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***EXR-8 Extended Rack Autosampler  
Operator's Manual***

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## ***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.

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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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### ***Returned Product Procedures***

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.

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### ***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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### ***DISCLOSURE***

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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 *EXR-8 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.

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WARNING

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***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.

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**WARNING**

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***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.

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***CLEANING INSTRUCTIONS***

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

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

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**WARNING**

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***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.***

***ENVIRONMENTAL***

Operating Temperature:	10° to 30°C
Relative Humidity	0% to 95%
Altitude	0 to 10000 Ft

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.

	<b>⚠ WARNING</b>
	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**

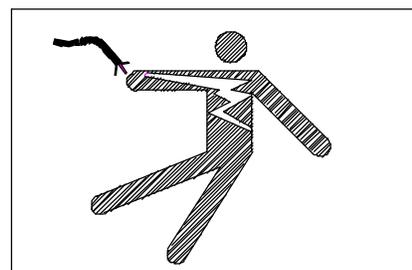
TOUT CONTACT AVEC LES HAUTES TENSIONS PEUT ENTRAÎNER LA MORT OU DES BLESSURES SÉVÈRES. CE PANNEAU NE DOIT ÊTRE ENLEVÉ QUE PAR UN RÉPARATEUR QUALIFIÉ.

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PANNEAU NE DOIT ÊTRE ENLEVÉ QUE PAR UN RÉPARATEUR QUALIFIÉ.

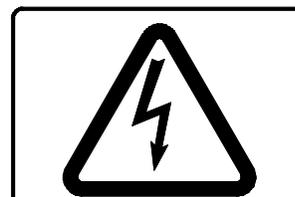


**⚠ WARNING**

CONTACT WITH DANGEROUS VOLTAGES CAN CAUSE DEATH OR INJURY. COVER TO BE REMOVED ONLY BY TRAINED SERVICE PERSONNEL.

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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.

	Pinch points on X, Y, Z axis movement. Pinch points on each side of the Autosampler head.
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	Attention – refer to the manual. This symbol indicates that information about usage of a feature is contained in the manual.
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**WARNING**  
If the auto sampler is used in a manner not specified by CETAC Technologies, the protection provided the equipment may be

**WARNING**  
The power switch on the autosampler rear panel is not the mains disconnect. Mains disconnect is accomplished by disconnecting the detachable power supply cord at the appliance coupler or at the mains plug. Ensure the power cord is easily accessible and removable, in the event of an emergency, which requires immediate disconnection.

**Notices and Compliance Declarations**

**WARNING**

The power switch on the desktop power supply is not the mains disconnect. Mains disconnect is accomplished by disconnecting the detachable power supply cord at the appliance coupler or at the mains plug. Ensure the power cord is easily accessible and removable, in the event of an emergency, which requires immediate disconnection.

**CAUTION**

The CAUTION notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

**WARNING**

This is a Safety Class 1 Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket-outlet provided with a protective earth contact. Intentional interruption is prohibited.

**Safety Maintenance**

The operator should check the detachable power supply cords condition. The equipment should not be operated if the mains inlets are cracked or broken. Any obvious damage to the case (from a drop or fall) should be checked by service personnel for loose or damaged parts. See individual parts lists for approved replacement parts.

**Safety and Regulatory Information**

Review this product and related documentation to familiarize with safety markings and instructions before you operate the instrument.

**WARNING**

The WARNING notice denotes a hazard. It calls attention to a procedure, practice, or the like, that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood

**Notices and Compliance Declarations**

**WARNING**

Ensure that all power is disconnected before removal of any covers.

**DC Voltage and Current**



24V  
3.33A

**AC Voltage and Current**

100-240V ~  
47-63Hz 1.9A

**DC Voltage and Current**



24V  
2.1A

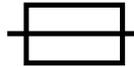
**AC Voltage and Current**

100-240V ~  
50/60Hz 1.3 A

™ of the European community



Other Fuse(s) - The equipment uses one 2A 250V AC fuse which is not operator replaceable.



**WARNING**

Equipment is not intended for wet locations. Miscellaneous liquids in the equipment could cause hazardous conditions.

**WARNING**

Pollution Degree - 1

**WARNING**

Do not operate in explosive atmosphere.

**WARNING**

All terminals have a maximum voltage of 24 Volts DC, 3.33 A current.

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## ***Preface***

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## ***Preface***

The *EXR-8 Extended Rack Autosampler Operator's Manual* explains the procedures for installing, using, and maintaining the CETAC EXR-8. It also provides information about troubleshooting EXR-8 problems and describes the design of the autosampler.

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## ***Who Should Read This Book***

The primary audience for the *EXR-8 Extended Rack Autosampler 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 the analytical instrument being used with the EXR-8.

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## ***How to Use This Book***

The *EXR-8 Extended Rack Autosampler 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 autosampler. Subsequent chapters detail the primary tasks associated with the EXR-8.

This manual contains the following chapters:

**Chapter 1, "Introduction"**, provides you with an overview of the EXR-8 autosampler's function and design.

**Chapter 2, "Preparing for Installation"**, discusses space and power requirements that must be met before the EXR-8 is installed. It also provides instructions for unpacking the autosampler.

**Chapter 3, “Installing the EXR-8”**, provides step-by-step procedures for installing the EXR-8 and connecting it to the analytical instrument.

**Chapter 4, “Verifying Installation”**, explains how to test the communications interface between the EXR-8 and the host computer. It also explains how to check autosampler components and test the sample probe.

**Chapter 5, “Using the EXR-8”**, describes the tasks you perform during daily operation of the EXR-8.

**Chapter 6, “Maintaining the EXR-8”**, explains daily, weekly, and periodic maintenance tasks.

**Chapter 7, “Troubleshooting the EXR-8”**, describes how to diagnose and correct EXR-8 problems.

These chapters are followed by a glossary of related terms.

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## ***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:

<b>EXR-8</b>	The Extended Rack Autosampler
<b>Host computer</b>	The computer that controls operation of the ICP-AES or ICP-MS instrument to which the autosampler is attached.
<b>Hz</b>	Hertz.
<b>ICP-AES</b>	An inductively coupled plasma atomic emission spectrometer.
<b>ICP-MS</b>	An inductively coupled plasma mass spectrometer.
<b>ID</b>	Inside diameter.
<b>LED</b>	Light-emitting diode.
<b>PEEK</b>	Polyetheretherketone.
<b>VAC</b>	Volts alternating current.
<b>VDC</b>	Volts direct current.

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

### **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 autosampler. 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 *EXR-8 Extended Rack Autosampler Operator's Manual*, you can refer to the following resources:

- The software manual for the analytical 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](mailto:custserv@cetac.com)

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***1***

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***Introduction***

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## ***Introduction***

The EXR-8 Extended Rack Autosampler is designed to be sturdy, reliable, and easy to use. It provides automated sample introduction that enables you to perform other tasks while the autosampler runs. The EXR-8 Extended Rack Autosampler automatically introduces up to 720 samples when fully loaded. It contains a microprocessor that allows sequential or random sampling, providing flexibility.

The EXR-8 is typically interfaced to and controlled by the analytical instrument host computer using a serial, USB or IEEE communications protocol.

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## ***EXR-8 Standard Components***

Autosampler 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 EXR-8 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:

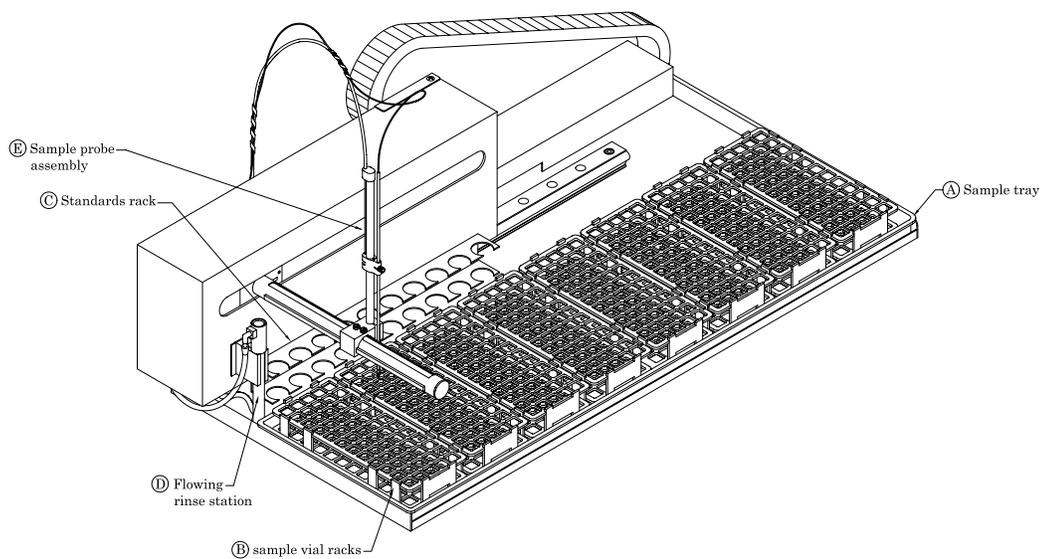
- predominantly aqueous solutions of strong acids (less than 40%)
- predominantly aqueous solutions of strong bases (less than 10%)
- common organic solvents such as acetone, alcohols, ethyl acetate, methylethylketone (MEK), petroleum oils and derived fuels, tetrachloroethylene, toluene, and xylene

---

**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)
- 

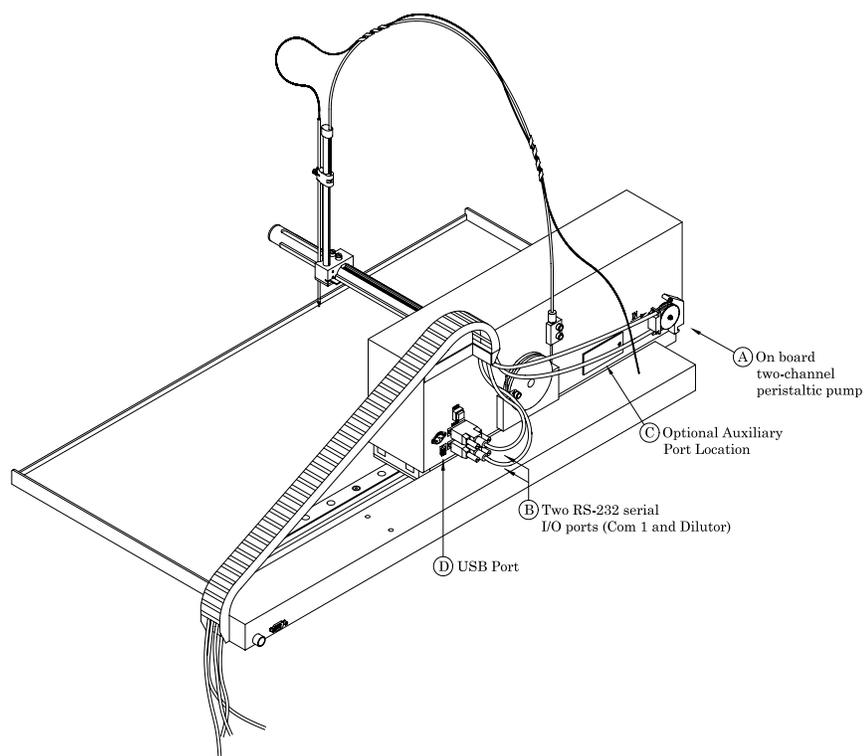


**Figure 1-1.** EXR-8—Front View.

The following standard components are located on the front of the EXR-8 and are shipped with the autosampler. Each lettered item corresponds with a callout in Figure 1-1.

**Introduction**

- A *Sample tray.*** The sample tray has 10 rear standard positions and accommodates up to 8 sample vial racks. Ribs located on the bottom of the sample tray hold the sample vial racks in place.
- B *Sample vial racks.*** EXR-8 includes eight 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 autosampler. The standards vials, which fit into the standards positions on the front of the autosampler head, are 50-milliliter conical centrifuge vials with caps.
- D *Flowing rinse station.*** The rinse station is located in the extreme left position of the autosampler head. 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 autosampler arm.



**Figure 1-2.** EXR-8—Back View.

The following standard components are located on the back of the EXR-8 and are shipped with the autosampler. 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 autosampler. 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 COM2).** The serial ports are located on the left side at the back of the autosampler. The COM1 port is the communications interface between the EXR-8 and the analytical instrument's host computer.

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

**D USB Option.** The EXR-8 comes standard with a USB port. This port can be used to interface the EXR-8 with the host computer.

The following standard components are also shipped with the EXR-8:

- **External desktop power supply.** The input rating is AC 100V-240V, 1 A, with an output of DC 24V, maximum 3.33 A.
- **Second external desktop power supply.** The input rating is AC 100V-240V, 1.3 A, with an output of DC 24V, maximum 2.1 A.
- **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.

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## Optional Accessories

If you are doing a specialized type of analysis or are connecting the EXR-8 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 autosampler. The following accessories are available for the EXR-8:

- **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.**

### 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

**Note:**

Contact CETAC Technologies if you need additional accessories not listed, need added features to integrate the EXR-8 into your analytical system, or have unique requirements. Research and development of new features and accessories for the EXR-8, often inspired by customer requests, is a continuing activity of CETAC Technologies.

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***Preparing for Installation***

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## ***Preparing for Installation***

Installing the EXR-8 requires preparation. Before you install the autosampler, you should evaluate the physical arrangement of the laboratory to choose a suitable location. Once you choose a location, you must carefully unpack the autosampler prior to beginning the installation.

This chapter discusses what requirements must be met when you choose a location for the autosampler. It also describes how to unpack the EXR-8 before installation.

---

### ***Choosing a Location***

Choosing a location for the EXR-8 involves evaluating the lab environment for the availability of space, water, and power. For the autosampler 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 autosampler close to the analytical instrument. The recommended minimum footprint for countertop installation of the EXR-8 is 145 x 110 x 75 centimeters. The normal operating position is horizontal, on a flat surface. The EXR-8 dimensions are 95 x 53 x 61 centimeters and weighs 19.5 kg.

#### ***Water Requirements***

For most applications, deionized water is used as a rinse agent in the EXR-8. If a different rinse agent is routinely used, place the rinse agent source within 2 meters of the EXR-8.

Ensure that there is a liquid waste receptacle within 2 meters of the EXR-8. The waste receptacle inlet should be at least 30 to 60 centimeters lower than the autosampler rinse station outlet.

### ***Power Requirements***

Place the EXR-8 within 1.2 meters of a power outlet. The EXR-8 requires two inputs, one for the EXR-8 base and one for the Autosampler head assembly.

The EXR-8 uses 2 external desktop power supplies. The input rating is AC 110V-240V 1A with an output of DC 24V, maximum 3.33A for the Autosampler head assembly. The input rating for the base module is AC 110V-240V 1.3 A Maximum with an output of DC 24V maximum 2.1 A.

The power supply socket for the Autosampler head assembly is on the back of the autosampler below the power switch. The power supply socket for the base unit is on the lower back right hand side of the unit.

---

**WARNING**

***The EXR-8 is intended to operate from an AC power source that will not apply more than 240V ac between the supply conductors and ground. A protective ground connection by way of the grounding connector in the power cord is required for safe operation.***

---

### ***Unpacking the EXR-8***

Inspect external packaging upon receipt for holes, tears, smashed corners, or any other outward signs of damage from rough handling or

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**Preparing for Installation**

abuse during shipment. Inspect all items during unpacking and notify the carrier immediately of any concealed damage.

If the EXR-8 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.

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**CAUTION**

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If condensation forms on or inside the autosampler, 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 autosampler.

**Note:**

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

---

***Installing the EXR-8***

---

## ***Installing the EXR-8***

The EXR-8 Extended Rack is designed for easy installation. Installation consists of three parts: Assembling the Cart (provided), assembling the Extended Rack, and connecting it to the host analytical instrument.

To install the Extended Rack, you must complete the following tasks. Each of these tasks will be discussed in detail later in this guide.

- 1 Assemble the Cart.***
- 2 Mount the head assembly (autosampler) onto the Extended Rack.***
- 3 Mount the z-drive assembly.***
- 4 Connect the autosampler to the Host Computer***
- 5 Align the Extended Rack.***

---

**CAUTION**

---

***Ensure that AC all power is off before proceeding with installation.***

---

## ***Assembling the Cart***

The Cart should be assembled using the instructions provided with the Cart. The Cart should have two holes on the top layer (Figure 3-1).



**Figure 3-1.** Cart from above.

---

### ***Mounting the head assembly (autosampler) onto the Extended Rack***

- 1 Place Extended Rack onto the Cart such that the center holes of the Extended Rack are aligned with those on the Cart.***
- 2 Place the standards rack on the rail plate (Figure 3-2).***



**Figure 3-2.** Standards rack placed onto the Extended Rack.

**Installing the EXR-8**

**3 While holding the standards rack, place the head assembly on the standards rack (Figure 3-3).**



**Figure 3-3.** Head assembly placed onto the standards rack.

**4 Remove the contents from Bag A and locate the hex wrench (Figures 3-4 and 3-5).**



**Figure 3-4.** Contents of Bag A.



**Figure 3-5.** Hex wrench.

**5 Place the washers on the screws.**

**6 Attach the left side of the head assembly to the Extended Rack as shown in Figures 3-6 and 3-7.**

**Installing the EXR-8**



**Figure 3-6.** Attaching the head assembly (first screw).



**Figure 3-7.** Attaching the head assembly (second screw).

**7 Attach the right side of the head assembly to the Extended Rack as shown in Figure 3-8.**



**Figure3-8.** Attaching the right side of the head assembly.

**8 Leave the head assembly slightly loose for alignment.**

**Installing the EXR-8**

---

***Mounting the chain assembly***

- 1** *Locate the chain assembly kit (Figure 3-9) and Bag B.*



**Figure 3-9.** Chain assembly kit.

- 2** *Attach the chain bracket to the top of the head assembly using the 10-32 screw found in Bag B (Figure 3-10).*



**Figure 3-10.** Attaching the chain assembly to the head assembly.

- 3** *Attach the other end of the chain assembly to the right side of the Extended Rack (Figure 3-11) using the three screws in Bag B.*



**Figure 3-11.** Attaching the chain assembly to the Extended Rack.

---

### ***Connecting the head assembly to the Extended Rack***

- 1 From the top of the chain assembly, locate the serial cable labeled 1 and connect to the COM 1 on the head assembly.***
- 2 From the top of the chain assembly, locate the serial cable labeled 2 and connect to the COM 2 on the head assembly.***
- 3 Plug the power cable into the head assembly.***
- 4 From the top of the chain assembly, locate the pump tubing and connect to the rinse pump on the head assembly.***
- 5 Cut pump tubes to length allowing for flexibility (Figure 3-12).***
- 6 From the end of the chain assembly, locate the serial cable labeled 2 and plug into the right side of the Extended Rack.***
- 7 Plug the power supply into the Extended Rack.***

### **Installing the EXR-8**



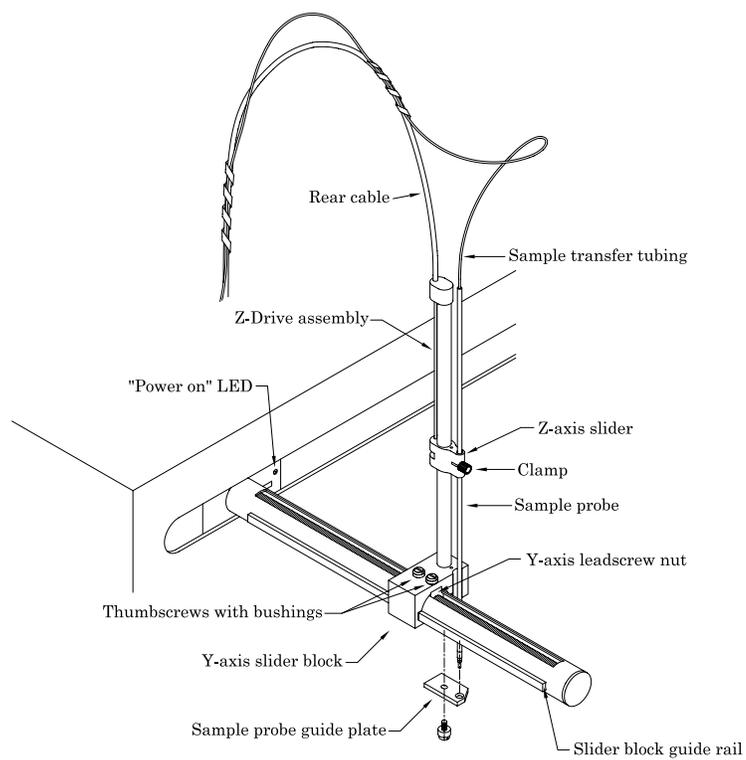
**Figure 3-12.** Connecting the pump tubing.

---

### ***Mounting the Z-Drive Assembly***

Mounting the z-drive assembly on the autosampler is the first major task. The z-drive assembly must be attached to the autosampler arm to allow movement and function of the sample probe. Figure 3-13 illustrates the z-drive assembly components.

**Installing the EXR-8**



**Figure 3-13.** Z-drive Assembly.

## Installing the EXR-8

---

### ***Attaching the Z-drive Assembly to the Autosampler Arm***

To attach the z-drive assembly to the autosampler arm, complete the following steps, with reference to Figure 3-13.

- 1 Position the z-drive assembly at the free end of the autosampler 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 autosampler 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.

---

### ***Installing the Sample Probe***

To install the sample probe, complete the following steps:

- 1 Install a clamp in the slot on the z-axis slider (Figure 3-13).***
- 2 Install the sample probe through the slider block and push through the clamp (Figure 3-13).***
- 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). Tighten the clamp. Clamp must be positioned as shown in Figure 3-13.**

**5 Verify that the probe tip clears the top of the rinse station when the Auto Sampler is in the home position (Figure 3-13) 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 (Figure 3-13).**

**2 Rotate the z-axis rotor 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.

## Installing the EXR-8

- 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.**
- 

## **Connecting the Autosampler to the Host Computer**

- 1 From the end of the chain assembly, locate the serial cable labeled 1 and connect it to COM 1 of the Host Computer.**
  - 2 Turn the EXR-8 on.**
  - 3 Turn the autosampler on.**
  - 4 Install the Test Software on the Host Computer. (Follow instructions provided with disk.)**
  - 5 Run AScript.exe.**
  - 6 Select Tools / Hardware Setup.**
  - 7 Select EXR-8 and exit the software.**
- 

## **Connecting the EXR-8 to an Analytical Instrument**

You can connect the EXR-8 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.**

---

### ***Establishing an RS-232 Serial Communications Interface***

The serial interface kit provided with the EXR-8 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 EXR-8 communications.**

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 COM1 port of the autosampler.**
- 4 Connect the COM2 port of the Autosampler to the COM port of the external rack com port.**

## Installing the EXR-8

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**CAUTION**

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Ensure that you are connecting the adapter to the COM1 port. Connecting the adapter to the other port on the EXR-8 will cause a malfunction.

- 5 Finger tighten both screws of the cable adapter.***

---

## ***Aligning the Extended Rack***

- 1 Run AScript.exe.***
- 2 Select File | Open.***
- 3 Select EXR-8 Alignment file.***
- 4 Select Tools | Define Racks.***
- 5 Select EXR-8 and then 60positions.txt.***
- 6 Place racks on tray.***
- 7 Select Cycle Indefinitely.***
- 8 Press the Start button.***
- 9 Verify that the probe hits center tube on all four corners.***
- 10 If it does not, move the head assembly until the probe hits center tube on all four corners. Once it does, tighten the screws on the head assembly.***
- 11 Press the Stop button.***
- 12 Select File | Open, and the file EXR-8 Full Alignment.***
- 13 Press the Start Button.***

***14 Verify that all the racks are aligned. If not, repeat step 10.***

***15 Press the Stop button.***

---

**4**

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***Verifying Installation***

**Verifying Installation**

---

## ***Verifying Installation***

Once installation of the EXR-8 Extended Rack Autosampler 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 autosampler.

Verifying installation of the autosampler 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 autosampler.

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

---

**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.**

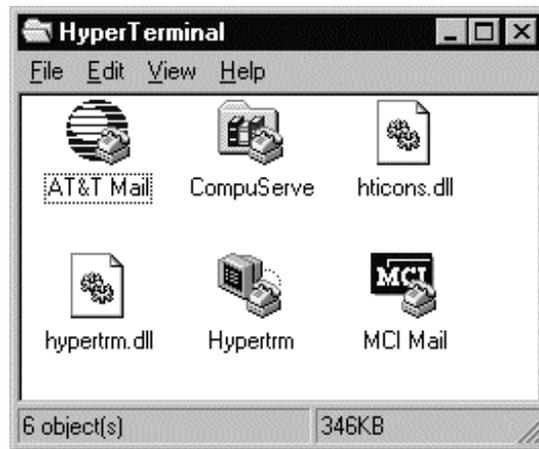
**2 Turn on power to the autosampler.**

**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®<sup>1</sup> window appears (Figure 4-1).



**Figure 4-1.** Example of Hyperterminal® Window.

<sup>1</sup> 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.**

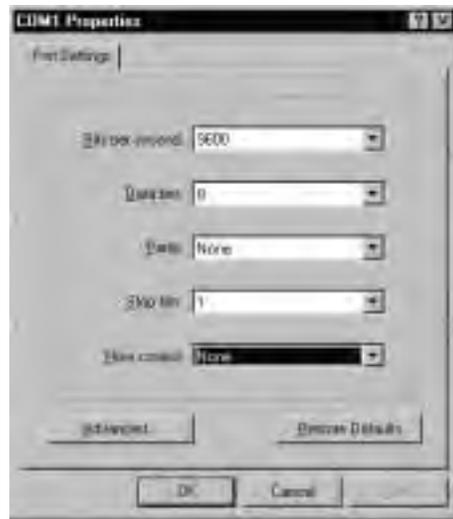
The phone number box appears (Figure 4-3).



**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

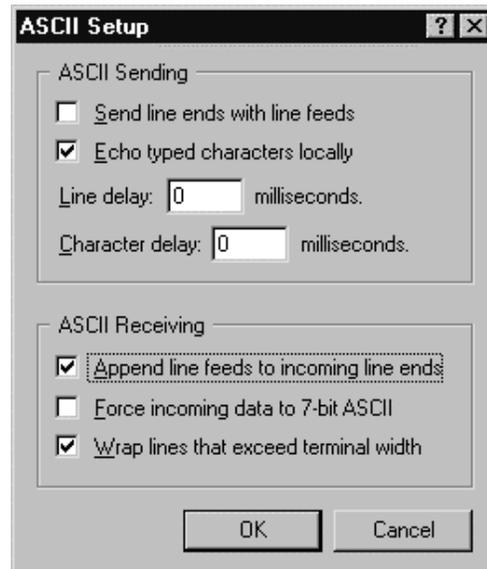
**8 Change the bits per second to 9600, set the data bits to 8, the parity to none, the stop bits to 1, the flow control to none, and click OK.**

**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 "VER<CR>" at the cursor in the upper left of the main Hyperterminal® screen and press Enter. (This is to test the cable from the computer to the Autosampler.)**

**14 Type" \VER<CR> " to test the cabling from the Autosampler to the extended rack.**

The autosampler resets, with the sample probe moving out and back into the home position. If the autosampler does not reset, see Chapter 7, "Troubleshooting the EXR-8".

---

## ***Checking the EXR-8 Components***

The following autosampler 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 autosampler. To do so, complete the following steps:

**1 Shut down and unplug the autosampler.**

**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 autosampler component, you must replace it. For more information, see the appropriate section in Chapter 6, "Maintaining the EXR-8".

---

## ***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 autosampler's cabinet-to-base alignment. If it is incorrectly aligned, the sample probe will not function properly. It is therefore

## Verifying Installation

important to test the sample probe before you actually run samples with the autosampler.

**Note:**

Before testing the sample probe, ensure that you have installed all autosampler 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 autosampler.

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

**1 Load the autosampler sample tray with empty sample vial racks.**

For information about placing the sample vial racks, see Chapter 3, "Installing the EXR-8".

**2 Turn the Extended rack power on and verify that the LED is flashing. The LED indicator is at the back right side of the extended rack.**

**3 Turn the autosampler 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.

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

**5 Place sample vial racks and sample vials at the designated positions.**

**6 Command the autosampler 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 autosampler alignment is not correct, contact CETAC Technologies Customer Service and Support or an authorized representative.

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***Using the EXR-8***

## ***Using the EXR-8***

The EXR-8 Extended Rack Autosampler 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 EXR-8 Extended Rack Autosampler. Once the proper operating conditions are met, you can arrange the sample vial racks and start the autosampler sequence run. When you finish using the autosampler, you may need to flush the rinse station and flow path before shutting the autosampler down.

This chapter explains how to create the proper operating conditions for using the EXR-8. It also explains how to arrange the sample vial racks, start and shut down the autosampler, and flush the rinse station and flow path.

---

## ***Establishing Optimal Operating Conditions***

The EXR-8 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 autosampler components that wear out under normal use, and purchase the appropriate supplies for use with the autosampler. 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 EXR-8 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 EXR-8. If possible, do not expose the autosampler to vibration or shock.
- Protect the autosampler from long-term exposure to condensation, corrosive materials, solvent vapor, continual standing liquids, or large spills into the autosampler 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.

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WARNING

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***Discharge static buildup and ground to the autosampler base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts, COM1, COM2, or auxiliary ports.***

- Avoid using the EXR-8 if strong electromagnetic interference, radio frequency interference, or radioactivity is present. Interference fields can cause erratic operation of the autosampler. The autosampler will not function properly if the level of radioactivity is above background.

## Using the EXR-8

### ***Replacing Autosampler Components***

The following EXR-8 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 autosampler will not function properly. For information about replacing autosampler components, see Chapter 6, "Maintaining EXR-8".

### ***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.

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**WARNING**

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***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 EXR-8.

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### ***Arranging the Sample Vial Racks***

You can change the arrangement of the sample vial racks to meet your needs. The EXR-8 accommodates up to eight sample vial racks of 21, 24, 40, 60, or 90 positions each. The autosampler 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 EXR-8".

---

**CAUTION**

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

---

### ***Starting the EXR-8***

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

**Using the EXR-8**

**1 Ensure that the rinse station is properly connected.**

For more information about proper connections, see Chapter 3, "Installing the EXR-8".

**2 Turn the autosampler power switch on.**

The green LED indicator along the autosampler 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 EXR-8.

**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 autosampler program.**

The autosampler runs until it reaches the end of the sampling sequence.

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## ***Shutting Down the EXR-8***

To shut down the EXR-8, 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 autosampler. 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 autosampler power switch.***
- 

## ***Flushing the Rinse Station and Flow Path***

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

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

Flushing the rinse system during initial startup of the autosampler removes any contaminants that could cause interference during sample

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**Using the EXR-8**

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 EXR-8" earlier in this chapter. For more information about draining the rinse system, see the previous section, "Shutting Down the EXR-8".

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***Maintaining the EXR-8***

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## ***Maintaining the EXR-8***

Routine maintenance of the EXR-8 consists of daily and weekly cleaning of specific autosampler components. Routine maintenance also includes checking EXR-8 components for leaks or other damage. Additional periodic maintenance tasks may be required, including replacement of the following autosampler components: peristaltic pump tubing, sample probe, rinse station tubing, and sample tray.

This chapter explains how to clean the EXR-8, inspect it for leaks, and replace damaged components.

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WARNING

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***Discharge static buildup and ground to the autosampler base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts, COM1, COM2, or auxiliary ports.***

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## ***Cleaning the EXR-8***

Cleaning the autosampler is the primary maintenance task you perform. Failure to do so regularly causes increased wear and reduces the autosampler's life.

You must clean the autosampler 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 autosampler'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 EXR-8 often results in spills on autosampler components such as the sample tray. Good maintenance requires that you clean the autosampler daily. To do so, complete the following steps:

***1 Shut down and unplug the autosampler and the Extended rack.***

For information about shutting down the Auto Sampler, see Chapter 5, "Using the EXR-8".

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

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**CAUTION**

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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, autosampler cabinet, and autosampler arm using a dry towel.***

The autosampler must be thoroughly dry before you turn the autosampler power on.

### ***Weekly Cleaning***

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

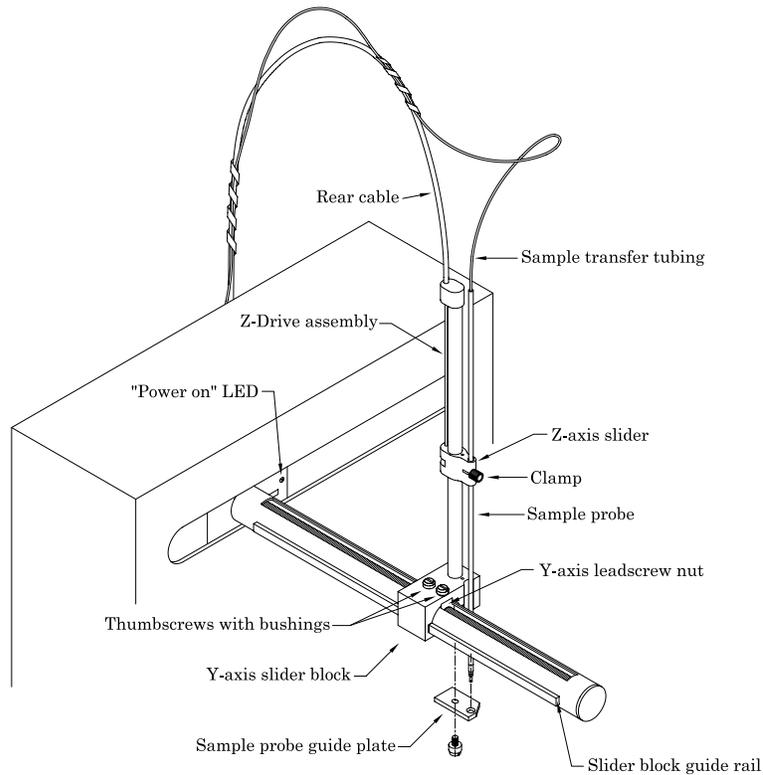
**1 Shut down and unplug the autosampler.**

**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 autosampler arm tubing, as shown in Figure 6–1.



**Figure 6–1.** Z-Drive Assembly on Autosampler Arm .

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**WARNING**

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***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 autosampler 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 autosampler 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 autosampler base.***

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

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## ***Checking for Leaks***

Several of the autosampler 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:

- 1 Shut down and unplug the autosampler.**
- 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 autosampler component, you must replace it. For more information, see the appropriate section in this chapter.

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## ***Replacing Peristaltic Pump Tubing***

Routine maintenance of the autosampler 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 autosampler. 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 autosampler.**
- 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 autosampler.***

***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 Install the new sample probe.***

For information about installing the sample probe, see Chapter 3, "Installing the EXR-8".

***4 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:

***1 Shut down and unplug the autosampler.***

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

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**Maintaining the EXR-8**

Moving the autosampler 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 autosampler arm back to the home position.**

---

## ***Replacing the Sample Tray***

Cleaning the autosampler 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 autosampler.**

**2 Remove all sample vial racks.**

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

Moving the autosampler 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 autosampler arm back to the home position.**

**9 Replace the sample vial racks.**

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***Troubleshooting the EXR-8***

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## ***Troubleshooting the EXR-8***

The EXR-8 Extended Rack Autosampler is both easy to operate and reliable. However, problems with it may occur. When the autosampler 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 autosampler. If you determine the problem is in the EXR-8, 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 EXR-8 problems. If you cannot solve a problem using the steps given in this chapter, contact CETAC Technologies Customer Service and Support.

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### ***Power System Problems***

A possible cause of an EXR-8 malfunction is a problem in the power system. If the autosampler is not functional, there may be no power getting to it. If this is the case, the green LED power indicator will be off and or the LED on the Extended rack is not flashing. To troubleshoot this problem, complete the following steps:

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

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## ***Interface Problems***

Operation of the EXR-8 is directed by the host computer. A malfunction of the autosampler 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 autosampler power switch to ensure it is on.***
- 2 Check the Extended rack to ensure it is on.***
- 3 Check the RS-232 cable from the computer to ensure it is plugged in to the COM1 port on the autosampler.***

If the cable is plugged in, ensure that it is tightened properly.

- 4 Check the RS-232 cable to ensure it is plugged in to the COM2 port of the autosampler and COM port of the extended rack.***

- 5 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 EXR-8".

### ***Software Configuration Problems***

If the RS-232 cable is connected properly and the autosampler 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.***
- 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."

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### ***Z-Drive Assembly Problems***

An autosampler 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 autosampler 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.***

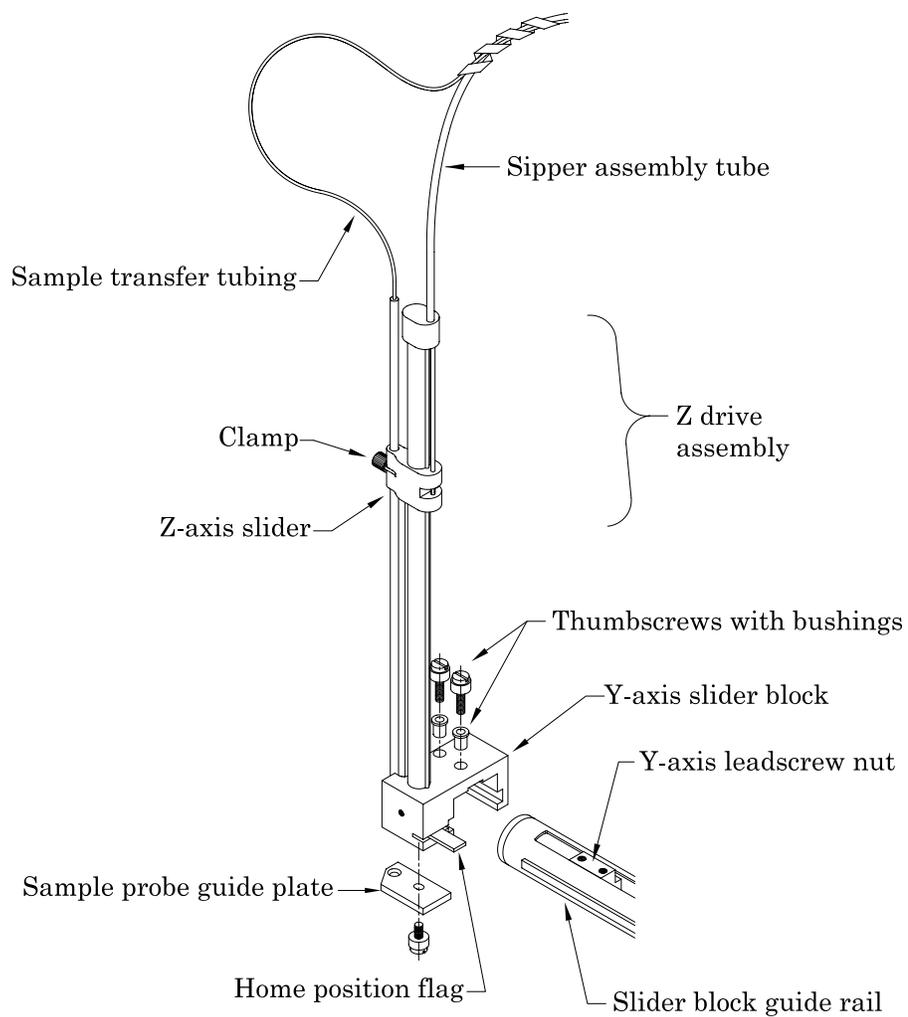
If the z-drive assembly is not installed, follow the instructions provided in Chapter 3, "Installing the EXR-8", to install it. If the z-drive assembly is already installed, continue with step 2.

- 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 autosampler arm, see Chapter 3, "Installing the EXR-8".

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



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

**Troubleshooting the EXR-8**

**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 EXR-8," for information about mounting a new z-drive assembly. You can order a new z-drive assembly from CETAC Technologies.

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## ***Glossary***

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## ***Glossary***

This glossary defines the terms used in the *EXR-8 Extended Rack Autosampler 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 EXR-8 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 EXR-8 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.