CETAC *ASXpress Plus*
Rapid Sample Introduction System
Upgrade for EXR-8 Autosamplers

Installation Guide

Manual Part Number **480176** rev1 a

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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

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.

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 *Operator's Manual* and ensuring that the instrument is operated safely and properly.

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

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Contents

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1 Introduction

Overview

This guide explains how to set up a CETAC EXR-8 Extended Rack Autosampler for use with the *ASXPRESS PLUS* Rapid Sample Introduction System.

Most instructions focus on the ASX-520 version of the EXR-8; minor changes to the procedure may be required for the ASX-510 and ASX-520HS versions.

This guide is for use by qualified chemists or laboratory technicians who are familiar with electrical and chemical safety precautions. **See the *ASXPRESS PLUS Operator's Manual* for notices and safety information.**

To install the system, you will need to

1. Remove the cover from the autosampler.
2. Upgrade the autosampler firmware, if necessary (see page 6).
3. Set the autosampler pump speed jumper to its fastest setting (see page 7).
4. Reassemble the autosampler cover.
5. Install the new cable bracket on the autosampler, if necessary. (See the *Installation Guide* which is provided with the bracket.)
6. Install the new rinse station and connect the rinse tubing (see page 17).
7. Connect the autosampler to the ASXpress Plus system and to the analytical instrument (see page 23).

> **NOTE**
>
> Some of these steps may already have been performed by CETAC or your dealer.

Firmware Requirements

Supported Firmware Versions

The *ASXPRESS PLUS* Rapid Sample Introduction System is compatible with the following firmware versions:

- ASX-520/ASX-520HS: firmware version 1.06 or later.
- ASX-510: firmware version 1.7 or later.

Where to Get the Firmware

The software needed to upgrade the firmware on the autosampler and the firmware upgrade file can be downloaded from the CETAC web site. To download the software and the firmware, go to http://www.cetac.com/downloads/download.html and select Autosampler Firmware Update. You will be presented with a form that asks for basic contact information. Upon completion, you will be e-mailed a web site address, a login ID and a password that will allow you to download any new firmware upgrade that may be available for your autosampler along with the necessary software to perform the upgrade.

See the next chapter for information on obtaining and upgrading the firmware. You can upgrade the firmware by setting some switches and using a firmware update utility, or by replacing the processor module ("Rabbit module") in the autosampler. Contact CETAC to determine which method is most appropriate for your autosampler. Instructions for updating the firmware are included with the firmware update utility.

2 Setting the Pump Speed Jumper

To change the pump speed, you will need to disassemble the autosampler so that you can move a jumper on the circuit board.

What happens if the jumper is not set to the highest speed? With the recommended tubing configuration, the built-in peristaltic pump is used to evacuate the rinse station, while an external pump fills the station. If the built-in pump is not running at the fastest speed, the rinse station will overflow.

WARNING

ELECTRICAL AND MECHANICAL HAZARDS
Make sure the unit is off and unplugged before beginning this procedure.

Opening the Autosampler to Access the Jumpers

NOTE

Your equipment may differ in appearance from what is shown in the photos. The photos show components which are intended to represent typical CETAC instruments from a range of eras. Most of the photos depict a standard ASX-520; note that for the EXR-8, the standards rack is attached to autosampler and not integrated with the tray.

Accessing the Interior of the Autosampler

1. Place the autosampler on a flat surface and ensure that the unit is powered off.
2. Remove the two Kynar thumbscrews from the Y-axis home block.

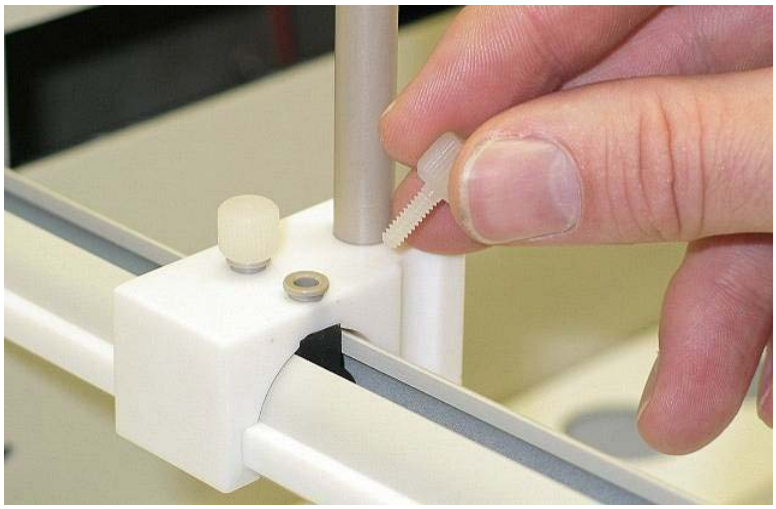

Figure 2-1 View of Y-axis home block with Kynar thumbscrews.

3 Remove the entire Z-drive assembly from the Y-arm by pulling the Z-drive assembly forward and off of the autosampler arm as shown (Figure 2-2).

Figure 2-2 Z-drive removed from arm assembly. (*Photo shows standard ASX-520 tray with integral standards rack.*)

4 Once the Z-drive assembly is removed, remove the rinse station (Figure 2-3). Turn the rinse station ¼ turn counter-clockwise while pulling it upward. Also, the tubing located at the bottom of rinse station will have to be disconnected from the pump at the rear of the autosampler.

Figure 2-3 View of rinse station

5 Remove the standards rack. Remove the three screws and pull it forward.

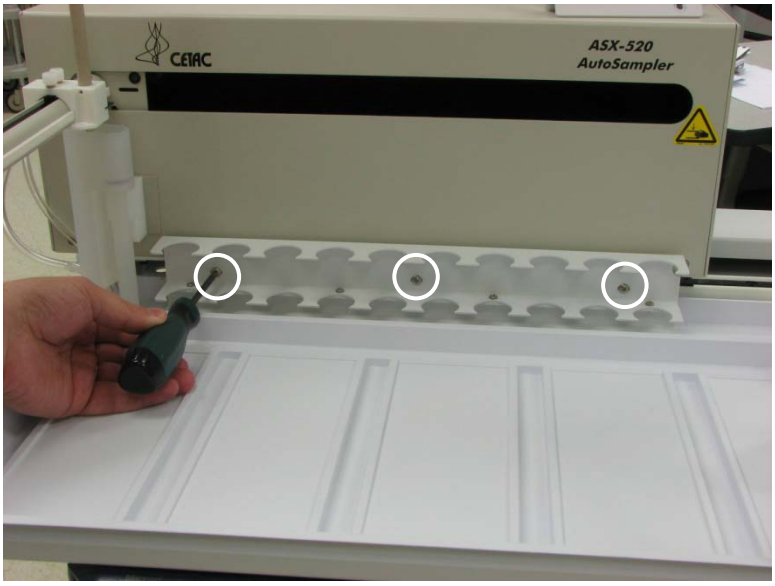

Figure 2-4 Removing the standards rack.

6 The autosampler tray should then be removed. Lift up the tray and pull out (Figure 2-5).

Figure 2-5 Removing the tray (*ASX-520*)

7 Next, the front cover is to be removed. Remove the four corner screws (Figure 2-6).

Figure 2-6 Front view of *ASX-520* autosampler showing front cover screws

8 The front cover is removed by lifting it slightly and pulling forward (Figure 2-7).

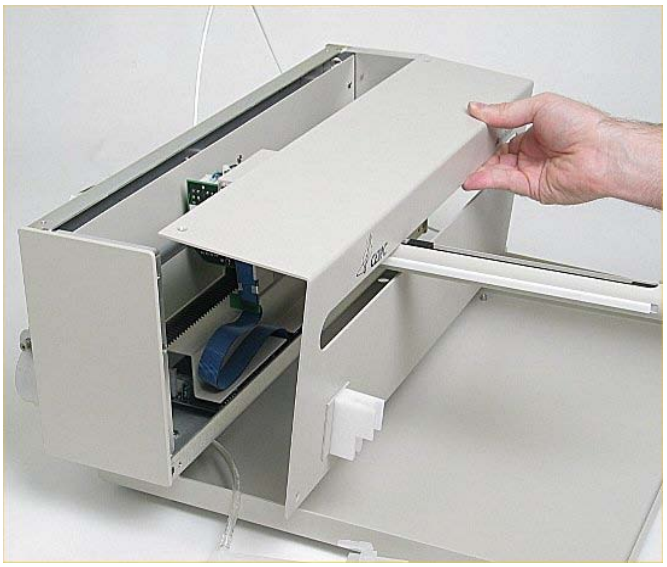

Figure 2-7 *ASX-520* autosampler with the front cover being removed

9 The screws that hold the inner shield must be removed. Move the Y-axis assembly all the way to the left (Figure 2-8 shows screw locations). Your autosampler may have a newer style shield with splashguard. These are removed in a similar manner.

Figure 2-8 View of inner shield inside the *ASX-520* autosampler

10 The inner shield can be removed by moving the arm to the right or left then lifting it up while pulling forward.(Figure 2-9).

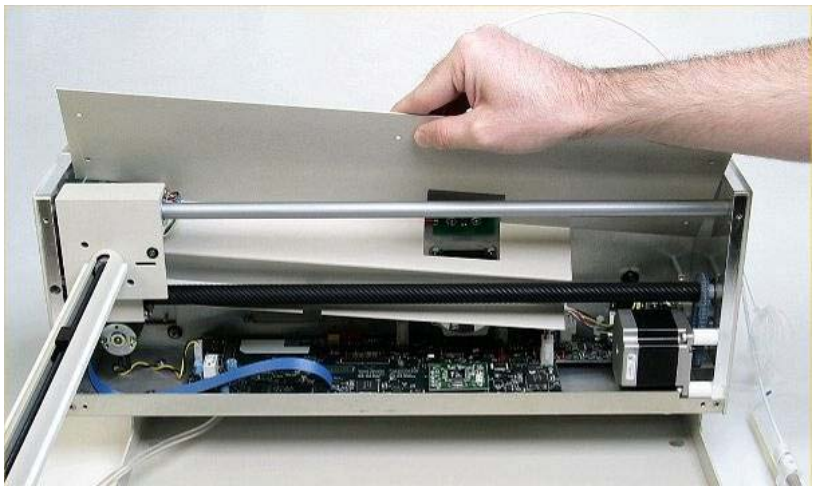

Figure 2-9 Removal of inner shield (*ASX-520*)

11 If you have a newer shield/splash guard combination proceed as follows. Locate and remove the 5 screws holding the shield in place.

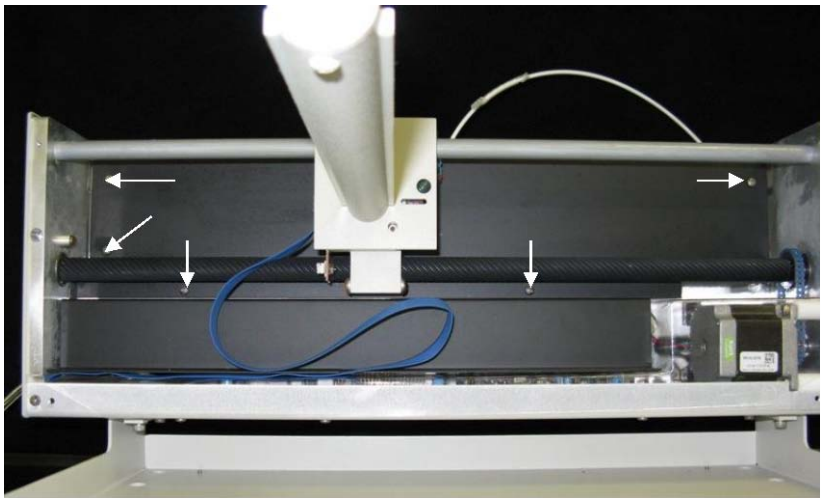

Figure 2-10 View of new shield and splashguard inside the ASX-520.

12 Remove the two shield pieces. Notice that the splashguard goes under the chassis on the top and over the chassis on the bottom. When you replace the splashguard, ensure it is oriented in this manner.

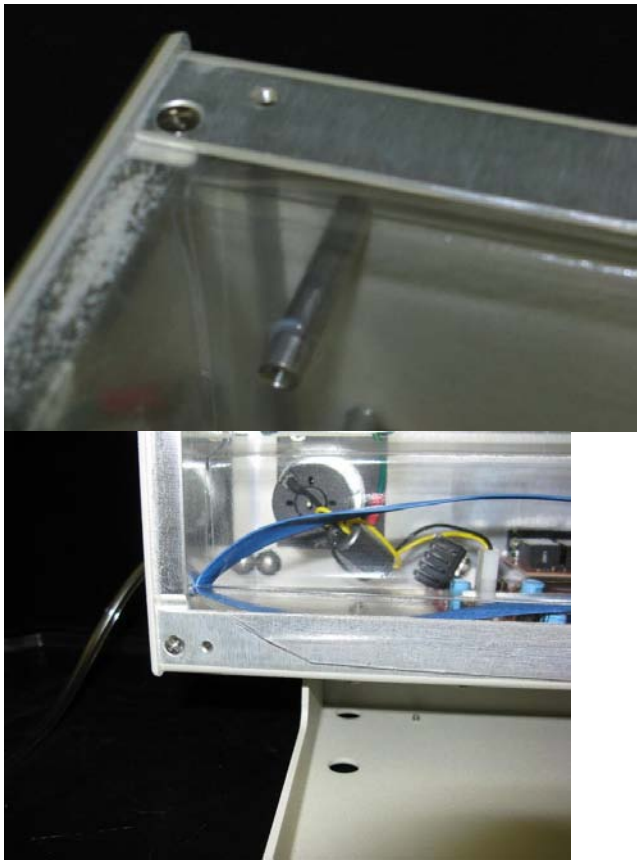

Figure 2-11 View of splashguard placement.

13 Remove the splashguard by pulling it out from one side. It may be necessary to reach under the guard and remove it from the support standoffs.

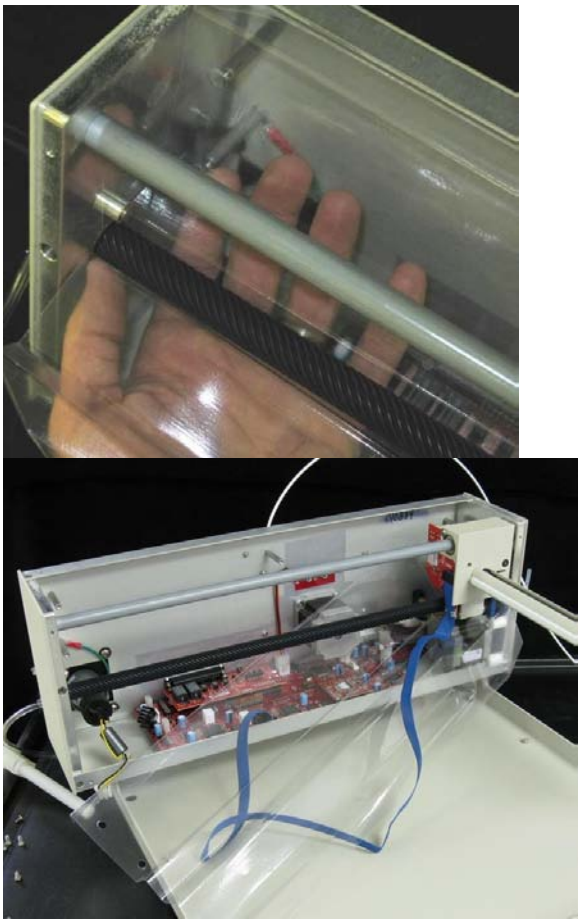

Figure 2-12 View of splashguard removal.

Setting the Pump Speed Jumper (*ASX-520/ASX-520HS/EXR-8*)

1. Locate the block of pump speed pins on the left side of the main circuit board
2. Move the jumper from its existing position to the position marked "Max RPM" (Figure 2-13).

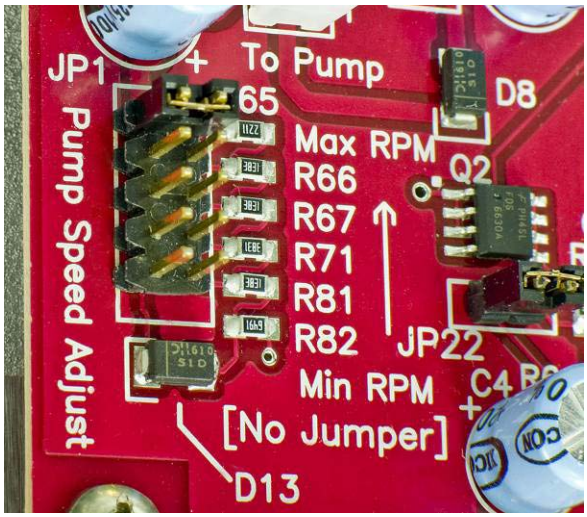

Figure 2-13 Jumper position utilized to increase pump speed (*ASX-520*)

> **Note:**
>
> ASX-520/ASX520HS main boards of differing eras/versions may have varying orientation of jumper positions. Follow the label on the circuit board for proper jumper positioning.

Closing Up the Autosampler

Once the firmware has been upgraded and the pump speed has been set, you can close up the autosampler.

- **Reinstall all shields**
- **Reinstall the front cover**
- **Reinstall the standards rack**

  Try to align the standards rack to its original position. Use the marks left on the rack by the screws as a guide.
- **Reinstall the Z-drive assembly**

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3 Installing the Rinse Plumbing

To work properly with the *ASXpress Plus* Rapid Sample Introduction System, the autosampler will require:

- Xpress rinse station
- External pump (required to achieve adequate sample and rinse flow rate) and associated plumbing
- 1.0mm ID sample probe

WARNING

INJURY HAZARD
Ensure that AC power to the autosampler is off before proceeding with installation. If power to the autosampler is not turned off, the autosampler could begin moving while you are working on it.

CAUTION

The plumbing connections should be made without using tools. In fact, using tools such as screwdrivers or pliers to perform installation tasks may result in a damaged or unusable instrument. Do not tighten fittings with anything other than your fingers.

Install the Xpress Rinse Station and Rinse Tubing

An Xpress rinse station (Figure 3-1) and associated modified tubing arrangement is required to accommodate the design requirements of the *ASXpress Plus* system. Please note the following considerations:

- If you have purchased a full system, it will already be configured properly and this step will not be necessary.
- If you are connecting the ASXpress Plus system to an autosampler with a standard rinse station installed, then you will need to replace it with the

Xpress rinse station (supplied with the upgrade kit), and make the tubing modifications as described in this section.

The Xpress rinse station is smaller than the one provided with the autosampler. This smaller rinse station allows the rinse solution to flow efficiently at the high flow rate used by the *ASXPRESS PLUS* system.

Figure 3-1 Xpress Rinse Station for ASX-500/510 Autosamplers

Removing the Existing Rinse Station

1. Verify that the autosampler is turned off and unplugged, and that no hazardous materials are present in the rinse station or tubing.
2. Turn the rinse station ¼ turn counter-clockwise while pulling up.
3. Note how the rinse tubing is threaded underneath the autosampler.
4. Remove the tubing connecting the rinse station to the peristaltic pump.
5. Remove the tubing connecting the rinse station to the drain/waste container.

   Set the rinse station and all tubing aside, as those items will not be reinstalled. You may wish to store the rinse station in a labeled plastic bag, in case the autosampler ever needs to be restored to its original state.

Installing the Xpress Rinse Station

1. Gently push the Xpress rinse station into place onto the rinse station holder block (mounted on the autosampler front cover) and turn it ¼ turn clockwise.
2. Replace the screw to secure the rinse station.

Installing the Rinse Tubing

An external peristaltic pump, which is faster than the one built into the autosampler, must be used to supply the rinse station.

The pump will be powered by the *ASXpress Plus* electronics module.

CAUTION Use only the pump provided with the *ASXpress Plus* system.

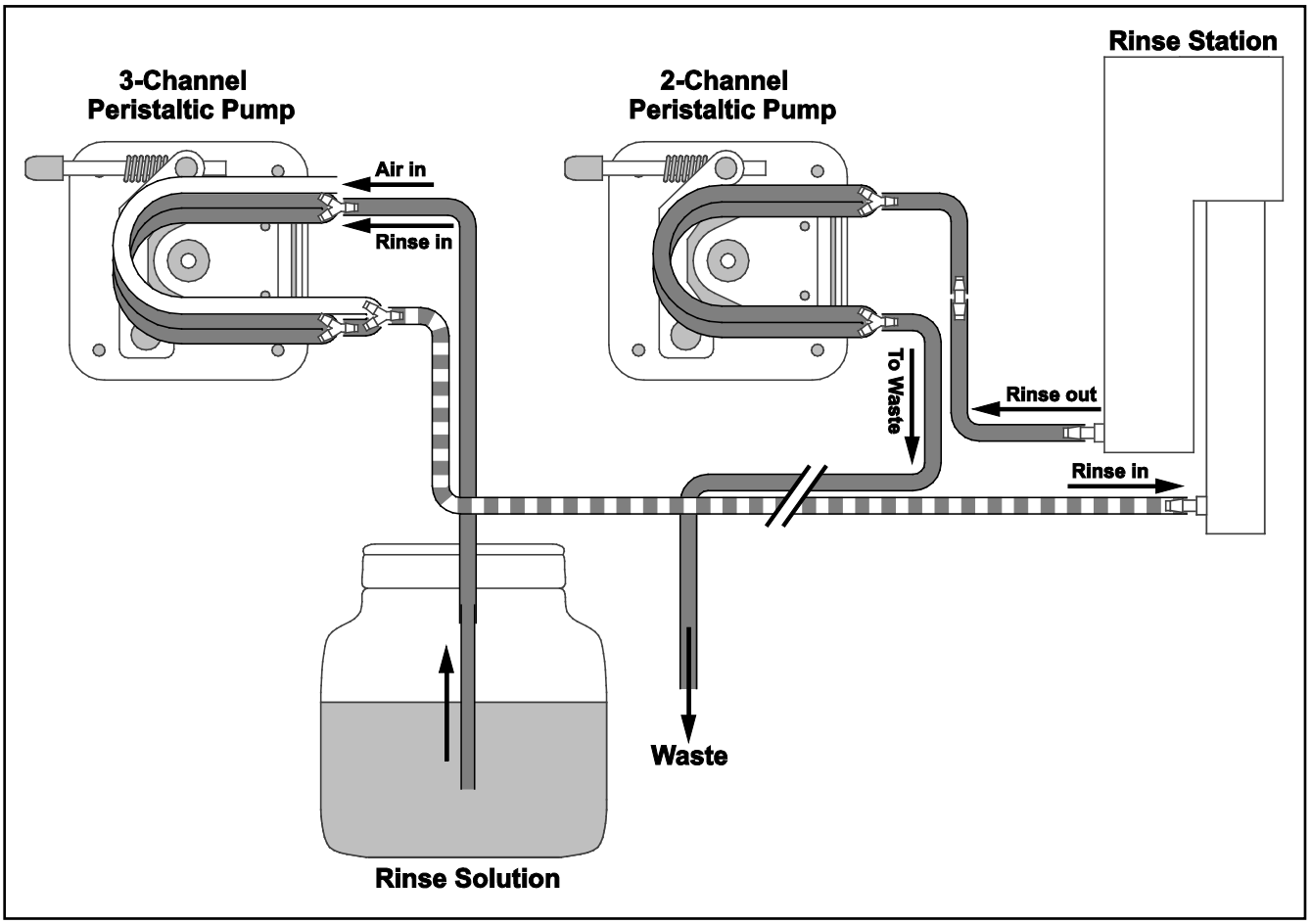


Figure 3-2 Rinse Tubing Diagram

Notes

The external peristaltic pump feeds two channels of rinse solution, mixed with one channel of air, into the rinse station. Leave one input of the pump channel disconnected (open to the atmosphere). The bubbles in the rinse solution improve the cleaning action of the rinse station.

The peristaltic pump built into the autosampler removes rinse solution. To avoid overflowing the rinse station, both channels of the pump must be used, and the pump must be running at its fastest speed.

Rinse solution may be recycled by directing the waste tube into the rinse solution container, if appropriate for your application. Make sure that the end of the waste tube is above the surface of the liquid in the container.

A short length of 1/4" OD tubing is used as an intake "straw."

A short length of 5/16" OD tubing is connected to the output port of the rinse station, then connected with an adapter to the 1/4" OD tubing. This makes it easier to remove the tubing from the rinse station.

Tubing between the autosampler and stationary objects (the external pump and rinse container) should run through the "chain." Tubing on the autosampler should be secured using the tray and clips, to prevent it from shifting as the autosampler moves. Bend the waste line in a "U" shape so that it can be clipped in place, but be careful not to kink the tubing.

The following photos show how the tubing might be arranged:

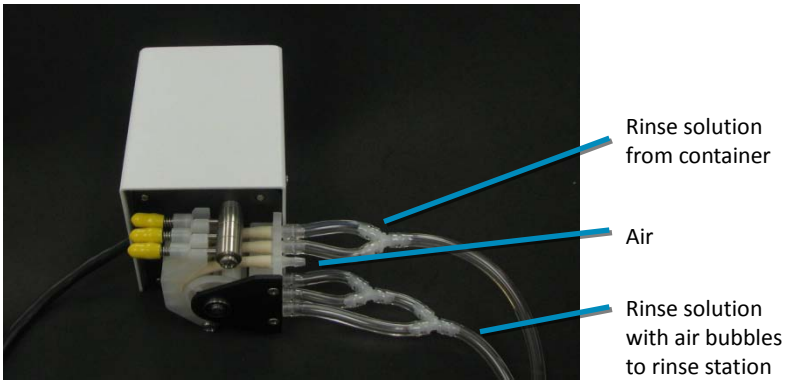


Figure 3-3 External peristaltic pump

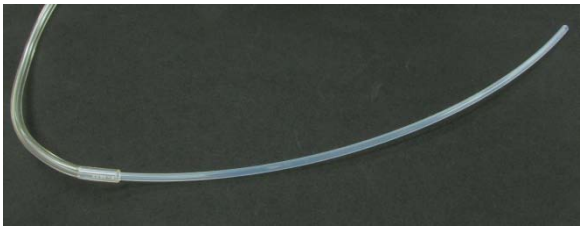


Figure 3-4 Rinse intake tube

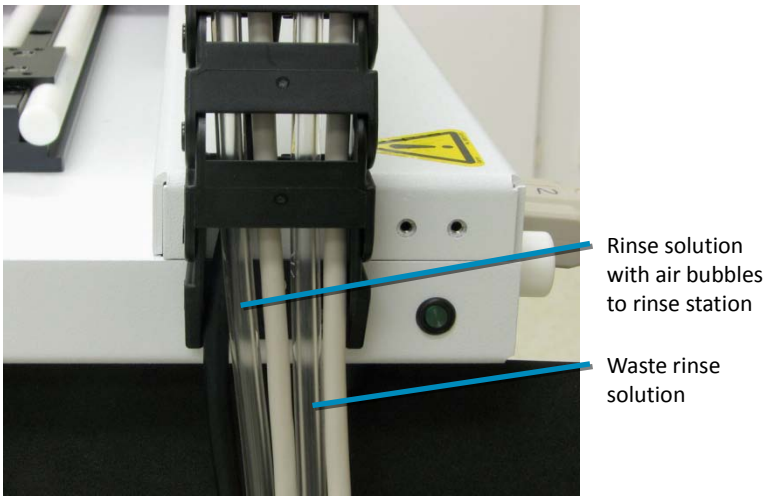


Figure 3-5 Rinse tubing and communication cables

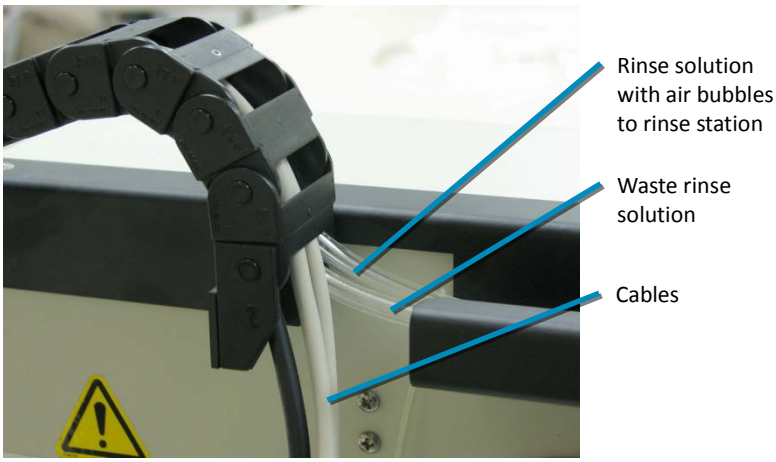


Figure 3-6 Rinse tubing and communication cables

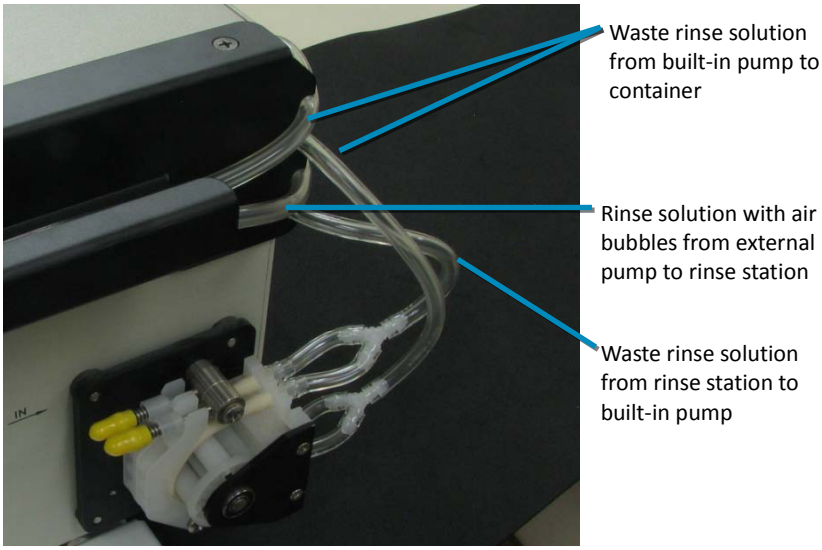


Figure 3-7 Built-in peristaltic pump, used to drain rinse station

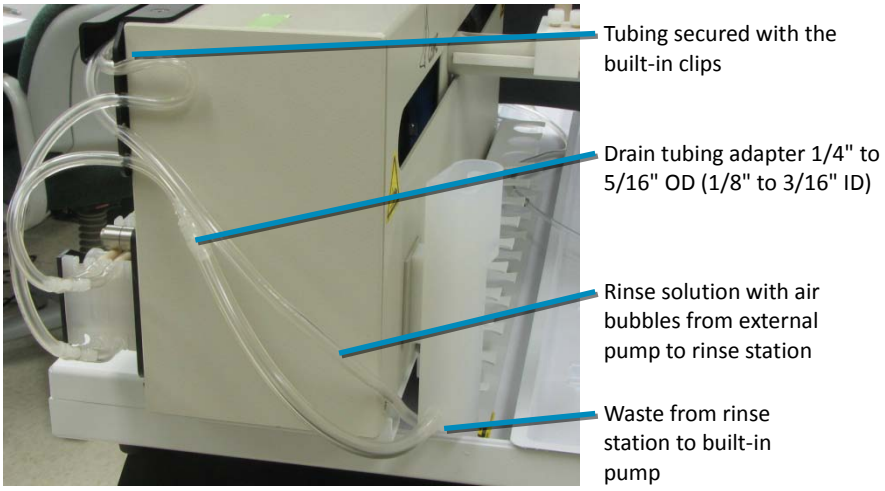


Figure 3-8 Built-in peristaltic pump and rinse station

Install the 1.0mm ID Sample Probe on the Autosampler

A 1.0mm ID sample probe (Figure 3-9) is provided for use with the CETAC autosampler for proper operation with the ASXpress *PLUS* system. Follow the autosampler Operator Manual Instructions to replace the probe with the 1.0mm sample probe, which is attached to the *ASXPRESS PLUS* 6-port valve at Port #2.

> **NOTE**
>
> The 1.0mm I.D. sample probe must be installed on the autosampler or the *ASXPRESS PLUS* Rapid Sample Introduction System will not perform properly. It is identified by double blue bands (Figure 3-9) installed on the probe tubing.

Figure 3-9 Double Blue Bands Identify the 1.0mm I.D. Sample Probe (*carbon fiber probe shown is standard equipment*)

4 Connecting the *ASXPRESS PLUS* System

To work properly with the *ASXPRESS PLUS* Rapid Sample Introduction System, the autosampler will require:

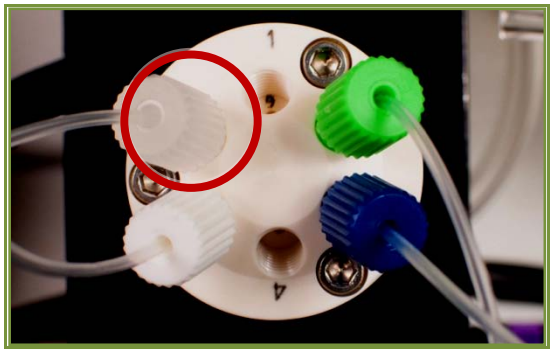
1 Prepare and position the *ASXPRESS PLUS* valve/pump module:

a Remove the protective cover from the 6-port valve.

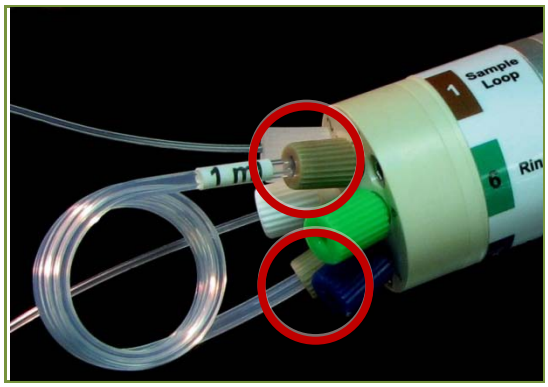
b Attach the sample probe to port #2-grey.

Note:

Use only "Double Blue Band", 1.0mm I.D. sample probes with the *ASXPRESS PLUS* system.



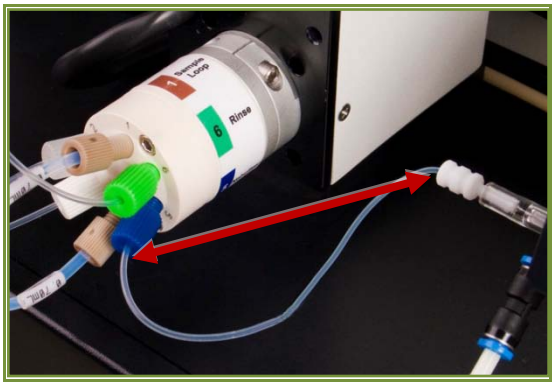
c Attach the sample loop between ports #1 and #4 on the 6-port valve.



Note:

Experiment with the loop size to determine the optimal size for your application, balancing sample size, sampling rate, and integration time. Several loops of varying sizes are supplied. See the *ASXPRESS PLUS* Accessories and Supplies Catalog for a full list of available sample loop sizes for aqueous and oils applications.

d Position the valve/pump module as close to the ICP nebulizer as possible. This may require adjusting vertical and horizontal placement of the valve/pump module, the orientation of the valve, or the orientation of the spray chamber. To accommodate additional placement convenience, the CETAC SP6572 Articulating Mounting System is available.



Note:

Minimize the tubing length between port #5 and the nebulizer to achieve the optimal time savings benefit of the *ASXPRESS PLUS*.

ATTENTION: Do not connect the nebulizer at this step. The photo shows some tubing as a reference (spliced to verify the length before cutting the final tubing). Further adjustments may be necessary before installation is complete.

2 Position the *ASXPRESS PLUS* electronics module and connect it to the valve/pump module with the attached cable.

Considerations:

- Place within 5 feet of the valve/pump module.
- Place within 5 feet of the autosampler rear panel.
- Place so that the operator is able to easily see the "load" and "inject" LEDs on the electronics module case.

3 Place the autosampler as near the *ASXPRESS PLUS* valve/pump module as is possible.

Considerations:

- Rinse station drain tubing connections
- Serial and USB cable connections
- Autosampler power supply connection

4 Connect the electronics module to its power supply.

WARNING: See the *ASXPRESS PLUS Operator's Manual* for electrical safety precautions.

5 Connect the host computer to the OEM COM port on the *ASXPRESS PLUS* electronics module. This will typically be an RS-232 serial connection to the port through which the application software (such as iTEVA™, WinLab32™, ICP-MS Expert™, or ChemStation™) sends commands to the autosampler.

Notes:

If the host computer does not have any free serial ports, a USB connection may be used. See "USB Connections."

No null modem adapter is needed for the RS-232 connections.

6 Connect the autosampler's serial input port to the AUTOSAMPLER port on the *ASXPRESS PLUS* electronics module. (If the autosampler has more than one serial port, the input port is typically labeled "COM 1.")

7 Connect the GUI COM port on the electronics module to the host computer. This will typically be an RS-232C serial connection.

Notes:

If the host computer does not have any free serial ports, a USB connection may be used, as shown here. See "USB Connections."

You have now made *two* connections from the host computer to the electronics module: GUI COM (for configuring the electronics module) and OEM COM (for sending autosampler commands).

USB Connections

Multiple communication cable options provide flexibility to use *all* RS-232, *all* USB or *a combination* of cables between the host PC and the electronics module. A USB driver must be installed to make the USB port emulate an RS-232 COM port, and the installation must be repeated for each USB connection.

To make a USB connection:

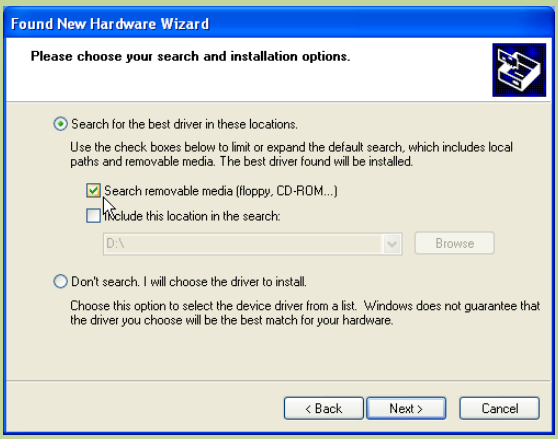
a Turn on the host computer and electronics module. Do *not* turn on the autosampler.

b Plug in the USB cable.

c Allow the Windows Found New Hardware Wizard to use Windows Update to search for a driver. In most cases, the driver will be found online and installed automatically. This process may take several minutes.

d If a driver is not found, insert the CD-ROM and allow the wizard to search the CD-ROM and install the driver (the exact procedure depends on the version of the Windows operating system). The hardware will be identified as an "FT 232R USB UART" and then as a "USB Serial Converter."

e When driver installation is complete, make a note of which COM port number was assigned.

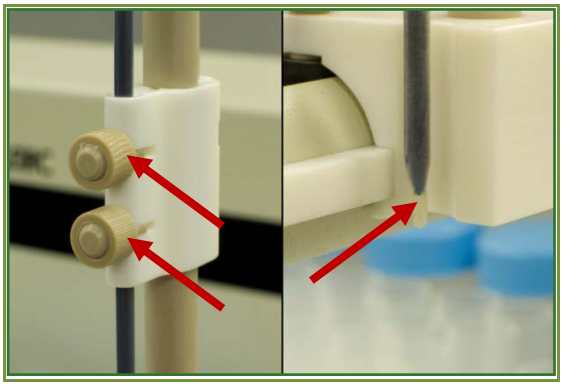


8 Connect the power supply to the autosampler, and to the mains power source. **Do not turn on the autosampler at this time**.

9 Install the sample probe onto the autosampler Z-drive assembly.

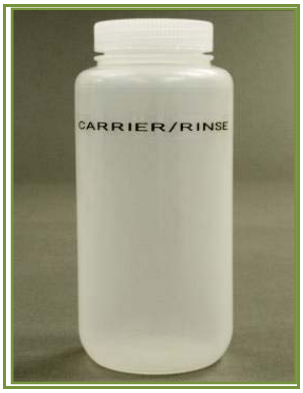
> **Note:**
>
> The Z-drive assembly is different for each model of autosampler.

(See the autosampler operator's manual for complete probe installation information.)



10 Connect the carrier/rinse solution:

a Prepare a carrier/rinse solution that is matrix-matched to your samples. A carrier/rinse solution bottle is provided with the *ASXPRESS PLUS*.



b Connect the carrier/rinse tee assembly to two lengths of peristaltic pump tubing (customer supplied) and install at the ICP instrument's peristaltic pump (see page 31). Connect one channel of the pump input to a pickup tube (shown, customer-supplied) for insertion into the carrier/rinse solution bottle. The input of the other channel of the pump remains open to the atmosphere, to draw in air. Note that the air is pumped into the tee assembly *perpendicular* to the liquid flow. The photo at right shows the supplied tee assembly connected to the customer-supplied peristaltic pump tubing and pickup tube.

c Connect the opposite end (green fitting) of the carrier/rinse tee assembly to port #6-green of the *ASXPRESS PLUS* 6-port valve (see photo at right and the diagram on page 31 of this guide).

11 Connect all drain tubing (3 tubes) to an appropriate waste container.

- Autosampler rinse station drain tubing
- *ASXPRESS PLUS* vacuum pump discharge “output” tubing
- Nebulizer/spray chamber drain tubing

Note: Ensure that tubing ends are not submerged below liquid level in the waste container, as this can impede flow and affect performance of the *ASXPRESS PLUS* system. Use caution to arrange drain tubing so that waste may gravity drain completely without trapping any liquid in the line.

12 Join the nebulizer to the sample line at port #5-blue on the *ASXPRESS PLUS* 6-port valve using peristaltic pump tubing.

Place a nut and ferrule on one end of the line to attach it to the nebulizer. To reduce carryover and ensure effective washout, use one continuous piece of tubing with no splices.

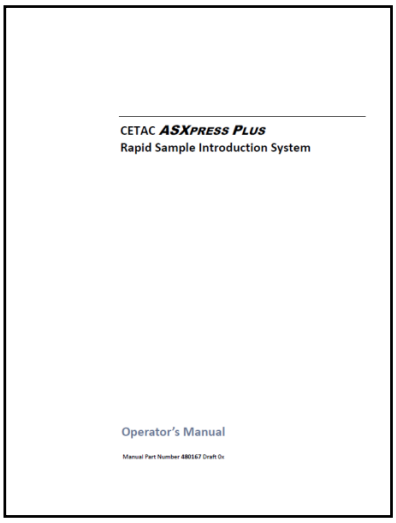
Note:

Cut the line to the shortest possible length. This may also require reorienting the spray chamber to allow close-proximity placement of the *ASXPRESS PLUS* near the nebulizer.

13 Install the software onto the host computer from the included CD. To do so, follow the instructions found in the *ASXPRESS PLUS Operator's Manual,* which is available on the CD or from www.cetac.com.

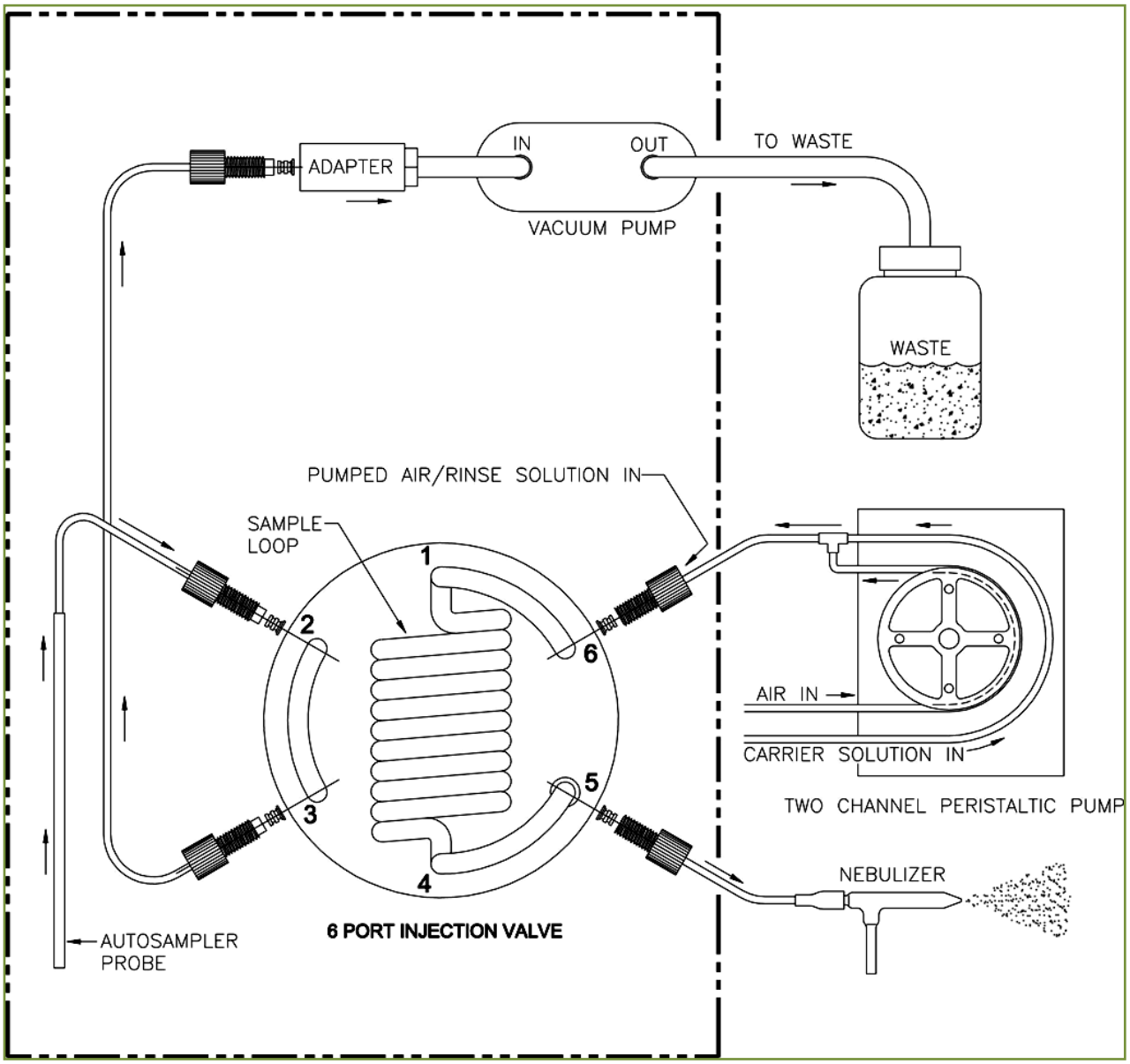
14 Set the autosampler personality to match the analytical instrument you are using, if necessary. (See the *Guide to Configuring Firmware Personalities* which is provided on the included CD.)

15 Refer to the *ASXPRESS PLUS Operator's Manual* for additional information on installation, setup or operation.


CETAC ASXPRESS PLUS
Rapid Sample Introduction System

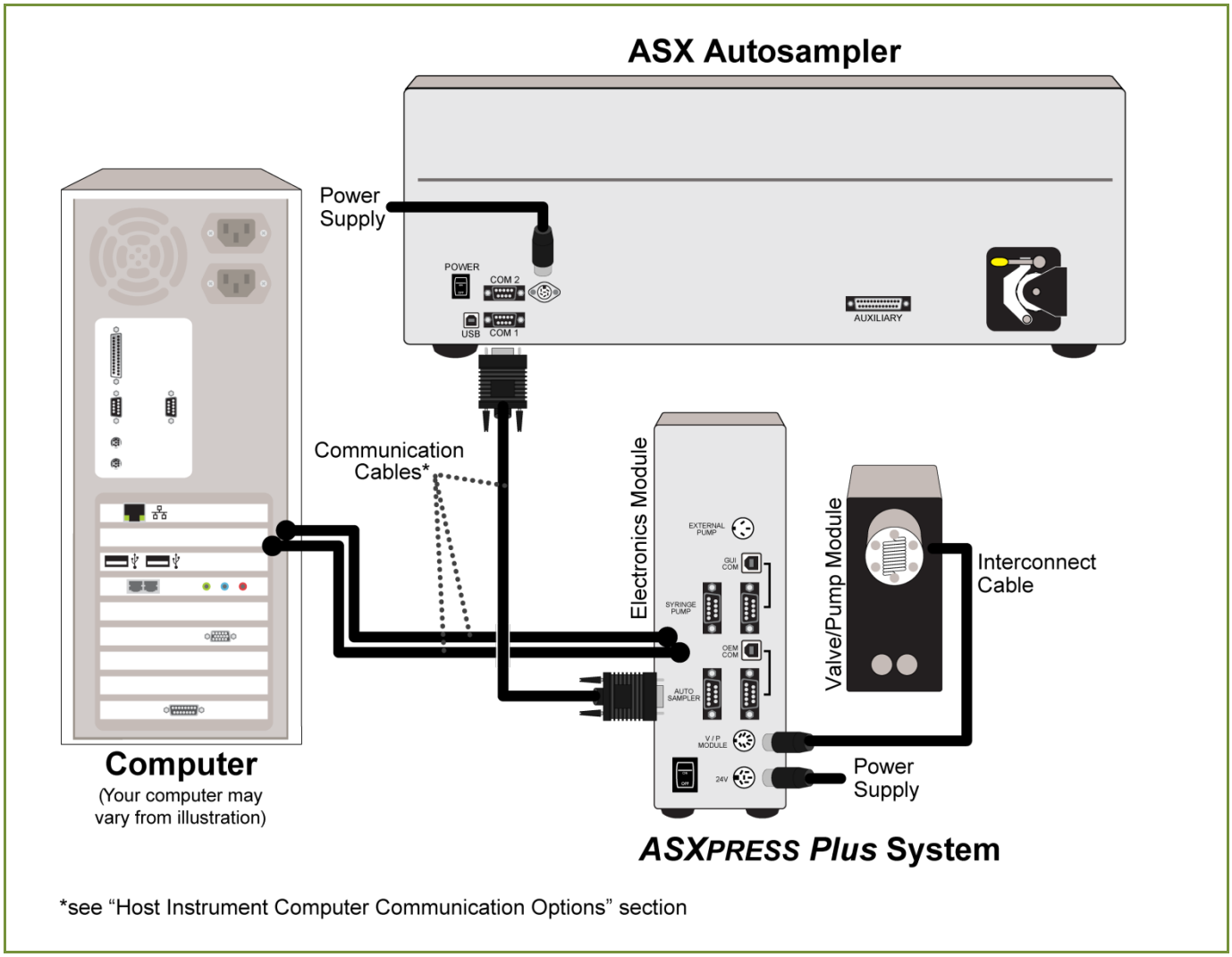
Operator's Manual

Valve/Pump Module Liquid Flow Connections



ASXPRESS PLUS Power/Communication General Connections

The external peristaltic pump (not shown) plugs into the EXTERNAL PUMP connector on the electronics module. The communication cables are pre-installed in the EXR-8 chain. Refer to the ASXPRESS PLUS Operator's Manual for further instruction, as required.



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