
***ASX-500 Model 510 Auto Sampler
Operator's Manual***

Product Warranty Statement

SD Acquisition, Inc., DBA CETAC Technologies ("CETAC"), warrants any CETAC unit manufactured or supplied by CETAC for a period beginning on the date of shipment and ending on the sooner to occur of: (a) the date that is twelve (12) months from the date of installation, or (b) the date that is thirteen (13) months from the date of shipment. Units found in the reasonable judgement of CETAC to be defective in material or workmanship will be repaired or replaced by CETAC without charge for parts and labor. CETAC reserves the right to change or improve the design of any unit without assuming any obligation to modify any unit previously manufactured.

This warranty does not cover any unit that has been subject to misuse, neglect, negligence, or accident. The warranty does not apply to any damage to the unit that is the result of improper installation or maintenance, or to any unit that has been operated or maintained in any way contrary to the instructions specified in the CETAC instruction and operation manual. Operation of the CETAC unit inside a laboratory fume hood is contra-indicated and will void the warranty. Any attempt to repair or alter any CETAC unit by anyone other than by CETAC authorized personnel or agents will void this warranty. If any non-CETAC component is installed in the CETAC manufactured unit without the approval of CETAC, the warranty will be voided. In addition, this warranty does not extend to repairs made necessary by the use of parts, accessories or fluids which are either incompatible with the unit or adversely affect its operation, performance or durability. CETAC'S obligation under this warranty is strictly and exclusively limited to repair or replacement of defective CETAC parts, and no claim of breach of warranty shall be cause for cancellation or rescission of the contract of sale of any unit.

The foregoing express warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability and fitness for a particular purpose. CETAC shall not be bound by any representations or statements on the part of its employees or agents whether oral or in writing and including any made in catalogues and other promotional material including technical details and specifications except where such representations and statements are expressly made part of this contract. CETAC assumes no responsibility for incidental, consequential or other damages, even if advised of such a possibility, including but not limited to loss or damage of property, loss of revenue, loss of use of the unit, loss of time, or inconvenience. CETAC's liability on any claim for loss or damage arising out of the sale, resale or use of any of its products shall in no event exceed the selling price of the unit.

Purchaser shall indemnify CETAC against any claim or liability which may be asserted as relates to the following: (i) the use to which any product supplied hereunder is put infringes the patent, copyright or other intellectual property rights of any third party; or (ii) any liability resulting from the failure by Purchaser to observe the terms of this Warranty.

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Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. CETAC must be notified within ninety (90) days of shipment of incorrect materials. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from CETAC. No replacements will be provided nor repairs made for products returned without such approval. Any returned product must be accompanied by a return authorization number. The expense of returning the unit to CETAC for service will be paid by the buyer. The status of any product returned later than thirty (30) days after issuance of a return authorization number will be subject to review. Shipment of repaired products will generally be made forty eight (48) hours after the receipt.

Products may not be returned which are contaminated by radioactive materials, infectious agents, or other materials constituting health hazards to CETAC employees.

Returned Product Warranty Determination

After CETAC'S examination, warranty or out of warranty status will be determined. If a warranted defect exists, the product will be repaired at no charge and shipped prepaid back to the buyer. If the buyer desires an air freight return, the product will be shipped collect. Warranty repairs do not extend the original warranty period.

If an out of warranty defect exists, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of repair and freight, or authorize the products to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number approval within fifteen (15) days of notification will result in the products being returned as is, at the buyers expense.

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REVISIONS

CETAC Technologies strives to provide the scientific community with an unparalleled combination of effective technology and continuing value. Modular upgrades for existing instruments will continue to be a prime consideration as designs progress.

CETAC Technologies reserves the right to revise this document and/or improve products described herein at any time without notice or obligation. Warranty registration entitles the named owner exclusively to manual change pages/new editions as they are published.

SAFETY

Instruments, accessories, components or other associated materials **may not** be returned to CETAC Technologies if contaminated with biohazard or radioactive materials, infectious agents, or any other materials and/or conditions that could constitute a health or injury hazard to CETAC employees. Call Customer Service and Support if there is any question or doubt relative to decontamination requirements.

CAUTION and WARNING statements, as applied in this document, shall be interpreted consistent with the following context: CAUTION applies only to potential property damage conditions; WARNING applies to potential personal injury conditions, in combination with or exclusive of potential property damage.

WARNING

The handling of organomercurial concentrates which may be used in the preparation of process standards presents a substantial (potentially lethal) safety hazard. Only an experienced, professionally trained organo-metallic chemist, knowledgeable and skilled specifically in the safe handling of organomercurials (using approved apparatus and approved protection measures in an approved facility) should attempt to prepare diluted organomercurial process standards from concentrates.

NOTE

SD Acquisition, Inc., DBA CETAC Technologies assumes no liability for the handling of organomercurial concentrates or the preparation, handling, or use of diluted organomercurial process standards. Instead, CETAC Technologies recommends use of appropriate standard reference materials to validate sample preparation (dissolution/digestion) and use of inorganic mercury standards for instrument calibration.

All user-serviceable components are specifically identified in this document as such; the balance shall be assumed to require the expertise of a factory service technician/engineer for adjustment, repair,

replacement, modification, etc. Others not so qualified and performing these actions shall do so at their own risk. Furthermore, never operate the instrument without first reading and understanding the *ASX-500 Model 510 Operator's Manual* and ensuring that it is operated safely and properly.

ORIGINAL PACKAGING

Retain original factory packaging for moves and factory return shipments. Shipping in anything other than the original fitted foam and container can result in incidental damage from which the purchaser will not be protected under warranty.

WARNING

Under all conditions the user must observe safe laboratory procedures during the operation of this product.

Notices and Compliance Declarations

***FEDERAL COMMUNICATIONS
COMMISSION (FCC) NOTICE***

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential environment is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

MODIFICATIONS

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by CETAC may void the user's authority to operate the equipment.

CABLES

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods to maintain compliance with FCC Rules and Regulations.

CANADIAN NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus." ICES-003 of the Department of Communications.

AVIS CANADIEN

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministre des Communications.

Notices and Compliance Declarations

POWER CORD SET REQUIREMENTS

The power cord set supplied with your instrument meets the requirements of the country where you purchased the instrument.

If you use the instrument in another country, you must use a power cord set that meets the requirements of that country.

WARNING

This equipment is designed for connection to a grounded (earthed) outlet. The grounding type plug is an important safety feature. To reduce the risk of electrical shock or damage to the instrument, do not disable this feature.

CAUTION

To reduce the risk of fire hazard and electrical shock, do not expose the unit to rain or humidity. To reduce the risk of electrical shock, do not open the cabinet. All maintenance is to be performed by an Authorized CETAC Service Provider.

Protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer.

CLEANING INSTRUCTIONS

To clean the exterior surfaces of the instrument, complete the following steps:

- | | |
|---|--|
| 1 Shut down and unplug the instrument. | 3 Repeat step 2, using a towel dampened with clear water. |
| 2 Wipe the instrument exterior surfaces only using a towel dampened with a lab-grade cleaning agent. | 4 Dry the instrument exterior using a dry towel. |

WARNING

Do not allow any liquid to enter the instrument cabinet, or come into contact with any electrical components. The instrument must be thoroughly dry before you reconnect power, or turn the instrument on.

COOLING FAN OBSTRUCTION

The instrument cooling fan(s) shall remain unobstructed at all times. Do not operate the instrument if the cooling fan(s) are blocked or obstructed in any manner.

ENVIRONMENTAL

Operating Temperature:	10° to 30°C
Relative Humidity	0% to 95%


Operator's Manual Addendum
Notices and Compliance Declarations

WARNING
 FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH FUSES OF THE SPECIFIED TYPE AND CURRENT RATING.

FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH FUSES OF THE SPECIFIED TYPE AND CURRENT RATING.


⚠ Avertissement

POUR UNE PROTECTION CONTINUÉE CONTRE LES RISQUES D'INCENDIE, REMPLACER UNIQUEMENT PAR DES FUSIBLES DE MÊME TYPE ET AMPÉRAGE.

	⚠ WARNING
	THIS INSTRUMENT CONTAINS ELECTRICAL CIRCUITS, DEVICES, AND COMPONENTS OPERATING AT DANGEROUS VOLTAGES. CONTACT WITH THESE CIRCUITS, DEVICES, AND COMPONENTS CAN CAUSE DEATH, SERIOUS INJURY, OR PAINFUL ELECTRICAL SHOCK. OPERATORS AND OTHER UNAUTHORIZED PERSONNEL MUST NEVER OPEN THE MAIN COVER. THE MAIN COVER OF THIS INSTRUMENT MUST ONLY BE OPENED BY TRAINED, QUALIFIED, OR APPROVED SERVICE ENGINEERS.

⚠ Avertissement

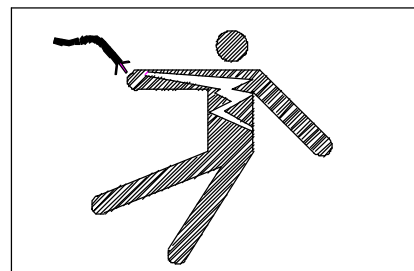
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAÎNER LA MORT OU DES BLESSURES SÉVÈRES. CE PANNEAU NE DOIT ÊTRE ENLEVÉ QUE PAR UN RÉPARATEUR QUALIFIÉ.

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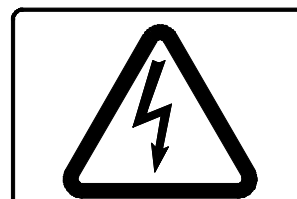


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Operator's Manual Addendum

Notices and Compliance Declarations

PANNEAU NE DOIT ÊTRE ENLEVÉ QUE
PAR UN RÉPARATEUR QUALIFIÉ.

 **WARNING**
HIGH LEAKAGE CURRENT -
ENSURE PROPER GROUNDING

 **AVERTISSEMENT**
COURANT DE FUITE ÉLEVÉ — FOURNIR
UNE MISE À LA TERRE EFFICACE.

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Preface

Preface

The *ASX-500 Model 510 Auto Sampler Operator's Manual* explains the procedures for installing, using, and maintaining the CETAC Model 510. It also provides information about troubleshooting Model 510 problems and describes the design of the Auto Sampler.

Who Should Read This Book

The primary audience for the *ASX-500 Model 510 Operator's Manual* consists of analytical chemists and lab technicians. To use this manual effectively, you should have a strong knowledge of chemistry, a basic knowledge of electronic sampling equipment, at least a beginning level of computer experience, and working knowledge of an ICP-AES or ICP-MS instrument.

How to Use This Book

The *ASX-500 Model 510 Auto Sampler Operator's Manual* contains seven chapters. You should read the chapters sequentially the first time. Thereafter, refer to the chapters separately as needed. The first chapter provides an introduction to the Auto Sampler. Subsequent chapters detail the primary tasks associated with the Model 510.

This manual contains the following chapters:

Chapter 1, "Introduction," provides you with an overview of the Model 510 Auto Sampler's function and design.

Chapter 2, "Preparing for Installation," discusses space and power requirements that must be met before the Model 510 is installed. It also provides instructions for unpacking the Auto Sampler.

Chapter 3, “Installing the Auto Sampler,” provides step-by-step procedures for installing the Model 510 and connecting it to the analytical instrument.

Chapter 4, “Verifying Installation,” explains how to test the communications interface between the Model 510 and the host computer. It also explains how to check Auto Sampler components and test the sample probe.

Chapter 5, “Using the Auto Sampler,” describes the tasks you perform during daily operation of the Model 510.

Chapter 6, “Maintaining the Auto Sampler,” explains daily, weekly, and periodic maintenance tasks.

Chapter 7, “Troubleshooting the Auto Sampler,” describes how to diagnose and correct Model 510 problems.

These chapters are followed by a glossary of related terms.

Conventions Used in This Book

This book uses certain conventions to distinguish different types of information easily. This section describes these conventions.

Instructions

All step-by-step instructions are numbered and in bold, as in the following example.

1 Replace the sample vial racks.

Many numbered instructions are followed by more detailed explanations.

Preface

Menu Items

This book uses the following format for referring to menu items:

Settings»Communication

The text before the arrow symbol is the name of the menu; the text after the arrow symbol is the menu choice. This example refers to the Communications menu choice in the Settings menu.

Terminology

This book frequently uses the following terms:

<i>Model 510</i>	The ASX-500 Model 510 Auto Sampler.
<i>Host computer</i>	The computer that controls operation of the ICP-AES or ICP-MS instrument to which the Auto Sampler is attached.
<i>Hz</i>	Hertz.
<i>ICP-AES</i>	An inductively coupled plasma atomic emission spectrometer.
<i>ICP-MS</i>	An inductively coupled plasma mass spectrometer.
<i>ID</i>	Inside diameter.
<i>LED</i>	Light-emitting diode.
<i>PEEK</i>	Polyetheretherketone.
<i>VAC</i>	Volts alternating current.
<i>VDC</i>	Volts direct current.

- X-axis** The left-to-right axis of the Auto Sampler.
- Y-axis** The front-to-back axis of the Auto Sampler.
- Z-axis** The up-and-down axis of the Auto Sampler.

Notes

Notes contain a reminder about the effect of particular actions. They are indicated as follows:

Note:

This example shows how a note is displayed.

Cautions

Cautions indicate situations that require immediate attention to prevent harm to the Auto Sampler. Cautions are indicated as follows:

CAUTION

This example shows how a caution is displayed.

Warnings

Warnings indicate situations that could cause bodily harm. Warnings are indicated as follows:

WARNING

This example shows how a warning is displayed.

Where to Go for More Information

In addition to the *ASX-500 Model 510 Auto Sampler Operator's Manual*, you can refer to the following resources:

- the software manual for the ICP-AES or ICP-MS instrument you are using
- CETAC Technologies Customer Service and Support:
 - 1 (800) 369-2822
 - 1 (402) 733-2829
 - 1 (402) 733-1932 (Fax)
 - e-mail: custserv@cetac.com

1

Introduction

Introduction

The ASX-500 Model 510 Auto Sampler is designed to be sturdy, reliable, and easy to use. It provides automated sample introduction that enables you to perform other tasks while the Auto Sampler runs. The Model 510 automatically introduces up to 360 samples when fully loaded. It contains a microprocessor that allows sequential or random sampling, providing flexibility.

The Model 510 is typically interfaced to and controlled by the ICP-AES or ICP-MS host computer using a serial or IEEE communications protocol. You can also connect the Auto Sampler to other devices, such as an Auto Dilutor, or use it with accessory equipment, such as a peristaltic pump.

Auto Sampler Standard Components

Auto sampler components are made of corrosion-resistant stainless steel alloys or anodized aluminum. The enclosure and base are made from a high-strength aluminum alloy that is chromated and finished with an epoxy powder coating.

The Model 510 operates reliably under a wide variety of conditions. Components in the sample flow path are made of polyetherimide (PEI) and polytetrafluoroethylene (PTFE). When these inert, non-metallic materials are used at temperatures less than 135°C, they can withstand repeated exposure to the following substances:

- predominantly aqueous solutions of strong acids (less than 40%)
- predominantly aqueous solutions of strong bases (less than 10%)
- common organic solvents such as acetone, alcohols, ethyl acetate, methylethylketone (MEK), petroleum oils and derived fuels, tetrachloroethylene, toluene, and xylene

CAUTION

Prolonged or repeated exposure to temperatures greater than 135°C and to the following substances can cause failure of the PEI flow path components:

- solutions of concentrated acids (greater than 40%)
 - solutions of concentrated bases (greater than 10% potassium, ammonium, or sodium hydroxides)
 - partially halogenated hydrocarbons or extremely aggressive organic solvents (chloroform, methylene dichloride, 1,1,2-trichloroethane)
-

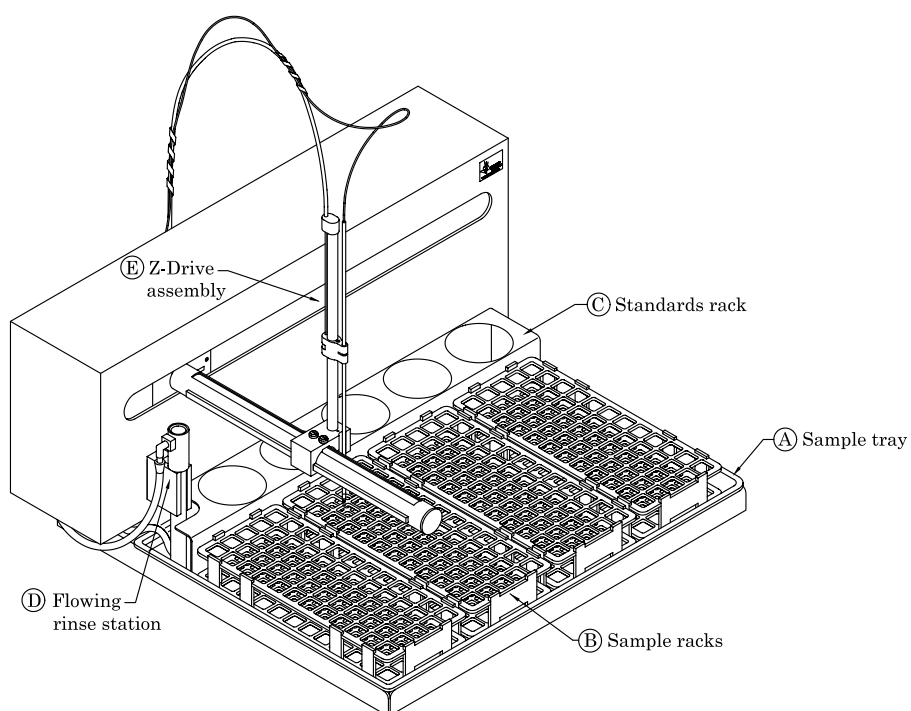


Figure 1-1. ASX-500 Model 510 Auto Sampler—Front View.

Introduction

The following standard components are located on the front of the Model 510 and are shipped with the Auto Sampler. Each lettered item corresponds with a callout in Figure 1-1.

- A *Sample tray.*** The sample tray has 10 rear standard positions and accommodates up to 4 sample vial racks. Ribs located on the bottom of the sample tray hold the sample vial racks in place.
- B *Sample vial racks.*** The Model 510 includes four sets of sample vial racks. You can choose from five different rack sizes (with either 21, 24, 40, 60 or 90 vials per rack). You can combine racks of different sizes as long as the host computer's software accepts the combination.
- C *Standards vials.*** Ten standards vials are included with the Auto Sampler. The standards vials, which fit into the standards positions at the back of the sample tray, are 50-milliliter conical centrifuge vials with caps.
- D *Flowing rinse station.*** The rinse station is located in the extreme left position at the back of the sample tray. It comes with tubing used to connect the rinse station to the rinse source and the waste container.
- E *Z-drive assembly.*** The z-drive assembly includes a y-axis slider block and guide plate as well as the sample probe. The z-drive assembly fits onto the Auto Sampler arm.

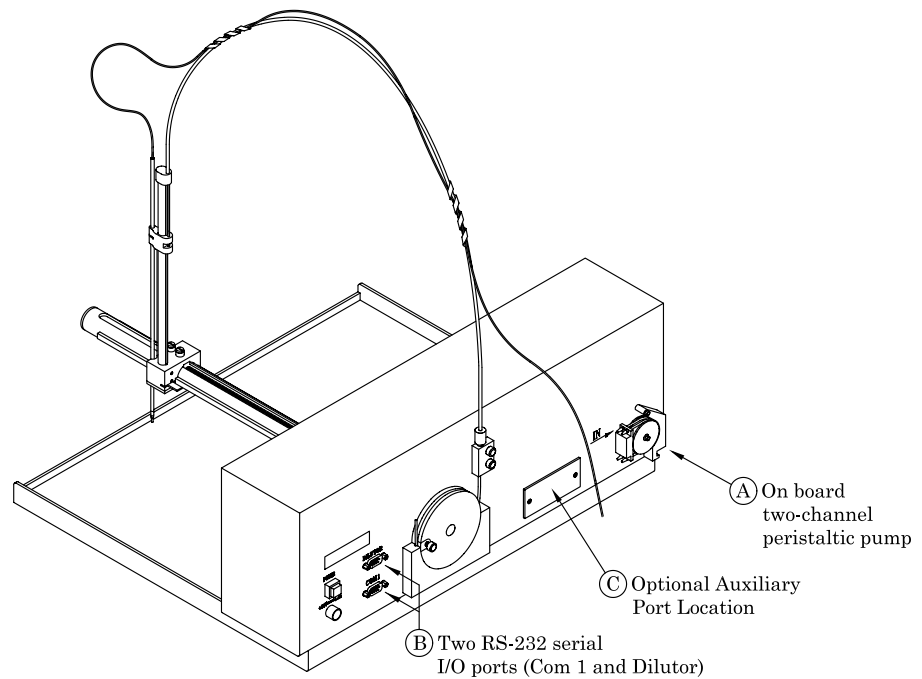


Figure 1-2. ASX-500 Model 510 Auto Sampler—Back View.

The following standard components are located on the back of the Model 510 and are shipped with the Auto Sampler. Each lettered item corresponds with a callout in Figure 1-2.

A On-board two-channel peristaltic pump. The on-board peristaltic pump is located in the lower right-hand corner on the back of the Auto Sampler. The pump moves the rinse solution from the rinse source through the flowing rinse station.

Introduction

B Two RS-232 serial I/O ports (COM1 and Dilutor). The serial ports are located on the left side at the back of the Auto Sampler. The COM1 port is the communications interface between the Model 510 and the analytical instrument's host computer. The dilutor port connects the Auto Sampler to other external devices, such as an Auto Dilutor.

C Optional 5-channel input/output (I/O) auxiliary port.

Note:

Supplied for Micromass ICP-MS instruments.

The following standard components are also shipped with the Model 510:

- **External desk-top power supply.** The input rating is AC 100V-240V, 1 A, with an output of DC 24V, minimum 1.7 A. It contains a 2 A, 250V fuse which is not user replaceable. This same power supply is used on the ADX-500 Auto Dilutor.
- **Sample probe kit.** The kit includes the sample probe with sample tubing. The sample probe fits into the z-drive assembly.
- **Serial interface kit.** The kit includes DB9F port adapters for host computers with normal AT-style DTE serial ports, and a 1.828-meter modular cable.

Optional Accessories

If you are doing a specialized type of analysis or are connecting the Model 510 to a host computer that uses a non-RS-232 communications protocol, you may need optional accessories in addition to the standard components included with the Auto Sampler. The following accessories are available for the Model 510:

- **Auto Dilutor.** The Auto Dilutor comes with an RS-232 serial interface. This option is only available when supported by the right application software.
- **IEEE-488 interface kit.** The kit includes an RS-232/IEEE-488 converter box, an IEEE-488 cable, a power cord, and instructions. It is used to convert an IEEE communications protocol to a serial protocol.
- **Serial interface null adapter.** The null adapter replaces one DB9F port adapter at the host computer. It is used for computers with DCE-AT style serial ports.
- **Serial interface special adapter kit.** The adapter kit replaces one or both standard serial port adapters with unwired DB9M, DB25M, and DB25F adapters for special applications or host computers with serial ports not conforming to the RS-232 standard.
- **Sample probes.** One 0.5-millimeter ID sample probe is included with every Auto Sampler system. Optional probe sizes available include 0.3 millimeter ID and 0.8 millimeter ID.

Available Probe Sizes

.3 mm ID	Black band
.5 mm ID	Blue band
.8 mm ID	Red band
.9 mm ID	Yellow band
1.0 mm ID	2 Blue bands

Introduction

Note:

Contact CETAC Technologies if you need additional accessories not listed, need added features to integrate the Model 510 Auto Sampler into your analytical system, or have unique requirements. Research and development of new features and accessories for the Model 510 Auto Sampler, often inspired by customer requests, is a continuing activity of CETAC Technologies.

Preparing for Installation

Preparing for Installation

Installing the ASX-500 Model 510 requires preparation. Before you install the Auto Sampler, you should evaluate the physical arrangement of the laboratory to choose a suitable location. Once you choose a location, you must carefully unpack the Auto Sampler prior to beginning the installation.

This chapter discusses what requirements must be met when you choose a location for the Auto Sampler. It also describes how to unpack the Model 510 before installation.

Choosing a Location

Choosing a location for the Model 510 involves evaluating the lab environment for the availability of space, water, and power. For the Auto Sampler to function optimally, the location you select must meet specific requirements associated with each of these items. The following sections discuss space, water, and power requirements.

Space Requirements

Most analytical applications benefit from the shortest sample flow path. Therefore, you should place the Auto Sampler close to the analytical instrument. The recommended minimum footprint for countertop installation of the Model 510 is 71 x 71 x 76 centimeters.

Water Requirements

For most applications, deionized water is used as a rinse agent in the Model 510. If a different rinse agent is routinely used, place the rinse agent source within 2 meters of the Model 510.

Ensure that there is a liquid waste receptacle within 2 meters of the Model 510. The waste receptacle inlet should be at least 30 to 60 centimeters lower than the Auto Sampler rinse station outlet.

Power Requirements

Place the Model 510 within 1.2 meters of a power outlet. The Auto Sampler's input requirements are 110–240 VAC $\pm 10\%$, 50/60 Hz, and 40 W. Voltage selection is automatic.

The Model 510 uses an external desktop power supply. The input rating is AC 110V-240V 1 A with an output of DC 24V, minimum 1.7 A. It contains a 2 A, 250V fuse which is not user replaceable.

Ensure that you position the Model 510 so that the location where the power supply cord plugs into it is easily accessible (is not blocked) and it can be quickly disconnected if needed.

The power supply socket is on the back of the Auto Sampler right below the power switch. Connect the power supply to the Auto Sampler first and then connect a line cord to the power supply. Do not apply power to the power supply until ready to operate the Auto Sampler.

Unpacking the ASX-500 Model 510 Auto Sampler

Inspect external packaging upon receipt for holes, tears, smashed corners, or any other outward signs of damage from rough handling or abuse during shipment. Inspect all items during unpacking and notify the carrier immediately of any concealed damage.

Preparing for Installation

If the Model 510 is shipped or removed from storage during cold weather, allow the packaged equipment to attain room temperature before opening and exposing to warm, humid air. It is usually sufficient to provide 4 to 8 hours for this purpose.

CAUTION

If condensation forms on or inside the Auto Sampler, allow it to dry thoroughly before connecting it to a power source and operating it. Failure to do so may cause equipment damage.

Remove the packing checklist from the shipping container, and check off items against it. Leave accessories in the packing until you are ready to install them on the Auto Sampler.

Note:

Do not throw away the factory packaging. Keep it for possible future use. This is one of the warranty conditions.

Installing the Auto Sampler

Installing the Auto Sampler

The ASX-500 Model 510 Auto Sampler is designed for easy installation. Installation consists of two parts: assembling the Auto Sampler and connecting it to the host analytical instrument.

For the most part, you can install the Model 510 without using tools. In fact, using tools such as screwdrivers or pliers to perform most installation tasks may result in a damaged or unusable instrument. You can remove thumbscrews with tools if necessary, but do not tighten them with anything other than your fingers.

To install the Auto Sampler, you must complete the following tasks. Each of these tasks will be discussed in detail later in this chapter.

- 1 Mount the z-drive assembly.***
- 2 Connect the rinse station.***
- 3 Assemble the sample vial racks.***
- 4 Establish external connections.***
- 5 Connect the Auto Sampler to the host computer.***

Ensure that AC power is off before proceeding with installation.

Mounting the Z-Drive Assembly

Mounting the z-drive assembly on the Auto Sampler is the first major task. The z-drive assembly must be attached to the Auto Sampler arm to allow movement and function of the sample probe. Figure 3-1 illustrates the z-drive assembly components.

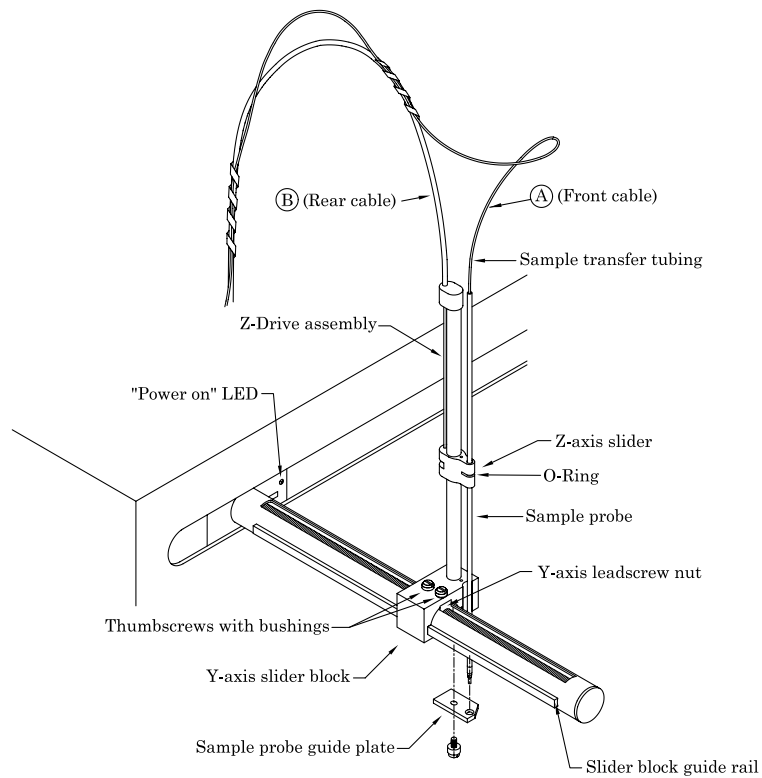


Figure 3-1. Z-drive Assembly.

Attaching the Z-drive Assembly to the Auto Sampler Arm

To attach the z-drive assembly to the Auto Sampler arm, complete the following steps, with reference to Figure 3-1.

- 1 Position the z-drive assembly at the free end of the Auto Sampler arm with the z-drive assembly pointing up.***
- 2 Match the 6-x 3-millimeter grooves in the Y-axis slider block with the guide rails on the Auto Sampler arm, and slide the block along the arm tube until the holes in the block align with the matching holes in the Y-axis lead screw nut.***
- 3 Secure the Y-axis slider block to the Y-axis lead screw nut using the 12-millimeter nylon thumbscrews installed from the top (through the bushings).***

Take care to only finger tighten the nylon thumbscrews.

Attaching the Z-drive Mounting Blocks

Attaching the z-drive mounting blocks to the Auto Sampler is a simple process. To attach the mounting blocks, complete the following steps.

- 1 Loop the 1.5-millimeter OD PEEK pull-pull cable around the bottom of the Z-axis rotor groove (Figure 3-2). See important caution message below!***

Installing the Auto Sampler

CAUTION

Ensure that the front white-colored cable (labeled "A") goes to the left side of the z-axis rotor (as viewed from the back of the Auto Sampler). The rear white-colored cable (labeled "B") goes to the right side of the z-axis rotor (as viewed from the back of the Auto Sampler). See Figures 3-1 and 3-2. Failure to connect the cables correctly will result in Auto Sampler malfunction.

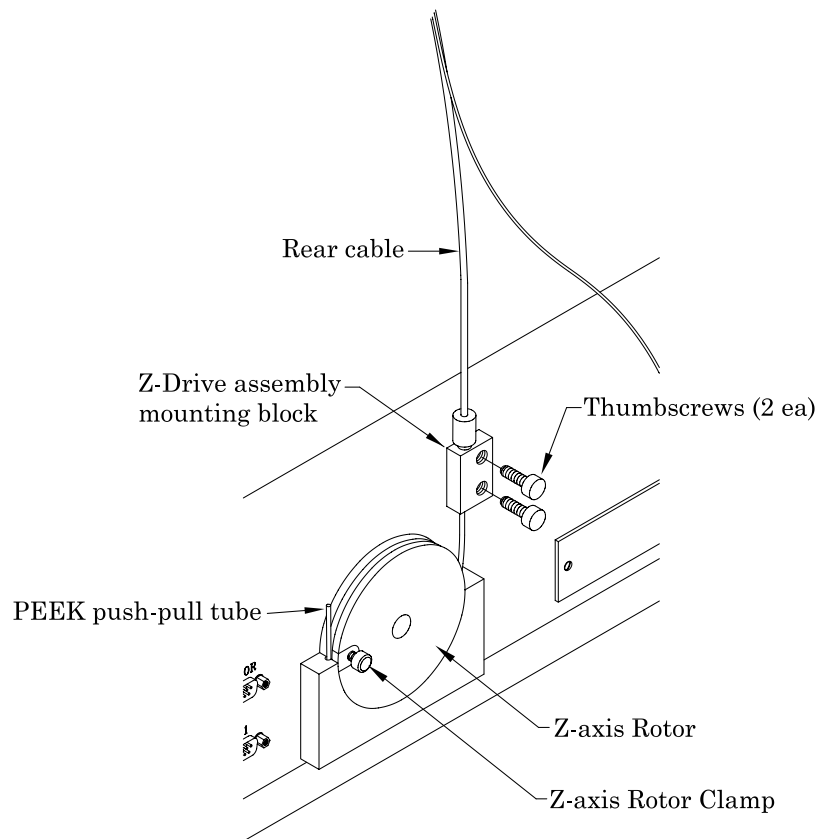


Figure 3-2. Back View of Auto Sampler Showing Z-Axis Rotor and Mounting Blocks.

Installing the Auto Sampler

2 Attach the mounting blocks to the back of the Auto Sampler cabinet with the stainless steel thumbscrews provided.

The blocks must be mounted with the holes to the far left and far right-hand sides as viewed from the back or the rotor will not function properly. Do not tighten the rotor clamp at this time.

Installing the Sample Probe

To install the sample probe, complete the following steps:

- 1 Install an O-ring in the slot on the z-axis slider (Figure 3-1).**
- 2 Install the sample probe through the slider block and push through the O-ring (Figure 3-1).**
- 3 Move the z-axis slider plus attached sample probe to the top of the z-axis drive.**
- 4 Leave approximately 105 millimeters of the sample probe's yellow-colored support tube extending above the top of the z-axis slider (with the slider at the top of the z-axis drive).**
- 5 Verify that the probe tip clears the top of the rinse station when the Auto Sampler is in the home position (Figures 1-1, 3-1) above the rinse station.**

You can manually move the Auto Sampler arm with attached z-axis drive to the rinse station without damage to the Auto Sampler.

- 6 Retain the sample transfer tubing with the spiral-wrap at tie points approximately 15 and 40 centimeters above the top of the z-axis drive, leaving an untangled service loop of approximately 13 to 15 centimeters above the probe.**

The sample transfer tubing should still have slack remaining when the probe is at the maximum downward limit.

Setting the Z-Axis Travel

To set the z-axis travel of the z-drive assembly, complete the following steps:

- 1 Adjust the z-axis slider (with attached sample probe) so that the slider is approximately 3-millimeters below the top of z-axis drive (see Figure 3-1).***
- 2 Rotate the z-axis rotor (Figure 3-2) clockwise so the rotor stop pin is against the rotor stop.***
- 3 Finger tighten the rotor clamp.***

Ensure that the PEEK pull-pull tube is fully located in the rotor clamp groove. Otherwise the PEEK tube will slip, resulting in no movement of the z-axis slider.
- 4 Manually rotate the z-axis rotor back and forth several times and check for full unhindered movement of the z-axis slider.***
- 5 With the z-axis in the full-up position, hold the z-axis slider and move the sample probe tube up and down so that 3 to 6 millimeters extends below the sample probe guide plate.***

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Installing the Auto Sampler

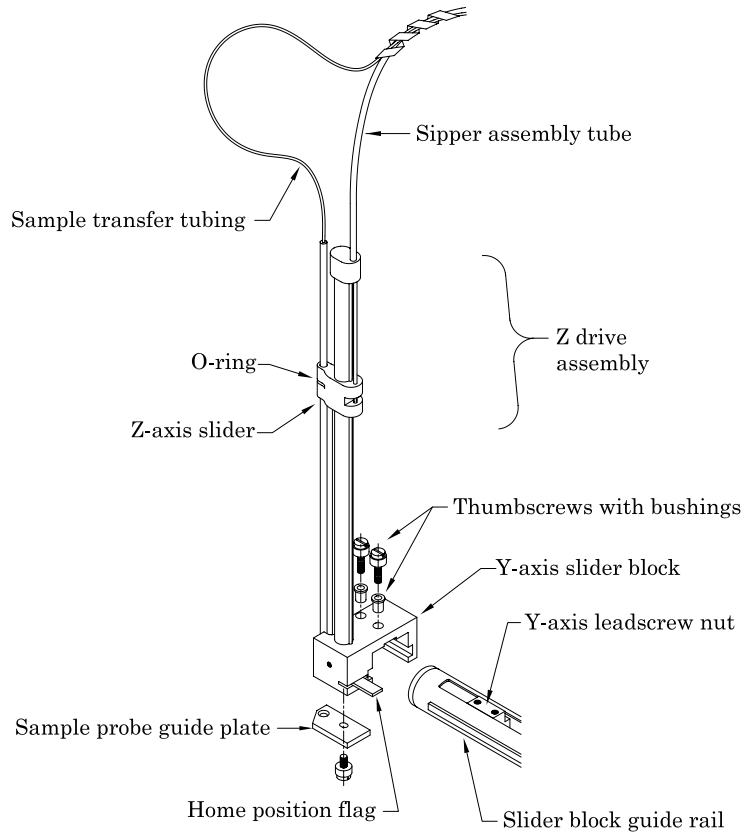


Figure 3-3. Z-Drive Assembly with Z-Axis Slider.

CAUTION

Do not maneuver the sample probe directly as damage may result.

Note:

To make fine adjustments to the sample probe X/Y targeting, loosen the nylon screw on the probe guide plate 1/8 to 1/4 turn and move the guide plate up to 0.2 millimeters from the original location. Be sure to tighten the nylon screw before operating the Model 510.

Connecting the Rinse Station

The cabinet-mounted rinse station is located at the extreme left position in the standards rack. Typically, deionized water is used as the rinse solution and is pumped into the rinse station by the on-board peristaltic pump. An acid rinse such as 2% HNO₃ solution may also be used.

Since the peristaltic pump inlet is at the top of the pump and the outlet is at the bottom, the rinse water flows from the bottom to the top of the rinse station. Up-flow rinsing is the most effective method for decontaminating the sample probe tube between samples. Reversing the connections and the rinse water flow reduces the effectiveness of the rinse station and can cause cross-contamination and unsatisfactory performance.

The waste rinse solution drains from the top of the rinse station by means of a pumped drain, which is the standard arrangement for draining the rinse station. If it is not desirable to use a pumped drain, you can create a gravity drain arrangement. This section contains instructions for both the pumped drain arrangement and the gravity drain arrangement.

Pumped Drain Arrangement

In a pumped drain arrangement, the rinse solution moves through the on-board peristaltic pump to the inlet at the bottom of the rinse station, as shown in Figure 3-4. It then drains out the top of the rinse station and into the rinse solution waste container through the second channel of the on-board peristaltic pump.

Installing the Auto Sampler

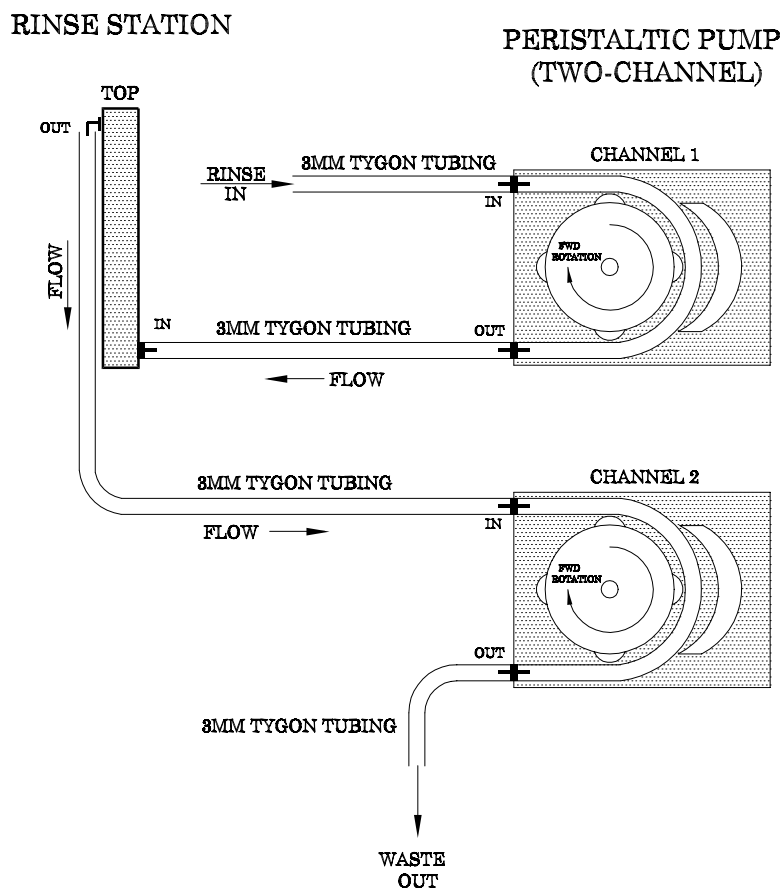


Figure 3-4. Pumped Drain Arrangement.

To connect the rinse station using the pumped drain, complete the following steps:

- 1 Connect the rinse water source to the on-board peristaltic pump by inserting the 3-millimeter i.d. Tygon¹ tubing onto the inlet at the top of the pump.**

¹ Tygon is a registered trademark of Norton Co.

Use the tubing provided for the rinse solution uptake.

2 Connect the peristaltic pump to the rinse station by completing the following steps.

Use approximately 30 centimeters of the 3-millimeter i.d. Tygon® tubing provided for the rinse solution uptake.

a Insert one end of the 3-millimeter i.d. Tygon® tubing onto the outlet at the bottom of the pump.

Insert the tubing carefully because the peristaltic pump fitting grips the tubing tightly. If you apply too much force, the fitting can break off.

b Insert the other end of the 3-millimeter i.d. Tygon® tubing onto the rinse tube inlet at the bottom of the rinse station.

Again, insert the tubing carefully to avoid breaking the fitting.

3 Connect the rinse station to the second channel of the on-board peristaltic pump by completing the following steps.

Use approximately 30 centimeters of the 3-millimeter i.d. Tygon® tubing provided.

a Insert the 3-millimeter i.d. Tygon® tubing onto the top outlet of the rinse station.

Insert the tubing carefully because the rinse station fitting grips the tubing tightly. If you apply too much force, the fitting can break off.

b Place the other end of the tubing onto the pump inlet (top of channel 2).

Again, insert the tubing carefully to avoid breaking the fitting.

4 Connect the second channel of the on-board peristaltic pump to the rinse solution waste container by completing the following steps.

Use up to 1.8 meters of the tubing provided for the pumped drain.

Installing the Auto Sampler

a Insert the 3-millimeter i.d. Tygon® tubing onto the peristaltic pump outlet.

Insert the tubing carefully because the rinse station fitting grips the tubing tightly. If you apply too much force, the fitting can break off.

b Place the other end of the tubing into the waste container.

Ensure that the tubing outlet is placed in the waste container so that it will not be immersed in the waste solution. Immersion of the drain tube outlet may cause the waste solution to back up and overflow.

Gravity Drain Arrangement

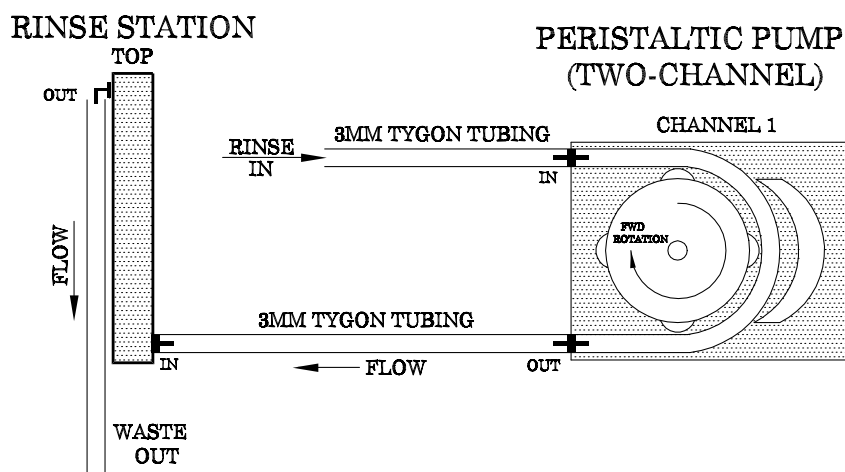


Figure 3-5. Gravity Drain Arrangement.

In a gravity drain arrangement, the rinse solution moves through the peristaltic pump to the inlet at the bottom of the rinse station, as shown in Figure 3-5. It then drains out the top of the rinse station by means of a gravity drain.

To connect the rinse station using a gravity drain, complete the following steps:

Installing the Auto Sampler

1 Connect the rinse solution source to the on-board peristaltic pump by inserting the 3-millimeter i.d. Tygon® tubing onto the inlet at the top of the pump.

Use the tubing provided for the rinse solution uptake.

2 Connect the peristaltic pump to the rinse station by completing the following steps.

Use approximately 30 centimeters of the 3-millimeter i.d. Tygon® tubing provided for the rinse solution uptake.

a Insert one end of the 3-millimeter i.d. Tygon® tubing onto the outlet at the bottom of the pump.

Insert the tubing carefully because the peristaltic pump fitting grips the tubing tightly. If you apply too much force, the fitting can break off.

b Insert the other end of the 3-millimeter i.d. Tygon® tubing onto the rinse station inlet at the bottom of the rinse station.

Again, insert the bottom tubing carefully to avoid breaking the fitting.

3 Connect the rinse station to the waste container by completing the following steps.

Use up to 1.8 meters of the 5-millimeter i.d. Tygon® tubing provided for the gravity drain. Ensure that the waste container is at least 30 to 60 centimeters lower than the rinse station outlet.

a Insert the 5-millimeter i.d. Tygon® tubing onto the rinse station outlet (on top).

Insert the tubing carefully because the rinse station fitting grips the tubing tightly. If you apply too much force, the fittings can break off.

b Place the other end of the tubing into the rinse solution waste container.

Ensure that the tubing outlet is placed in the waste container so that it will not be immersed in the waste solution. Immersion of the drain tube outlet may cause the waste solution to back up and overflow.

Assembling and Placing the Sample Vial Racks

Sample vial racks for the Model 510 Auto Sampler are shipped unassembled. However, you can easily assemble them without using tools. Once you assemble the sample vial racks, place them in the sample tray before proceeding with the installation.

WARNING

Before loading or unloading any sample vial racks on the sample tray, park the sampling arm and probe in the home position by cycling the power off and on. The home position is the initial position at power-up. Never attempt to load, unload, or reposition a sample vial rack or sample vial while the Auto Sampler is operating.

To assemble and place the sample vial racks, complete the following steps:

1 Snap the racks together as shown in the instructions included with each rack.

You can also easily disassemble the racks if you need to ship or store them.

Note:

Keep at least one copy of the assembly instructions provided for each rack. Keep the copy with this manual for reference.

2 Place the first sample vial rack at the extreme left-hand side of the sample tray so that the feet on the rack's underside engage the locating ribs on the sample tray's surface.

Correctly placed sample vial racks will not move more than ± 2 millimeters in either a left/right or forward/backward direction unless

Installing the Auto Sampler

you lift them. Tilted sample vials indicate an improperly placed rack, which must be corrected before you operate the Auto Sampler.

3 Place the next sample vial rack to the right of the previous rack so that the feet on the rack's underside engage the locating ribs on the sample tray's surface.

Ensure that the rack is not tilted and is properly placed.

4 Repeat step 3 until you place all the sample vial racks.

When viewed from the front of the Model 510, the sample vial racks should now be arranged on the sample tray as follows: rack #1 at the extreme left position, rack #2 at the left center position, rack #3 at the right center position, and rack #4 at the extreme right position.

Establishing External Connections

The next step in the installation process involves connecting the Model 510 Auto Sampler to the power source and to an analytical instrument. The following sections explain how to establish these connections.

Connecting the Auto Sampler to the Power Source

A voltage-specific external desktop power supply is supplied with each Model 510 Auto Sampler.

WARNING

Use only this external desktop power supply or an exact replacement.

To connect the Auto Sampler to a power source, plug the external desktop power supply cord into the power connector located on the back panel of the Auto Sampler. Then, plug the power supply's power cord into a 100–240-VAC $\pm 10\%$, 50/60-Hz utility power outlet.

Installing the Auto Sampler

Connecting the ASX-500 Model 510 to an Analytical Instrument

You can connect the Auto Sampler directly to a sample introduction peristaltic pump and then to any sample introduction device, such as the CETAC U-5000AT+ or U-6000AT+ Ultrasonic Nebulizer. To do so, complete the following steps:

- 1 Determine the length of the sample transfer tubing you need, and cut it to size.***
- 2 Connect the free end of the sample transfer tubing to the inlet of the analytical instrument's peristaltic pump tubing.***

Connecting the ASX-500 Model 510 Auto Sampler to the Host Computer

You cannot operate the Model 510 Auto Sampler until you establish a communications interface between the Auto Sampler and the host computer. It is through this interface that the host computer directs the operation of the Model 510 Auto Sampler. The Model 510 Auto Sampler supports the following two communications protocols:

- The serial (RS-232C) protocol is the standard configuration. There are two RS-232C serial ports on the Model 510, and a serial interface kit is shipped with the Auto Sampler.
- The parallel (IEEE-488) protocol is less common than the serial configuration. An IEEE-488 interface kit is available as an optional accessory to the Model 510. See Chapter 1, "Introduction," for more information about this kit.

Note:

Although the Model 510 supports both serial and IEEE communications protocols, the host computer governs which protocol is used. To determine which protocol is required for the analytical instrument you are using, refer to the hardware or software manual provided with the instrument. The following sections explain how to establish a communications interface using a serial protocol and using an IEEE protocol.

CAUTION

When interconnecting any computing devices, keep the communications cables away from sources of electromagnetic or radio frequency (RF) interference, such as electric motors, transformers, fluorescent light ballasts, or RF energy sources. Limit cable runs for RS-232C to less than 16 meters. If these conditions cannot be satisfied, use low-impedance, fully shielded cables to provide satisfactory operation. The cables are available from many sources, but you will need to specify the correct mating connectors and "straight-through" (DTE-DCE) wiring.

Establishing a Serial Communications Interface

The serial interface kit provided with the Model 510 Auto Sampler includes an interface cable equipped with two modular port adapters. Use the interface kit to establish a serial communications interface with the host computer. To do so, complete the following steps:

- 1 Plug one end of the cable into the host computer's serial (COM) port selected for Auto Sampler communications.***
-

Installing the Auto Sampler

Make sure that the COM port you select matches the port selected in the host computer's software.

2 Finger tighten both screws of the cable adapter.

Note:

If a host computer serial port with a DB9F, a DB25M, or a DB25F connector (9 pin D-submini receptacle or 25 pin D-submini plug or receptacle) must be used, use the mating connector from the CETAC Technologies universal port adapter kit. You can order the adapter kit from CETAC Technologies or purchase an adapter locally to convert the serial port to a DB9M. **Do not use a "null modem" adapter.**

3 Connect the other end of the cable to the Model 510 COM1 port.

CAUTION

Ensure that you are connecting the adapter to the COM1 port. Connecting the adapter to the Dilutor port on the Auto Sampler will cause a malfunction. The Auto Sampler dilutor port is used for communications to the Auto Dilutor or other devices other than the host computer.

4 Finger tighten both screws of the cable adapter.

Establishing an IEEE Communications Interface

Before you can establish an IEEE communications interface with the host computer, you must have the IEEE-488 interface kit, which includes a converter box and an IEEE-488 cable. Use the IEEE-488 kit to establish a parallel interface with the host computer. To do so, complete the following steps:

1 Connect the converter box according to the manufacturer's instructions.

Manufacturer's instructions are provided with the kit.

2 Plug one end of the cable into the serial port on the 232/488 converter box.

3 Finger tighten both screws of the cable adapter.

4 Connect the other end of the cable to the Model 510 COM1 port.

CAUTION

Ensure that you are connecting the adapter to the COM1 port. Connecting the adapter to the Dilutor port on the Auto Sampler will cause a malfunction. The Auto Sampler dilutor port is used for communications to the Auto Dilutor or other devices other than the host computer.

5 Finger tighten both screws of the cable adapter.

Verifying Installation

Verifying Installation

Verifying Installation

Once installation of the ASX-500 Model 510 Auto Sampler is complete, it is important to verify that you have installed it correctly. Attempting to use it before ensuring that it is installed correctly may result in damage to the Auto Sampler.

Verifying installation of the Auto Sampler consists of two parts:

- ensuring that the communications interface between it and the host computer is working
- ensuring that the sample probe functions properly.

This chapter explains how to test the above items before using the Auto Sampler.

Note:

The procedures given in this chapter are for use in a Windows® 95 or Windows® NT environment.

Testing the Interface

If the communications interface between the Auto Sampler and the host computer is not established correctly, the Auto Sampler will not function. Before you test the interface, ensure that the communication port connectors are properly attached between the host computer and the Auto Sampler.

Note:

The following procedures assume that you have opened Windows® 95 or Windows® NT and the Program Manager window is showing.

To test the communications interface, complete the following steps:

1 Start the host computer and go to the main Windows® screen.

2 Turn on power to the Auto Sampler.

3 Click the start button in the lower left corner of the Program Manager window.

A selection list will appear.

4 Select Programs>>>Accessories>>>Hyperterminal and double-click.

The Hyperterminal®¹ window appears (Figure 4-1).

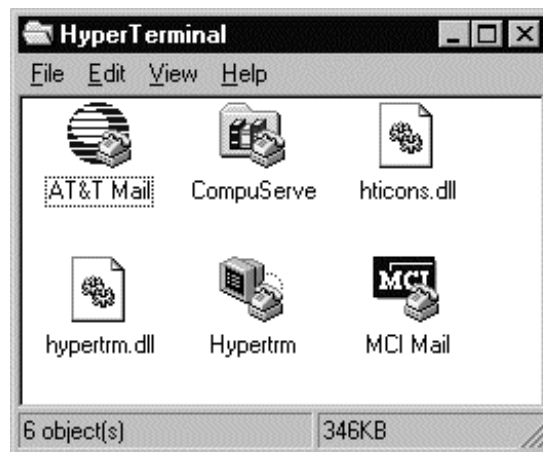


Figure 4-1. Example of Hyperterminal® Window.

¹ Hyperterminal is a registered trademark of Hilgraeve, Inc.

Verifying Installation

5 Double click on the Hyperterminal® icon.

The Connection Description box appears (Figure 4-2).



Figure 4-2. Connection Description Box.

6 Type the name COM1_test for the connection and choose an icon from the list given, and click OK.

The phone number box appears (Figure 4-3).



Figure 4-3. Phone Number Box.

7 Select Direct to COM1 in the Connect Using box. Click OK.

The COM1 Properties box appears (Figure 4-4).

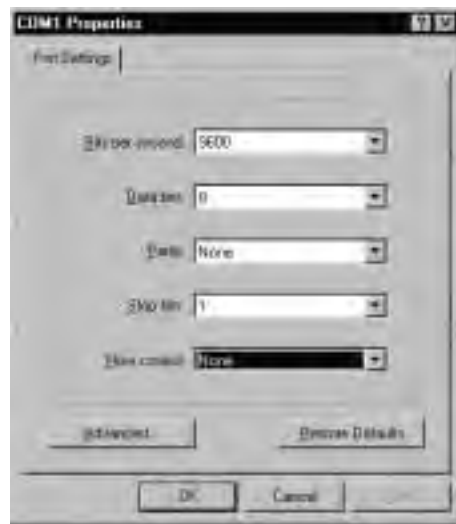


Figure 4-4. COM1 Properties Box.

Verifying Installation

8 Change the bits per second to 9600, set the data bits to 8, the parity to none, the stop bits to 1, the flow control to none, and click OK.

9 Select File>>>Properties.

The COM1_Test Properties box appears.

10 Select Settings on the COM_Test Properties box and click on the ASCII setup button on the lower right of the box.

The ASCII setup box appears (Figure 4-5).

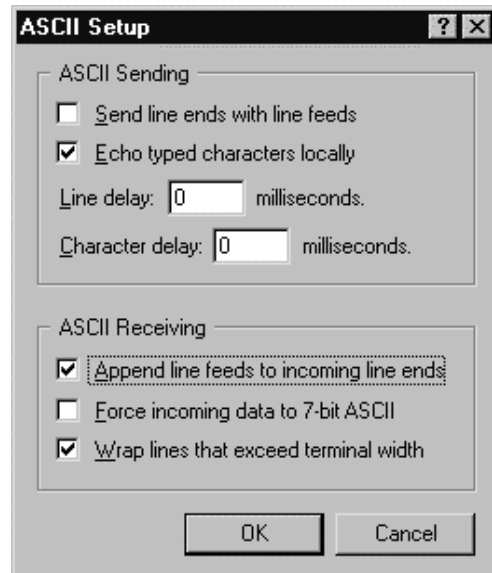


Figure 4-5. ASCII Setup Box.

11 In the ASCII Setup box, select the following items:

- a. Echo typed characters locally.
- b. Append line feeds to incoming line ends.
- c. Wrap lines that exceed terminal width.

Click OK.

12 Click OK on the COM1_Test Properties box.

13 Type HOME at the cursor in the upper left of the main Hyperterminal® screen and press Enter.

The Auto Sampler resets, with the sample probe moving out and back into the home position. If the Auto Sampler does not reset, see Chapter 7, "Troubleshooting the Auto Sampler".

Checking the Auto Sampler Components

The following Auto Sampler components may be damaged during shipping or installation: the sample probe, the peristaltic pump tubing, and the rinse station and tubing. It is important that you check these components for damage before you operate the Auto Sampler. To do so, complete the following steps:

1 Shut down and unplug the Auto Sampler.

2 Visually inspect the sample probe, peristaltic pump tubing, and rinse station and tubing for leaks or signs of damage.

If you detect a leak or other damage to an Auto Sampler component, you must replace it. For more information, see the appropriate section in Chapter 6, "Maintaining the Auto Sampler".

Testing the Sample Probe

The sample probe must descend into the center of each sample vial to ensure satisfactory sample uptake. Shipping or rough handling can disturb the Auto Sampler's cabinet-to-base alignment. If it is incorrectly aligned, the sample probe will not function properly. It is therefore important to test the sample probe before you actually run samples with the Auto Sampler.

Verifying Installation

Note:

Before testing the sample probe, ensure that you have installed all Auto Sampler components correctly. Also, ensure that you have securely tightened all thumbscrews and connected the communications cable from the host computer to the COM1 port on the Auto Sampler.

Testing the sample probe involves observing the operation of the sample probe. To do so, complete the following steps:

1 Load the Auto Sampler sample tray with empty sample vial racks.

For information about placing the sample vial racks, see Chapter 3, "Installing the Auto Sampler".

2 Turn the Auto Sampler power switch on and verify that the LED power indicator is on.

The LED power indicator is green in color. The indicator is located behind the z-drive assembly when it is in the home position.

3 Using the host computer control software, designate sample positions at the left rear, left front, right rear, and right front of the sample tray.

4 Place sample vial racks and sample vials at the designated positions.

5 Command the Auto Sampler to move the sample probe to the designated sample positions. Check that the sample probe correctly accesses each position and that the probe descends into the center of each sample vial.

Note:

If the Auto Sampler alignment is not correct, contact CETAC Technologies Customer Service and Support or an authorized representative.

Using the Auto Sampler

Using the Auto Sampler

The ASX-500 Model 510 Auto Sampler is both reliable and easy to use. Before using it, however, ensure that your lab environment provides operating conditions that will prolong the life of the Model 510 Auto Sampler. Once the proper operating conditions are met, you can arrange the sample vial racks and start the Auto Sampler sequence run. When you finish using the Auto Sampler, you may need to flush the rinse station and flow path before shutting the Auto Sampler down.

This chapter explains how to create the proper operating conditions for using the Model 510 Auto Sampler. It also explains how to arrange the sample vial racks, start and shut down the Auto Sampler, and flush the rinse station and flow path.

Establishing Optimal Operating Conditions

The Model 510 Auto Sampler operates reliably even under less than ideal conditions. It is not, however, indestructible. Malfunction or damage can occur if specific operating conditions are not met. Meeting these conditions requires that you create the proper lab environment, replace Auto Sampler components that wear out under normal use, and purchase the appropriate supplies for use with the Auto Sampler. The following sections explain how to meet these conditions.

Note:

Damage or malfunction that results from unsatisfactory operating conditions may constitute misuse and abuse and be excluded from warranty coverage.

Creating the Lab Environment

To create satisfactory operating conditions in your lab environment, follow these guidelines:

- Operate the Model 510 Auto Sampler in a conventional lab environment where the temperature is 50–95 °F (10–35 °C), the humidity is 20–70% non-condensing, and the unit is not exposed to excessive flammable or corrosive materials.
- Avoid rough handling of the Model 510 Auto Sampler. If possible, do not expose the Auto Sampler to vibration or shock.
- Protect the Auto Sampler from long-term exposure to condensation, corrosive materials, solvent vapor, continual standing liquids, or large spills into the Auto Sampler cabinet or arm. Exposures of this type can damage the drive mechanisms as well as the electronics.
- Observe the same general electrostatic discharge precautions as with any other integrated circuit electronic devices. Low humidity environments, especially when combined with static-generating materials, require maximum care.

WARNING

Discharge static buildup and ground to the Auto Sampler base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts, COM1, DILUTOR, or auxiliary ports.

- Avoid using the Model 510 Auto Sampler if strong electromagnetic interference, radio frequency interference, or radioactivity is present. Interference fields can cause erratic operation of the Auto Sampler. The Auto Sampler will not function properly if the level of radioactivity is above background.

Using the Auto Sampler

Replacing Auto Sampler Components

The following Model 510 Auto Sampler components wear out under normal use and must be replaced periodically.

- peristaltic pump tubing
- sample probe

If you fail to replace these components when they deteriorate, the Auto Sampler will not function properly. For information about replacing Auto Sampler components, see Chapter 6, "Maintaining the Auto Sampler."

Purchasing Supplies

Because the life-span of the sample and standards vials varies, you should maintain an adequate supply of spare vials. When you need to purchase additional supplies, it is extremely important that you choose the appropriate sizes and materials.

When you purchase sample and/or standards vials, make sure they meet the following requirements:

- The diameter of the sample or standards vial matches the rack size you are using. The diameter of the standards vial is 28 millimeters, plus or minus 1 millimeter.
- The height does not exceed 125 millimeters.
- Vials used for standards are conical-bottom centrifuge vials. Anything other than tapered-bottom vials will not remain properly positioned in the rear standards rack.
- The material is compatible with the samples you are analyzing or the reference standards you are using. This requirement also applies to the peristaltic pump tubing.

WARNING

Use of mismatched sample vials and sample vial racks may result in malfunctions or sample spills. Be sure your vials meet the given requirements.

To order additional supplies, refer to the *CETAC Accessories and Supplies Catalog* for the ASX-500 Model 510 Auto Sampler.

Arranging the Sample Vial Racks

You can change the arrangement of the sample vial racks to meet your needs. The Model 510 Auto Sampler accommodates up to four sample vial racks of 21, 24, 40, 60, or 90 positions each. The Auto Sampler physically accepts any and all size combinations and arrangements of sample vial racks. However, you can use racks of mixed sizes only if the host computer's software enables you to do so.

For more information about placing sample vial racks in the sample tray, see Chapter 3, "Installing the Auto Sampler."

CAUTION

Incorrectly defining the position count can result in sample spills and invalid analysis results.

Starting the Auto Sampler

Once you arrange the sample vial racks and ensure that the arrangement is correctly defined in the software, you can start the Auto Sampler and let it run until the sampling sequence is finished. To do so, complete the following steps:

Using the Auto Sampler

1 Ensure that the rinse station is properly connected.

For more information about proper connections, see Chapter 3, "Installing the Auto Sampler."

2 Turn the Model 510 Auto Sampler power switch on.

The green LED indicator along the Auto Sampler x-axis lights up when the power is on.

3 Adjust the peristaltic pump shoe until the desired rinse solution flow rate is achieved.

4 Purge air from the rinse system by placing the rinse solution uptake tubing in the rinse solution source and running the rinse solution through the rinse station.

Ensure there are no air bubbles visible in the rinse uptake tubing before you run samples with the Model 510 Auto Sampler.

Note:

If you are flushing the rinse system during initial startup, first use a 2% nitric acid solution as the rinse agent. Flush the rinse system a second time using deionized water as the rinse agent.

5 Access the host computer's software and activate the Auto Sampler program.

The Model 510 Auto Sampler runs until it reaches the end of the sampling sequence.

Shutting Down the Auto Sampler

To shut down the Auto Sampler, complete the following steps:

- 1 Drain the rinse system by removing the rinse solution uptake tubing from the rinse solution source. Let the peristaltic pump run until all solution drains from the tube attached to the rinse station outlet.***

If you use a rinse solution other than deionized water, flush the rinse system with deionized water before shutting down the Model 510 Auto Sampler. For more information, see the following section, "Flushing the Rinse Station and Flow Path."

- 2 Release the pressure shoe on the peristaltic pump.***

Releasing the pressure shoe decreases wear on the pump tubing.

- 3 Turn off the Model 510 Auto Sampler power switch.***

Flushing the Rinse Station and Flow Path

Generally, you can operate the Model 510 Auto Sampler without flushing the rinse system. Under normal circumstances, you can simply drain the rinse system prior to shutting down the Auto Sampler. However, you need to flush the rinse station and flow path under two circumstances:

- during initial startup of the Model 510 Auto Sampler after installation
- following the use of strong bases, acids, or organic solvents as rinse agents

Using the Auto Sampler

Flushing the rinse system during initial startup of the Model 510 Auto Sampler removes any contaminants that could cause interference during sample analysis. Flushing the rinse system after using strong rinse agents prevents degradation and failure of the flow path components.

To flush the rinse station and flow path, complete the following steps:

1 Insert the rinse uptake tubing into a deionized water source.

Note:

If you are flushing the rinse system during initial startup, first use a 2% nitric acid solution as the rinse agent, followed by deionized water.

2 Run the rinse solution through the rinse station and flow path for 5 to 10 minutes.

Once you flush the rinse system, you can proceed with the sampling sequence or drain the rinse system as part of the shutdown procedure. For information about running the sampling sequence, see "Starting the Auto Sampler" earlier in this chapter. For more information about draining the rinse system, see the previous section, "Shutting Down the Auto Sampler."

Maintaining the Auto Sampler

Maintaining the Auto Sampler

Routine maintenance of the ASX-500 Model 510 Auto Sampler consists of daily and weekly cleaning of specific Auto Sampler components. Routine maintenance also includes checking Model 510 components for leaks or other damage. Additional periodic maintenance tasks may be required, including replacement of the following Auto Sampler components: peristaltic pump tubing, sample probe, rinse station tubing, and sample tray.

This chapter explains how to clean the ASX-500 Model 510 Auto Sampler, inspect it for leaks, and replace damaged components.

WARNING

Discharge static buildup and ground to the Auto Sampler base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts, COM1, Dilutor, or auxiliary ports.

Cleaning the Auto Sampler

Cleaning the ASX-500 Model 510 Auto Sampler is the primary maintenance task you perform. Failure to do so regularly causes increased wear and reduces the Auto Sampler's life.

You must clean the Model 510 Auto Sampler both daily and weekly to prevent damage and extend its life. It is especially important to clean up spills and remove contaminants, such as abrasives, from the Auto Sampler's moving parts. It may also be necessary to chemically neutralize spills. The following sections explain daily and weekly cleaning procedures.

Daily External Cleaning

Use of the Model 510 Auto Sampler often results in spills on Auto Sampler components such as the sample tray. Good maintenance requires that you clean the Auto Sampler daily. To do so, complete the following steps:

1 Shut down and unplug the Auto Sampler.

For information about shutting down the Auto Sampler, see Chapter 5, "Using the Auto Sampler."

2 Wipe the sample tray, Auto Sampler cabinet, and Auto Sampler arm using a towel dampened with a lab-grade cleaning agent.

CAUTION

Do not allow the cleaning agent to come into contact with the lead screws. Also, never lubricate either of the two lead screws.

3 Repeat step 2, using a towel dampened with clear water.

This process removes any remaining contaminants.

4 Dry the sample tray, Auto Sampler cabinet, and Auto Sampler arm using a dry towel.

The Model 510 Auto Sampler must be thoroughly dry before you turn the Auto Sampler power on.

Weekly Cleaning

Although cleaning it daily removes spills and contaminants from most of the Auto Sampler components, it is necessary to clean the Model 510 Auto Sampler more thoroughly once a week. To do so, complete the following steps:

Maintaining the Auto Sampler

1 Shut down and unplug the Auto Sampler.

2 Remove the sample tray.

For information about removing the sample tray, see "Replacing the Sample Tray" later in this chapter.

3 Wipe loose particles off the Y-axis lead screw with a dry, lint-free cloth.

The Y-axis lead screw is a large metal screw located inside the Auto Sampler arm tubing, as shown in Figure 6-1.

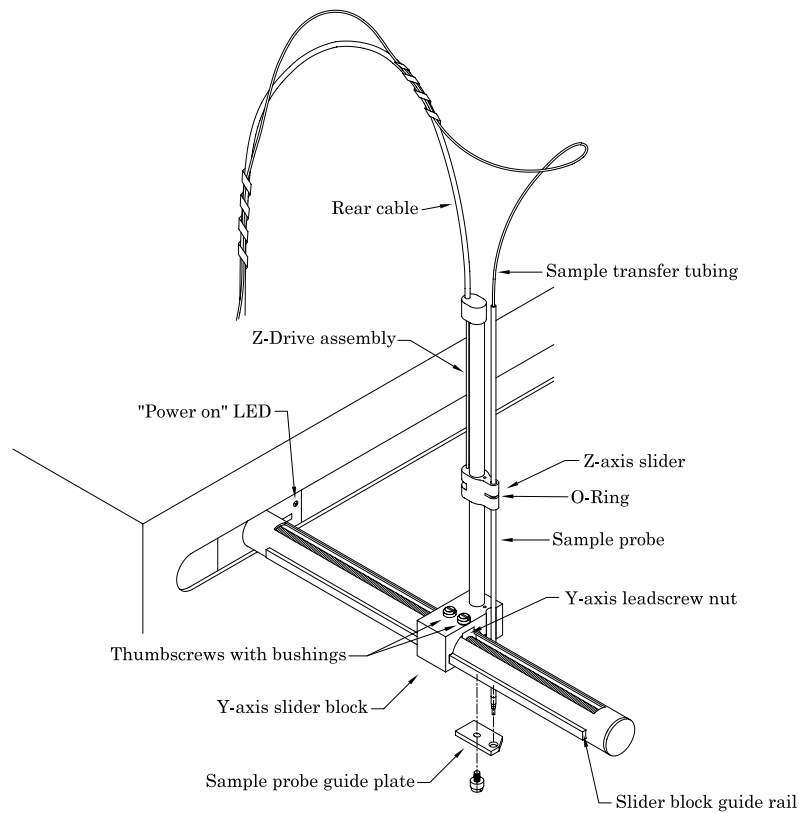


Figure 6-1. Z-Drive Assembly on Auto Sampler Arm.

WARNING

Never lubricate the lead screws. The lead screw nuts are compounded with a dry film lubricant. Oiling the lead screws will cause gumming, galling, and binding of the sample probe assembly.

4 Wipe the Auto Sampler exterior and base until they are clean, using a towel dampened with a lab-grade cleaning agent, followed by a towel dampened with clear water.

Pay special attention to the slider block and guide rails along the tube of the Auto Sampler arm.

5 Wash the sample tray in a warm detergent solution.

Make sure you remove all spills and stains.

6 Rinse the sample tray with water and then dry it.

Ensure that the sample tray is thoroughly dry.

7 Replace the sample tray on the Auto Sampler base.

For information about replacing the tray, see “Replacing the Sample Tray” later in this chapter.

Checking for Leaks

Several of the Auto Sampler components have a limited life and will wear out under normal use: the sample probe, the peristaltic pump tubing, and the rinse station and tubing. Standard maintenance procedures require that you periodically check these components for leaks. To do so, complete the following steps:

Maintaining the Auto Sampler

1 Shut down and unplug the Auto Sampler.

2 Visually inspect the sample probe, peristaltic pump tubing, and rinse station and tubing for leaks or signs of deterioration.

If you detect a leak or other damage to an Auto Sampler component, you must replace it. For more information, see the appropriate section in this chapter.

Replacing Peristaltic Pump Tubing

Routine maintenance of the Model 510 Auto Sampler includes replacement of the peristaltic pump tubing. Because of the operating nature of peristaltic pumps, the tubing will probably be the most frequently replaced item on the Auto Sampler. If you use strong bases, acids, or solvents as rinsing agents, the tubing may break down rapidly.

To replace the peristaltic pump tubing, complete the following steps:

1 Shut down and unplug the Auto Sampler.

2 Release the pressure shoe and remove the old tubing.

Carefully pull or cut the old tubing to remove it.

3 Replace the pump tubing by pushing the new tubing onto the mounting block fittings.

Replace the new tubing carefully. Damage can result if you apply too much force.

4 Reconnect the pressure shoe.

Replacing the Sample Probe

You must replace the sample probe if it is leaking or shows other signs of deterioration. To do so, complete the following steps:

1 Shut down and unplug the Auto Sampler.

2 Remove the old sample probe and tubing.

Be careful not to use excessive force when removing the sample probe. Applying too much force can result in damage to the z-drive assembly.

3 Remove the old O-ring and replace it with a new O-ring.

4 Install the new sample probe.

For information about installing the sample probe, see Chapter 3, "Installing the Auto Sampler."

5 With the z-drive in the full-up position, hold the z-axis slider and move the sample probe tube up and down so that 3 to 6 millimeters extends below the sample probe guide plate.

Replacing the Rinse Station Tubing

If the rinse station tubing is typically exposed to deionized water as a rinsing agent, you do not need to replace it often. However, if you use other rinsing agents, such as acids or solvents, the tubing is likely to deteriorate more rapidly. To replace the rinse station tubing, complete the following steps:

Maintaining the Auto Sampler

1 Shut down and unplug the Auto Sampler.

2 Move the Auto Sampler arm 20 to 30 centimeters away from the home position by gently pushing it.

Moving the Auto Sampler arm ensures that the sample probe will not be damaged while you replace the rinse station tubing.

3 Disconnect the rinse solution uptake and drain tubing.

Apply only a linear force when removing the tubing to prevent the fittings from breaking.

4 Remove the rinse station tube by completing the following steps:

a Rotate the rinse station tube counterclockwise 1/4 turn.

b Remove the rinse station tube from the mounting block by lifting the tube straight up.

5 Replace the rinse station tube by pushing the new rinse station tube into the mounting block and rotating it clockwise 1/4 turn.

6 Reconnect the rinse solution uptake and drain tubing.

Apply only a linear force when replacing the tubing to prevent the fittings from breaking.

7 Move the Auto Sampler arm back to the home position.

Replacing the Sample Tray

Cleaning the Model 510 Auto Sampler sample tray each week extends its life and makes frequent replacement unnecessary. However, if the sample tray needs to be replaced, complete the following steps:

1 Shut down and unplug the Auto Sampler.

2 Remove all sample vial racks.

3 Move the Auto Sampler arm 20 to 30 centimeters away from the home position by gently pushing it.

Moving the Auto Sampler arm ensures that the sample probe assembly will not be damaged while you replace the sample tray.

4 Raise the rinse station tube approximately 2 centimeters.

5 Raise the front edge of the damaged tray at least 2.5 centimeters and slide it forward.

If you have difficulty removing the sample tray, raise the front edge higher before sliding it forward.

6 Install the new tray.

7 Lower the rinse station tube.

Ensure the rinse station tube is positioned securely.

8 Move the Auto Sampler arm back to the home position.

9 Replace the sample vial racks.

Troubleshooting the Auto Sampler

Troubleshooting the Auto Sampler

The ASX-500 Model 510 Auto Sampler is both easy to operate and reliable. However, problems with it may occur. When the Auto Sampler does not function properly, isolate the problem to determine if it originates in the host computer, the analytical instrument, the RS-232 cable, or the Auto Sampler. If you determine the problem is in the Model 510, check the power system, the communications interface, or the sample probe assembly to find the cause of the problem and resolve it.

This chapter explains how to troubleshoot Model 510 Auto Sampler problems. If you cannot solve a problem using the steps given in this chapter, contact CETAC Technologies Customer Service and Support.

Power System Problems

A possible cause of Model 510 Auto Sampler malfunction is a problem in the power system. If the Auto Sampler is not functional, there may be no power getting to it. If this is the case, the green LED power indicator will be off. To troubleshoot this problem, complete the following steps:

- 1 Check the wall outlet and see if the external power supply is plugged in.***
- 2 Check that the power switch of the external power supply is turned on.***

Interface Problems

Operation of the Model 510 Auto Sampler is directed by the host computer. A malfunction of the Auto Sampler can indicate a problem with the RS-232 cable or with the configuration of the software on the host computer. The following sections explain how to troubleshoot these problems.

RS-232 Cable Problems

The first step in troubleshooting interface problems is to check the RS-232 cable. To do so, complete the following steps:

- 1 Check the Auto Sampler power switch to ensure it is on.***
- 2 Check the RS-232 cable to ensure it is plugged in to the COM1 port on the Auto Sampler.***
If the cable is plugged in, ensure that it is tightened properly.
- 3 Check the host computer to ensure that the RS-232 cable is connected to the appropriate COM port.***

If the cable is plugged in, ensure that it is tightened properly. For more information about connecting the RS-232 cable, see Chapter 3, "Installing the Auto Sampler."

Software Configuration Problems

If the RS-232 cable is connected properly and the Auto Sampler is still not communicating with the host computer, ensure that the host software is configured correctly. To do so, complete the following steps:

- 1 Run the host software and ensure that the instrument is functioning properly.***

Troubleshooting the Auto Sampler

2 Check the software configuration for the correct COM port selection and baud rate (9600, N, 8, 1).

If the wrong port or baud rate is selected, change the configuration. For information about changing the software configuration, see Chapter 4, "Verifying Installation."

Z-Drive Assembly Problems

A Model 510 Auto Sampler malfunction may be caused by a problem in the z-drive assembly. You can easily determine that a malfunction is related to the z-drive assembly if you hear a loud chattering noise when the Model 510 power switch is on or if the sample probe is not moving. To troubleshoot z-drive assembly problems, complete the following steps:

1 Ensure that the Y-axis slider block and z-drive assembly are installed.

If the z-drive assembly is not installed, follow the instructions provided in Chapter 3, "Installing the Auto Sampler," to install it. If the z-drive assembly is already installed, continue with step 2.

2 Check the Y-axis block home position flag for damage.

The home position flag is shown in Figure 7-1. If the flag is damaged, you must replace the entire y-axis slider block. For information about mounting the y-axis slider block on the Auto Sampler arm, see Chapter 3, "Installing the Auto Sampler."

If the home position flag is undamaged, continue with step 3.

Troubleshooting the Auto Sampler

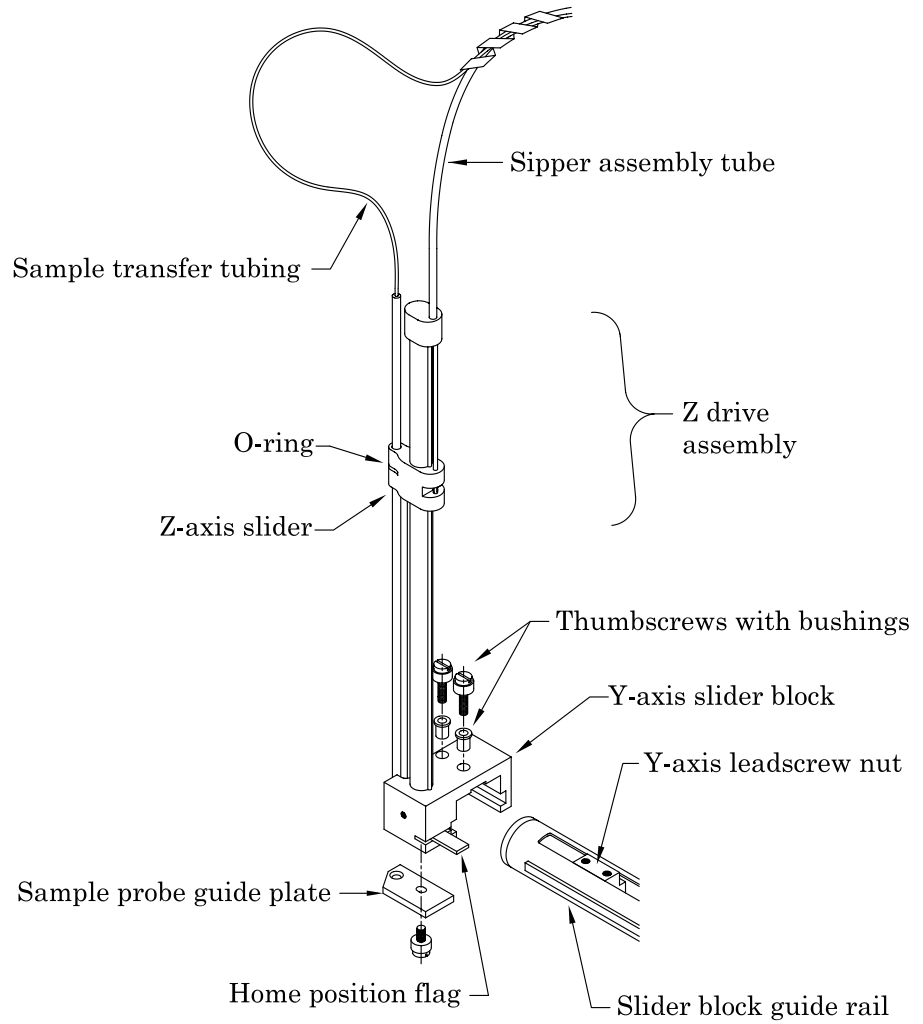


Figure 7-1. Z-Drive Assembly with Y-Axis Block Home Position Flag.

Troubleshooting the Auto Sampler

3 *Check that the sample probe is moving.*

If the sample probe is binding, free the sample probe assembly.

Note:

If you cannot free the z-drive assembly, you will need to replace it. See Chapter 3, "Installing the Auto Sampler," for information about mounting a new z-drive assembly. You can order a new z-drive assembly from CETAC Technologies.

Glossary

Glossary

This glossary defines the terms used in the *ASX-500 Model 510 Auto Sampler Operator's Manual*.

analytical instrument The instrument, typically an ICP-AES or ICP-MS, to which the Auto Sampler is connected.

Auto Sampler arm The arm that extends from the front of the MODEL 510 cabinet. It governs the left / right and forward / backward travel of the z-drive assembly.

I/O ports The connections used for establishing communication between the MODEL 510 or the ADX-100 and the host computer or other external devices.

peristaltic pump The on-board pump controlling the movement of the rinse solution to the rinse station.

rinse solution The solution, typically deionized water, used to clean the sample probe.

rinse station The Auto Sampler component used to clean the sample probe with a rinse solution.

sample probe The tube that moves the analyte from the sample vial to the sample transfer tubing.

Y-axis slider block The component that fits over the Auto Sampler arm and executes the forward/backward movement of the z-drive assembly along the Auto Sampler arm.

Z-axis rotor The component that controls the movement of the Z-axis slider.

Z-axis slider The z-drive assembly component that governs the up-and-down travel of the sample probe.