polypropylene tubing

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