

Instructions For Use

P/ACE MDQ Installation & Maintenance

32 Karat 8.0

A36419AC
March 2012



Beckman Coulter, Inc.
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P/ACE MDQ Installation & Maintenance

32 Karat 8.0

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Warranty

Subject to the exceptions and upon the conditions stated below, the Company warrants that the products sold shall be free from defects in workmanship and materials for one year after delivery of the products to the original Purchaser by the Company and if any such product should prove to be defective within such one year period, the Company agrees, at its option, either (1) to correct by repair or at the Company's election by replacement, any such defective product provided that investigation and factory inspection discloses that such defect developed under normal and proper use, or (2) to refund the purchase price.

The exceptions and conditions mentioned above are as follows:

- a. Components or accessories manufactured by the Company which by their nature are not intended to and will not function for one year are warranted only to give reasonable service for a reasonable time. What constitutes a reasonable time and a reasonable service shall be determined solely by the Company. A complete list of such components and accessories is maintained at the factory.
- b. The Company makes no warranty with respect to components or accessories not manufactured by it. In the event of defect in any such component or accessory the Company will give reasonable assistance to Purchaser in obtaining from the respective manufacturer whatever adjustment is authorized by the manufacturer's own warranty.
- c. Any component claimed to be defective must, if required by the Company, be returned to the factory, transportation charges prepaid, and will be returned to Purchaser with transportation charges collect unless the product is found to be defective, in which case the Company will pay all transportation charges.
- d. If the product is a reagent or the like, it is warranted only to conform to the quantity and content and for the period (but not in excess of one year) stated on the label at the time of delivery.
- e. The Company may from time to time provide a special printed warranty with respect to a certain product and where applicable, such warranty shall be deemed incorporated herein by reference.

IT IS EXPRESSLY AGREED THAT THE ABOVE WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND OF THE WARRANTY OF MERCHANTABILITY AND THAT THE COMPANY SHALL HAVE NO LIABILITY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND OR FROM ANY CAUSE WHATSOEVER ARISING OUT OF THE MANUFACTURE, USE, SALE, HANDLING, REPAIR, MAINTENANCE, OR REPLACEMENT OF ANY OF THE PRODUCTS SOLD.

Representations and warranties made by any person, including dealers and representatives of the Company, which are inconsistent or in conflict with the terms of this warranty, shall not be binding upon the Company unless reduced in writing and approved by an expressly authorized officer of the Company.

Safety Information

This section provides safety information and instructions for the hardware and accessories of the system. It is broken down into the following subsections:

- r Symbols
- r Waste Management and Recycling
- r Chemical and Biological Safety
- r Electrical Safety
- r Moving Parts Safety

Safety Symbols

The following information describes the notes and warnings used in this document. Beckman Coulter recommends that you review this information before using the system.







WARNING Paragraphs marked by “WARNING” alert you of a potential hazard to your personal safety if you do not adhere to the information stated within the paragraph.




CAUTION Paragraphs marked by “CAUTION” indicate that there is a potential danger of equipment damage.

IMPORTANT Paragraphs marked by “IMPORTANT” contain information about a possible software program failure, draw attention to a specific software setting or point out that a loss of data may occur if information stated within the paragraph is not adhered to or if procedures are executed incorrectly.


NOTE Paragraphs marked by “NOTE” contain supplemental or explanatory information concerning the current topic or procedural step.

The symbols displayed below and on the instrument are reminders that all safety instructions should be read and understood before installation, operation, maintenance, or repair to this instrument is attempted.

	CAUTION This icon accompanies text and/or other symbols dealing with potential damage to equipment. When present, it indicates that there is a potential danger of equipment damage, software program failure, or that a loss of data may occur if information stated within the “ CAUTION ” paragraph is not adhered to or procedures are executed incorrectly.
	HIGH VOLTAGE Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a high voltage source.
	BIOHAZARD Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a biological source.
	LASER LIGHT Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a laser source.
	SHARP OBJECTS Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from unblunted corners or other appendages on the outside or inside of the equipment.
	HOT SURFACE Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from heated surfaces or other appendages on the outside or inside of the equipment.


	PROTECTIVE EARTH OR GROUND TERMINAL This symbol identifies the location of the protective earth or ground terminal lug on the equipment.
	OFF POSITION OF PRINCIPAL POWER SWITCH This symbol graphically represents the equipment main power push-button switch when it is in the off position.
	ON POSITION OF PRINCIPAL POWER SWITCH This symbol graphically represents the equipment main power push-button switch when it is in the on position.

Waste Management and Recycling

 <p>A28219-AA A016608L.EPS</p>	<p>This symbol is required in accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Union. The presence of this marking on the product indicates that the device:</p> <ol style="list-style-type: none"> 1. was put on the European Market after August 13, 2005 and 2. must not be discarded using the municipal waste collection system of any member state of the European Union. <p>Customers must understand and follow all laws regarding the proper decontamination and safe disposal of electrical equipment. Please contact your dealer or local Beckman Coulter office for details on the take-back program that will facilitate the proper collection, treatment, recovery, recycling, and safe disposal of Beckman Coulter products bearing this label.</p>
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Chemical and Biological Safety

WARNING Normal operation of the system can involve the use of solvents and reagents that are toxic, flammable, or biologically harmful.

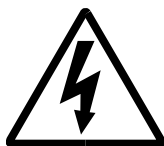
<p>WARNING</p> 	<ul style="list-style-type: none"> • Observe all precautionary information printed on the original solution containers. • Operate the system in the appropriate environment. • Take all necessary precautions when using pathology or toxic materials to prevent the generation of aerosols. • Observe all applicable precautionary procedures when using flammable solvents in or near the instrument. • Wear appropriate laboratory attire, for example, safety glasses, gloves, lab coat and breathing apparatus, when working with hazardous materials. • Dispose of all waste solutions in a proper manner.
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Electrical Safety

To reduce risk of electrical shock, all devices employ a three-wire electrical cable and plug to connect the equipment to earth ground.

- r Ensure that the wall outlet receptacle is properly wired and earth grounded.
- r DO NOT use a three-to-two wire plug adapter.
- r DO NOT use a two-wire extension cord or a two-wire multiple-outlet power strip.
- r Disconnect power to the system before performing maintenance.
- r DO NOT remove any panels; panels should be removed only by qualified service personnel.

WARNING



A high voltage power supply is used with this instrument. Safety interlocks disable high-voltage output while the capillary access cover is open and remove the risk of shock while performing routine instrument functions. However, removal of any panel may expose an individual to the possibility of severe electrical shock and/or mechanical injury. For this reason, any service requiring removal of a panel or otherwise overriding or disabling safety interlocks must be done by Beckman Coulter personnel only.

Moving Parts

Moving parts are limited to the sample handling system. Plate movement is safety interlocked through the Sample Access Cover. To avoid injury due to moving parts, observe the following:

- r Keep loose clothing and hair away from the plate area.
- r Never attempt to physically restrict movement of the plate assembly.

Introduction

1.1 General Information

This guide includes details on where to find information on specification and site requirements, installation and configuration of system hardware/software, maintenance (customer performable), and installation of additional features (SS420X, EDA, etc.). The details can be found following the appropriate sections as follows:

- r Section 1 - Introduction
- r Section 2 - Specifications & Site Requirements
- r Section 3 - Hardware and Software Installation
- r Section 4 - Maintenance
- r Section 5 - Additional Features



Specifications and Site Requirements

2.1 Introduction

Specifications and Site Requirements are published in the **P/ACE™ MDQ Pre-Installation Guide**. This guide is sent to the installation site prior to the actual system installation. The guide provides information necessary to ensure a successful installation, e.g., environment, bench space, power requirements, etc., as well as specifications for the instrument and associated components.



Specifications and Site Requirements

Introduction

Hardware and Software Installation

3.1 Introduction

For initial installation, a Beckman Coulter Service Representative will install and configure your system. This section includes procedures for hardware and software installation in case it becomes necessary to relocate or reconfigure the instrument.

NOTE Initial installation by anyone other than an authorized Beckman Coulter representative invalidates any warranty covering this instrument.

This section is organized into four topics. The table below lists these topics in the order that they are presented.

Topic	Description
Installation - General	Introductory information including unpacking/repacking and storage of the P/ACE MDQ instrument.
Installation - Hardware/Software	Installing the system includes configuring the Computer, installing the GPIB board and driver, installing 32 Karat™ Software, setting up the P/ACE MDQ instrument, details on license repair, uninstalling the software license, reprocessing the license, and information regarding software license diskettes.
System Configuration	Configuring system components.
Installation - Additional Features (See "Additional Features" on page 79.)	Installing and configuring the SS420X device; installing the Buffer Tray Reservoir and External Detector Adapter.

3.2 Installation - General

This section of the guide covers installation of hardware/software, system configuration, and additional features.

Hardware/Software installation includes setting up the computer, installing the GPIB board and its driver, installing the 32 Karat Software, and completing the process by setting up the P/ACE MDQ instrument to include the type of detector and capillary cartridge required.

System configuration includes entering the information in the software to reflect the P/ACE MDQ hardware installed.

The Windows XP operating system must be installed on the computer prior to installing the GPIB board, its driver, and the 32 Karat Software.

Additional features provide details on installing and configuring such items as the Buffer Tray Reservoir, the External Detector Adapter, and the SS420X device.

The Beckman Coulter Service Engineer will initially perform all the general installation and configuring procedures. However, these procedures will be outlined in the following paragraphs for reference purposes and for those installations where the customer provides the computer.

Unpacking and Repacking

The Beckman Coulter Service Representative will unpack the P/ACE MDQ and computer. General unpacking and installation information is given here in case it becomes necessary to relocate or reconfigure the instrument.

Unpacking

1. Inspect both the computer and P/ACE MDQ containers for obvious damage.
2. Remove both units from their respective shipping containers, then remove the protective plastic covering. Also, remove any shipping hardware. Keep the shipping containers in case you need to repack the instrument.

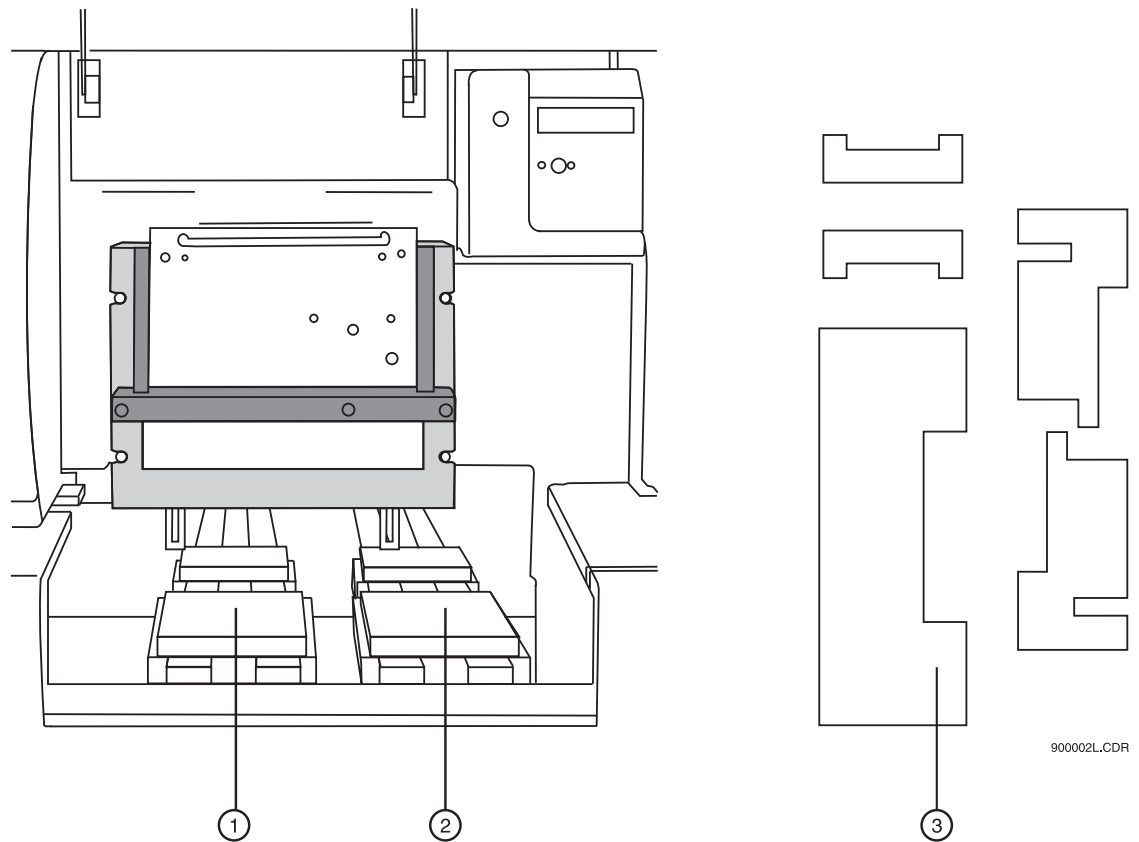


Figure 3.1 Location of Interlocking Devices Used During Shipping

CAUTION The P/ACE MDQ is heavy (155 lbs/70.5 kg). To avoid personal injury and/or possible damage to the equipment if dropped, use at least two people to lift the instrument.

1. Lift the cartridge cover door at the front of the P/ACE MDQ.
2. Remove five interlocking devices from the carriage assemblies. Lift the carriage assemblies to one side to remove the foam inserts beneath each assembly. Refer to Figure 3.1.
3. Note any damage or missing items and contact the shipping company or your sales representative immediately.
4. Position the instrument and computer as shown in Figure 3.2

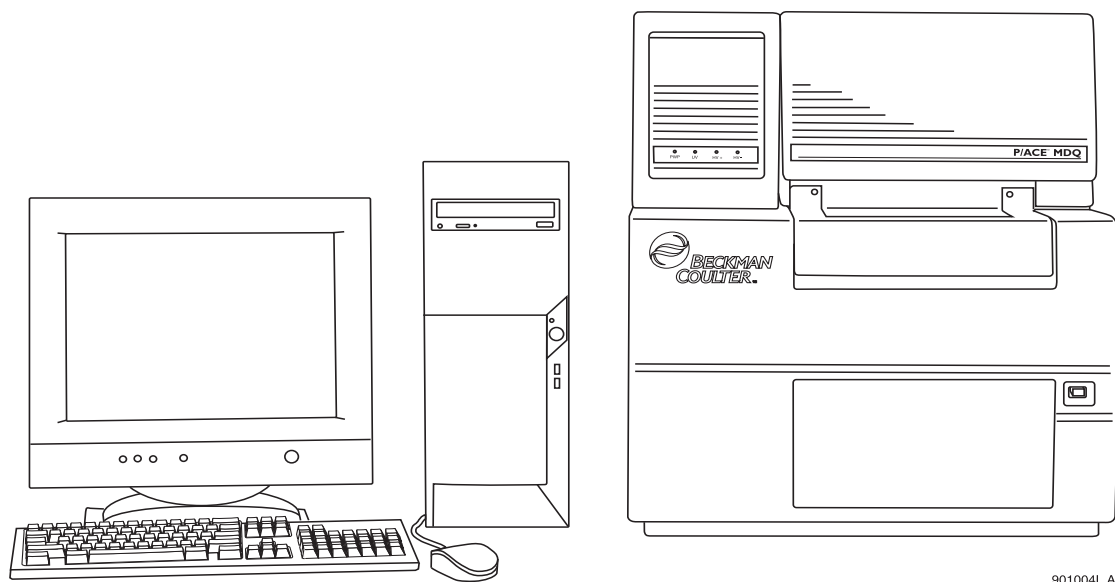


Figure 3.2 Placement of Computer and P/ACE MDQ Instrument on Work Surface

Repacking

1. To prepare the P/ACE MDQ for relocation and/or shipment, replace the interlocking devices previously removed.
2. Install the protective plastic covering on the P/ACE MDQ, then place it in the shipping container. Cover any additional hardware and place in shipping container.

Storage

The P/ACE MDQ can be stored indefinitely at temperatures from 4°C to 40°C. It is not advisable to store the instrument for long periods of time below 4°C or above 40°C. If the instrument is colder or warmer, allow the instrument to warm or cool to within the operating temperature range before turning the power on and beginning the warm-up period.

After power has been turned off for several hours or more, allow a recovery time of 1 hour (minimum) to ensure stability. The lamp must be on for the warm-up period.

Refer to the information provided with the computer for storage recommendations.

3.3 Installation - Hardware / Software

The following outlines the hardware/software installation process. Initially, installation will be done by the Beckman Coulter Service Engineer. The following information is for reference purposes only. The installation process includes:

- r Installing the GPIB board in the computer
- r Configuring the computer. Refer to the following table for recommended computer hardware configuration
- r Installing the GPIB board driver
- r Installing 32 Karat Software
- r Setting up the P/ACE MDQ Instrument
- r Connecting computer and P/ACE MDQ instrument via Communications Cable

Recommended Computer Hardware Configuration

CPU	IBM M51 Computer with 3.2 GHz processor
Memory	1024 Mb (minimum)
Hard Drive	40 Gb or larger
CD/DVD RW	Required
USB Ports	Required
Monitor/Resolution/Colors	1024 x 768/True Color
Keyboard	101 key
Mouse	Microsoft® compatible
Interface	PCIe Communications Interface Board (provided with software)
Printer	Any Windows XP™ compatible printer
Operating System	Microsoft Windows XP Pro with service pack 2
Note	These are the specifications that must be met if the customer is providing the Personal Computer. Beckman Coulter provided computers will meet or exceed the above specifications.

Installing the GPIB Communication Interface Board

The GPIB board provides the communications interface between the computer and the P/ACE MDQ instrument. Install GPIB board as follows:

1. Remove the computer's cover, then install the GPIB board in any available PCI slot. Refer to the manual supplied with the computer on how to remove the cover and install additional boards.
2. Replace cover. Before the GPIB board's driver can be installed, the computer must be configured.
3. Insert the GPIB driver into the CD-ROM drive. I
4. Install the PCIe driver. Refer to "Configuring the Computer" on page 10, then install the GPIB board's driver as covered in "Installing the GPIB Communication Interface Board Driver" on page 11.

3.4 Configuring the Computer

NOTE The following configuration settings assume that Windows XP Operating System is installed on the computer. If not, Windows XP must be installed before configuring the computer.

Power/Peripherals

- r Ensure monitor, mouse, and keyboard are plugged into the computer, then plug the power cord into the ac power outlet. Turn the computer on.

CMOS

Referring to the computer's manual for details on how to enter the CMOS, ensure the following:

- r All power management features are disabled.
- r Num Lock is set to **ON**.
- r Enable COM1 and COM2.

Display

Referring to the XP Operating System manual on how to change the video card settings via the Display icon (icon located in the Control Panel), ensure the following:

- r Screen saver is set to **None**.
- r Power saving standby modes disabled.
- r Video resolution set to 1024 x 768, small fonts, true colors.

Boot Control

Referring to the XP Operating System manual on how to set startup parameters via the System icon (icon located in the Control Panel), perform the following:

1. Select the **System** icon from the **Control Panel**.
2. Select the **Startup/Shutdown** tab.
3. Select **Windows XP**.
4. Set **Show List** to 10 seconds.

5. Exit the **Control Panel**.

Installing the GPIB Communication Interface Board Driver

Included with the GPIB Interface Board is a CD-ROM containing the board's driver. Install driver as follows:

1. If not already running, start Windows XP.
2. Insert the CD-ROM provided with board into the CD drive.
3. Select Install **NI-488.2 Software for Windows**.
4. Skip the software registration, when prompted.
5. Follow the prompts and accept all defaults.
6. Install only the driver when selecting installation components.
7. Install **NI-VISA** when prompted.
8. Use VISA express installation.
9. Do not install any Plug and Play options when prompted.
10. Do not remove the CD from the drive.
11. Reboot the computer as directed.
12. When prompted by Wizard, select **Configure your GPIB interface**, then follow the steps outlined in the following table. If not prompted, enter the Control Panel, select the GPIB icon and follow the steps outlined below in the following table.

Step 1	Click Board Type	Select GPIB0 Select PCI-GPIB Click OK
Step 2	Select GPIB0	
Step 3	Click Configure	Set Bus timing to 500 ns Set Cable... to Disabled Click software and set: Primary to 0 Secondary to None Check System Controller Check Enable Auto Polling I/O Time-out to 10 seconds Parallel Poll Duration to default Check EOI at end of write EOI at end of write EOS byte to 0 Click OK
Step 4	Select DEV1	

Step 5	Click Configure	Set Name to DEV1 Set Access Board to GBPIO Set Primary to 1 Set Secondary to None Check send EOI at end of write Set EOS byte to 0 Set I/O Time-out to 10 seconds Set Serial Poll Time-out to 1 second Click OK
Step 6	Select GPIB0	
Step 7	Click OK	
Step 8	Step through Wizard to the next step. Select verify your hardware and software installation. All tests should pass. Click OK	
Step 9	Optional	Select Communicate with your instrument. If you chose this step, follow the described steps. You will not be able to initiate any activity in the instrument. The responses you see will be garbled, but you will see that the driver communicates with the instrument. This is the extent of the test.
Step 10	Select Do not show at Windows startup	
Step 11	Click Exit	
Step 12	Close Control Panel if previously opened	
Step 13	Remove the CD from the drive	
Step 14	Reboot the computer	
Step 15	Driver should load successfully. Repeat all steps if driver loading is not successful. If after several attempts you are not successful in loading the driver, contact a Beckman Coulter Service Representative.	

13. After completing installation of the GPIB board's driver, proceed to "Installing the 32 Karat Software" on page 13.

3.5 Installing the 32 Karat Software

The following information is for reference purposes only. Beckman Coulter installs the 32 Karat Software on the systems shipped with a computer. However, a customer provided computer requires installation of the software. Refer to the following steps to install the 32 Karat Software:

1. Start the computer. After the Windows desktop appears, proceed as follows:
2. Insert 32 Karat Software installation CD-ROM into the CD drive. The Master Setup screen will appear after a short delay.
3. Click on **Install 32 Karat™ Software**.
4. If the Master Setup screen does not appear automatically, open the CD-ROM (open **My Computer | E:**), then find the `Msetup.exe` file.
5. Double-click on this file to start the installation process.

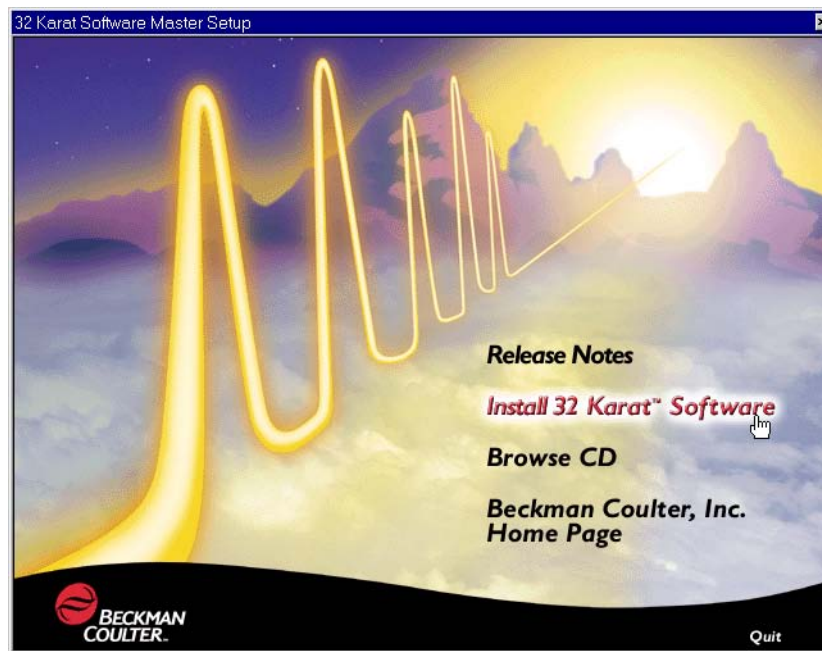


Figure 3.3 Master Setup Screen

6. The first screen to appear is the Welcome screen. This screen advises you to close down any current Windows applications before you start the installation and informs you that unauthorized distribution of the 32 Karat Software is a crime.

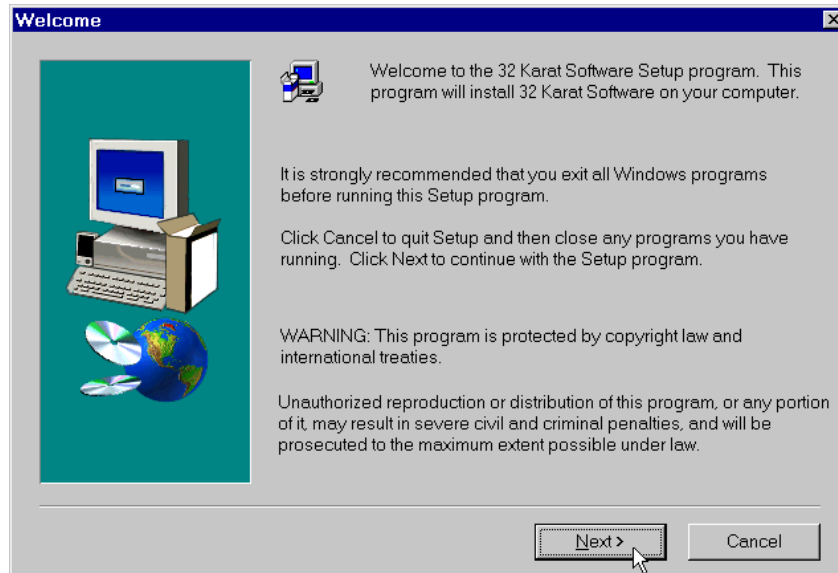


Figure 3.4 Welcome Screen

7. Click **Next** to continue the installation. Follow the prompts.
8. When the software installation is complete, the Setup Complete screen will be displayed.

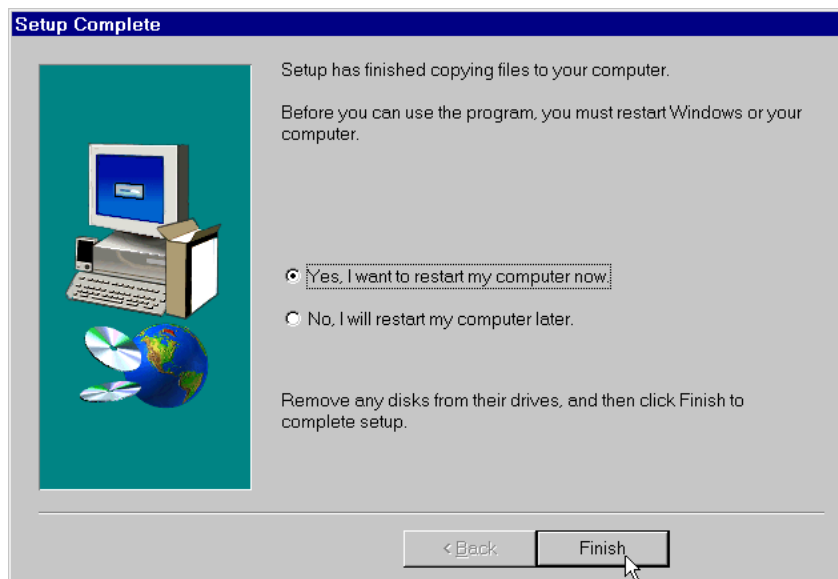


Figure 3.5 Setup Complete Screen

9. Choose **Yes**, then click the **Finish** button.
The setup program will automatically restart your computer. If you choose No, the computer will not be restarted. However, you **MUST** restart before running the 32 Karat Software.

3.6 Software Licenses

To collect data using 32 Karat Software you must install the “license key” that was provided with the software. If the word “DEMO” appears in the title bar of the 32 Karat Software, it indicates that the software is unlicensed.

Before installing the Software License Key, open the 32 Karat Software once in the “DEMO” mode to allow the system to configure itself with the computer. Close the 32 Karat Software then re-open it and proceed with installing the Software License Key as outlined below.

The key is your software license. It contains your data system serial number and determines the number of instruments and other options that may be used with your system.

Installing the Software License Key

To use 32 Karat software to acquire data from the instrument(s), a license key must be installed. This key enables the operation of the software on the computer. The key is your software license. It contains your data system serial number and determines the number of instruments and other options that may be used with your system.

A USB Flash Drive containing a file with all the purchased options (for example, number of instruments, system suitability, PDA, and other options) was provided with your shipment.

The license key is installed by inserting the USB Flash Drive into any available USB slot.

IMPORTANT The Flash Drive must remain in place at all times while the software is running.

You can, however, un-install the license key and re-install it on another computer if desired.

3.7 Changing the Network Name or Workstation Operating System

If it is desired to change the computer name after the 32 Karat software and license are installed, follow these steps:

NOTE It is not necessary to remove the USB Flash drive license key.

1. Exit the 32 Karat software.
2. Change the computer name as desired.
3. Delete the file `C:\32Karat_CONFIG\drvstart32c.sys`.
4. Reboot the computer.
5. Run the 32 Karat software.

This will reinstall the license with the new computer name.

3.8 Installing the P/ACE MDQ Instrument

Having completed the unpacking of the instrument and placed it on the work area next to the computer as shown in Figure 3.2, installed the GPIB board and its driver in the computer and installed 32 Karat Software, complete installation of the P/ACE MDQ Instrument and detector.

The installation procedures covered are listed as follows. Start with the type of detector to be installed (a or b below), then proceed to remaining items (c through e).

- a. Ultra Violet (UV) or Photodiode Array Detector (PDA) and Capillary Cartridge Installations
- b. LIF Detector and Capillary Cartridge Installations
- c. Buffer/Sample Tray Installation
- d. Connecting Computer to P/ACE MDQ Instrument
- e. Analog Outputs

NOTE If the computer and GPIB board are not installed, please refer to "Installing the GPIB Communication Interface Board" on page 10, to, "Installing the GPIB Communication Interface Board Driver" on page 11, and "Configuring the Computer" on page 10 before proceeding.

Installing the UV or PDA Detector/Capillary Cartridge

NOTE The following procedure covers installation of the UV and PDA detectors. The capillary cartridge installation procedure can be found in "Installing the Capillary Cartridge for UV/PDA Detectors" on page 19.

For details on installing the LIF Detector, please refer to the "Installing the LIF Detector" on page 20.

Before you begin, you will need:

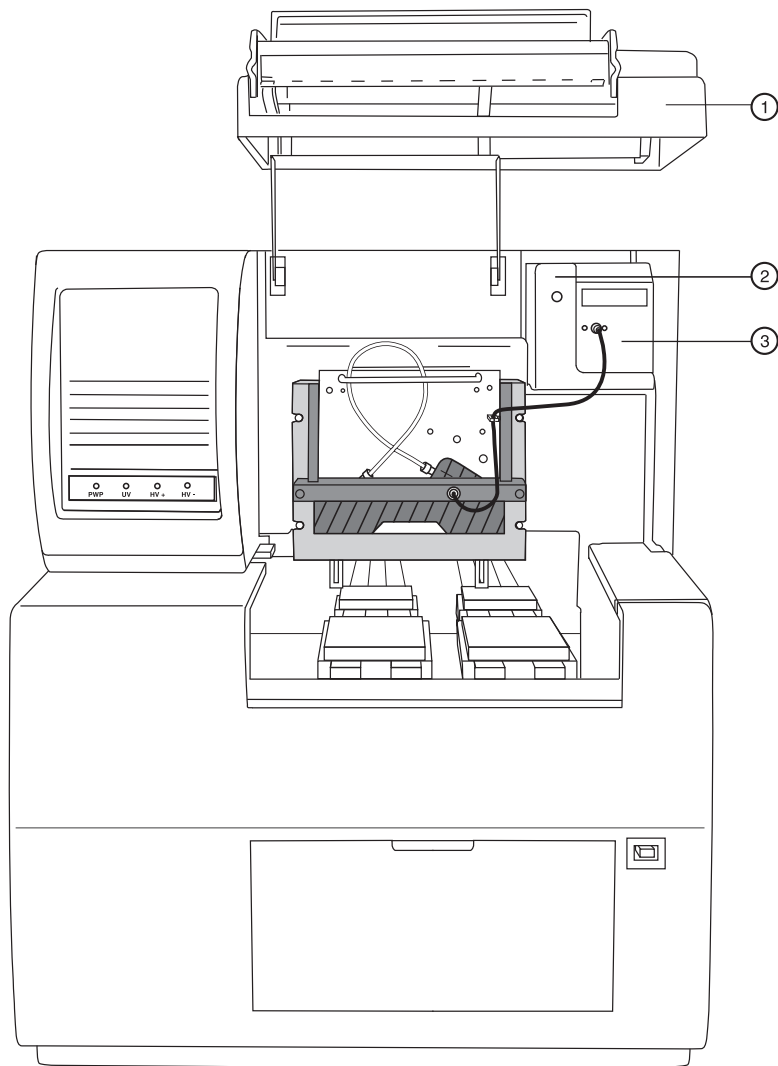
- r UV or PDA Detector
- r Fiber optic cable (UV cable is 2 ended and the PDA cable is 3 ended)

Proceed as follows:

1. Verify that power is off and no capillary cartridge is installed.
2. Lift the cartridge cover door and find the detector mounting location as shown as shown in Figure 3.6 (UV detector) and Figure 3.7 (PDA detector).
3. Unpack the detector and remove the protective connector caps.
4. Position the detector on the mounting location. Carefully slide the detector back to make contact with the back-plane receptacle.
5. Tighten the thumb screw until snug.

Unpack the fiber optic cable and remove the protective covers from each end (2 covers for the UV cable and 3 covers for the PDA cable). Be sure to keep the protective covers for storage when not in use. Connect the cable to the clamp arm first, then to the detector. The remaining end of the fiber optic cable will be connected after completing the capillary cartridge installation. Refer to "Installing the Capillary Cartridge for UV/PDA Detectors" on page 19.

CAUTION Connecting the fiber optic cable in the reverse order may cause damage to the fiber.



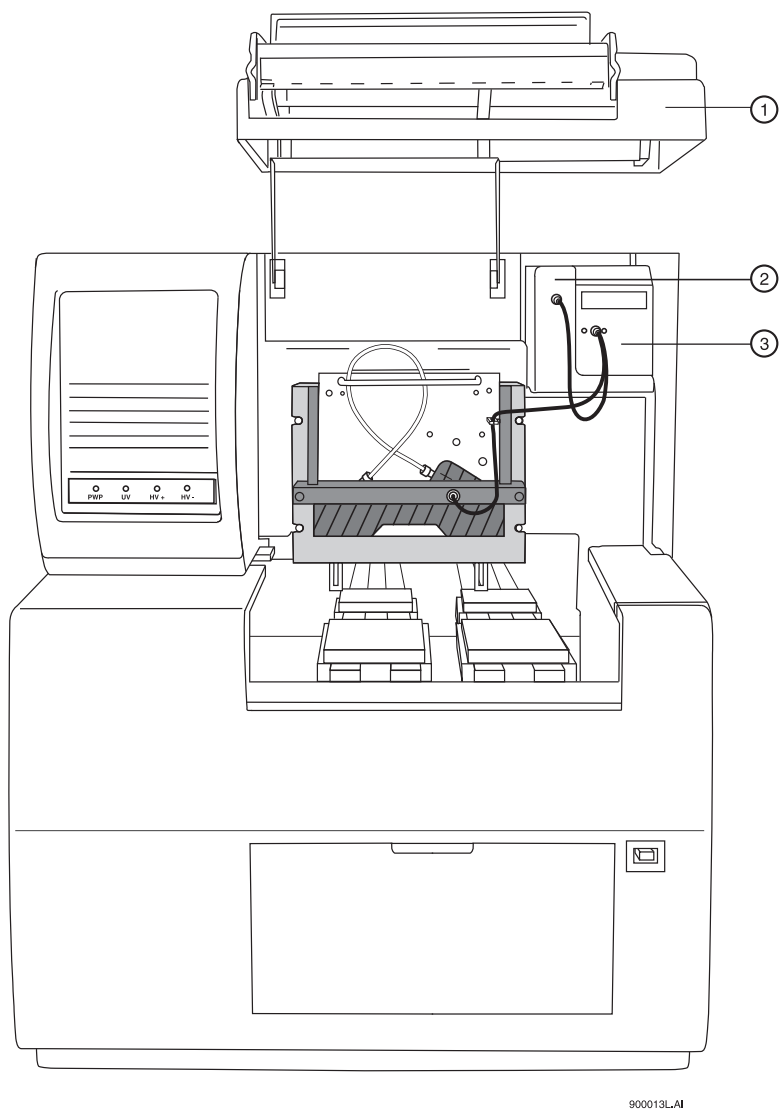
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Figure 3.6 UV Detector Installation

1. Cartridge Cover Door

3. Fiber Optic Cable

2. Detector Mounting Location



900013L.A1

Figure 3.7 PDA Detector Installation

1. Cartridge Cover Door	3. Fiber Optic Cable
2. Detector Mounting Location	

3.9 Installing the Capillary Cartridge for UV/PDA Detectors

Except for the capillary, the capillary cartridge included in your ship kit comes assembled and ready to use with the exception of a capillary. To install a capillary, or change the coolant tubing length, perform Capillary Cartridge Rebuild procedures located in "Maintenance" on page 33.

Before you begin, you will need the capillary cartridge assembled with a capillary.

1. Lift the cartridge cover door at the front of the P/ACE MDQ. Refer to Figure 3.8.
2. Loosen the captive screws and lift the insertion bar.
3. Position the capillary cartridge over the cartridge interface block so that the ends feed into the center holes in the interface block and carefully lower the cartridge in place.
4. Lower the insertion bar and tighten the captive screws until they are snug.
5. Connect the remaining end of the fiber optic cable to cartridge as shown in Figure 3.6 (UV) Figure 3.7 (PDA).
6. Lower the cartridge cover door.

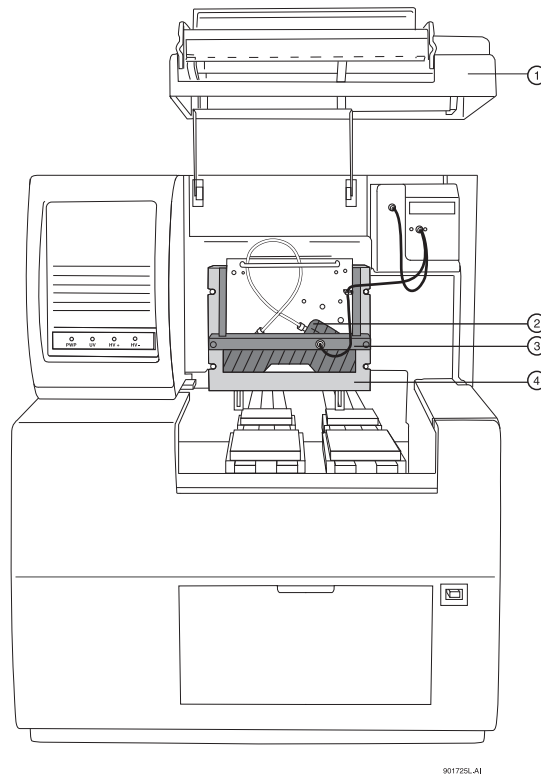


Figure 3.8 Cartridge Installation

1. Cartridge Cover Door	3. Insertion Bar
2. Capillary Cartridge	4. Interface Block

NOTE To ensure proper performance, the capillary-cartridge aperture must be replaced after 3 months of use. Please see "Rebuilding the Capillary Cartridge" on page 34.

3.10 Installing the LIF Detector

The following procedures include all of the details for installing the LIF Detector, including capillary cartridge preparation and installation.

WARNING To avoid a potential shock hazard, power down the instrument before proceeding with component installation.

Pre-installation Requirements

Initial installation, which will be done by a Beckman Coulter Field Service Engineer, includes setting up the laser, connecting it to the LIF Detector System, and verifying proper system operation (including operation of the laser interlock system, which prevents the user from exposure to laser light). The LIF Detector requires software and instrument firmware version 5.0 or higher for 32 Karat Software.

Bench Space

The P/ACE MDQ instrument and the laser require an area of approximately four feet by two feet. Allow adequate space between components for air circulation (6 inches minimum). Additional space is required for a computer, printer, and other optional equipment, if applicable.

CAUTION Some laser modules produce significant quantities of heated air. To avoid temperature-related problems with the instrument, position these lasers so that this heated air is not drawn into the P/ACE MDQ instrument.

Installing the Interconnect Module

If installed, remove the UV or PDA detector from the upper-right corner of the P/ACE MDQ instrument. Install the Interconnect Module in the upper-right corner. Secure the module by finger tightening the locking screw located in the front lower middle-area of this module.

WARNING To avoid a potential shock hazard, power down the instrument before proceeding with component removal or installation.

Connecting the Laser Cable(s) to the Interconnect Module

Pull back the interlock cover, as shown in Figure 3.9. Hold the cable securely, and screw the fastener into the Interconnect Module. Do not allow either cable to become twisted during

installation to avoid damaging the fiber optic line inside the cable. Finally, install the interlock cover as shown in Figure 3.9.

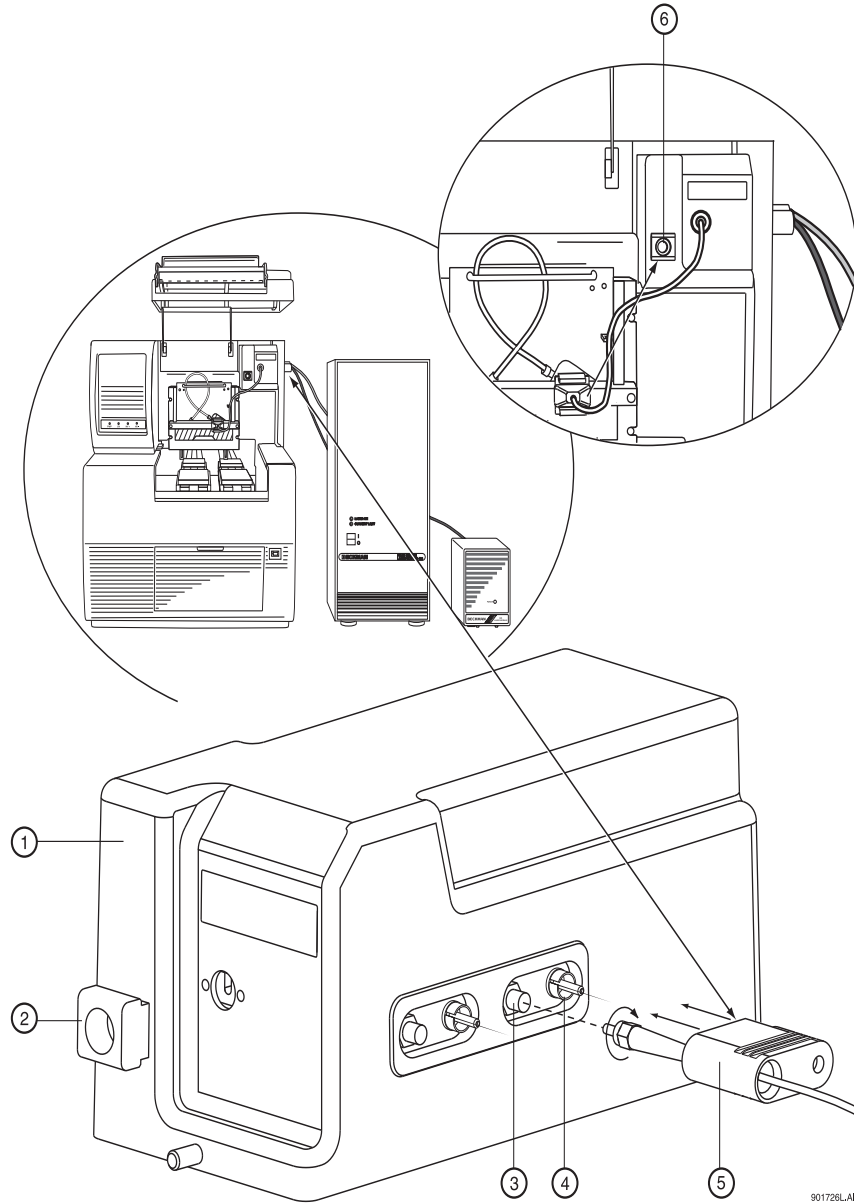


Figure 3.9 Connecting Laser Cables to Interconnect Module

1. Interconnect Module	4. Interlock Connector
2. Probe Holder	5. Interlock Cover
3. Fiber Optic Connector	6. Probe Holder

Installing the LIF Detector Module

NOTE Prior to installing the LIF Detector Module, the filter(s) and filter housing must be installed.

Installing Filters in the Filter Housing

The Filter Housing, which is inserted in the right side of the LIF Detector, has two filter holders, one for each detector channel. Refer to Figure 3.10 for a detailed diagram of the Filter Housing. One or more filters can be used in each filter holder, depending on the application and the width of the filter.

During typical operation, two filters are used: one “rejection” filter and one “emission” filter. The rejection filter prevents scattered laser light from passing into the detector. The emission filter is a band-pass filter that allows only the fluorescent signal at a selected wavelength to pass into the detector.

Beckman Coulter supplies the following filters:

- r 520 nm, 560 nm, and 675 nm emission (band-pass)
- r 488 nm notch

Depending on the application and laser, you may use any standard 0.5" diameter filter(s) in the range of 350 to 750 nm. The filter(s) total thickness cannot be more than 0.350”.

Follow the steps below to install filter(s) into the filter holder, refer to Figure 3.10:

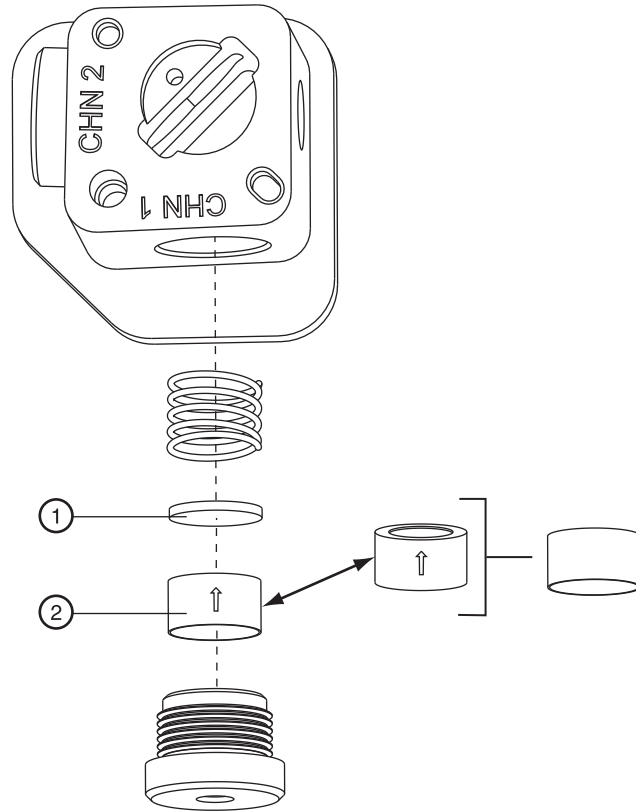
1. Hold the filter housing in the same orientation as shown in the drawing.
2. Hold the filter with the arrow on the outside edge of the filter pointing up.
(If the filter does not have an arrow on its edge, refer to the note below).

IMPORTANT Be sure to handle the filters by the edges.

3. Carefully place the filter into the filter holder.
4. When all filters are in the filter holder, insert the spring and install the filter holder in the appropriate location (channel 1 or 2) in the filter housing.

NOTE If there is no arrow on the edge of the filter you are using, look at both sides of the filter and determine which side has the more reflective surface. The more reflective side also has a wide-edge rim that extends beyond the filter surface. The filter should be installed with the more reflective side facing the light source (the laser). In the LIF detector, laser light comes from the center of the filter housing. So if you are holding the housing in the proper orientation, install a filter with the arrow and/or reflective side with the wider rim pointing up (toward the filter housing).

If a filter is installed incorrectly, it will work but its performance may be degraded.



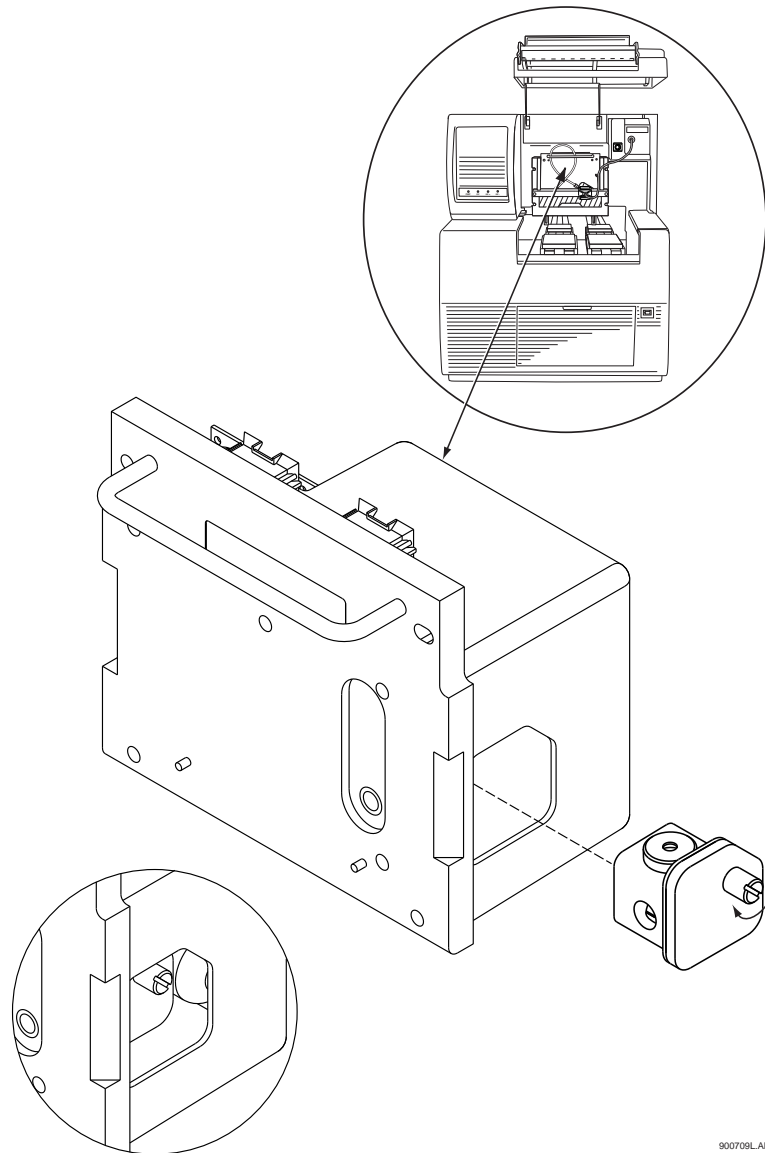
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Figure 3.10 Installing Filters in the Filter Housing

-
1. Notch Filter
 2. Emissions (Band-Pass) Filter
-

Installing the Filter Housing into the Detector

Insert the filter housing into the opening in the right side of the detector. Refer to Figure 3.11. Make sure the “keyed” corner of the filter housing lines up with the “keyed” corner of the Detector Module. The housing will fit into the opening in this orientation only, so it cannot be installed incorrectly. After changing filters, allow the system to stabilize for 15 minutes before use.



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Figure 3.11 Installing the Filter Housing into the LIF Detector

Installing the LIF Detector into the P/ACE MDQ

WARNING To avoid a possible shock hazard, power down the P/ACE MDQ instrument before proceeding with component installation.

Place the LIF Detector into the P/ACE MDQ, as shown in Figure 3.11, keeping the two female connectors on the LIF Detector level with the two male connectors located on the instrument. Secure the Detector Module in place by fastening the captive screws finger tight.

Preparing the Cartridge for LIF Usage

Build the cartridge as described in the P/ACE MDQ Installation and Maintenance Manual, up to the point when the aperture plug is installed. The LIF Detector uses a special plug, which is not interchangeable with those used on the UV/PDA system.

Installing the LIF Plug and Probe Stabilizer

Referring to Figure 3.12, proceed as follows:

1. Carefully install the metal LIF plug from the back of the cartridge.
2. Snap on the probe stabilizer such that the lock pins snap into the dimples on the plug.

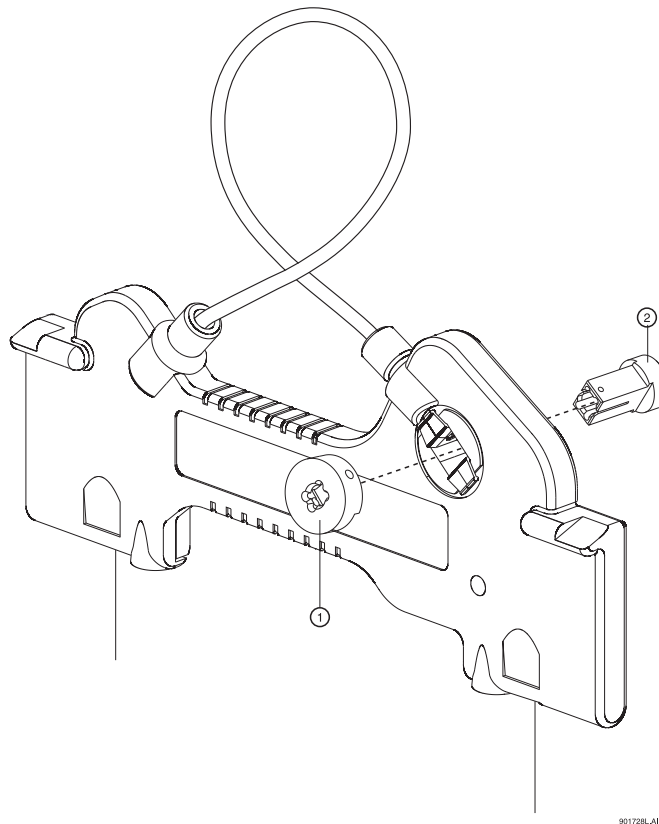


Figure 3.12 Installing the LIF Plug and Probe Stabilizer

1. Probe Stabilizer	2. LIF Plugs
---------------------	--------------

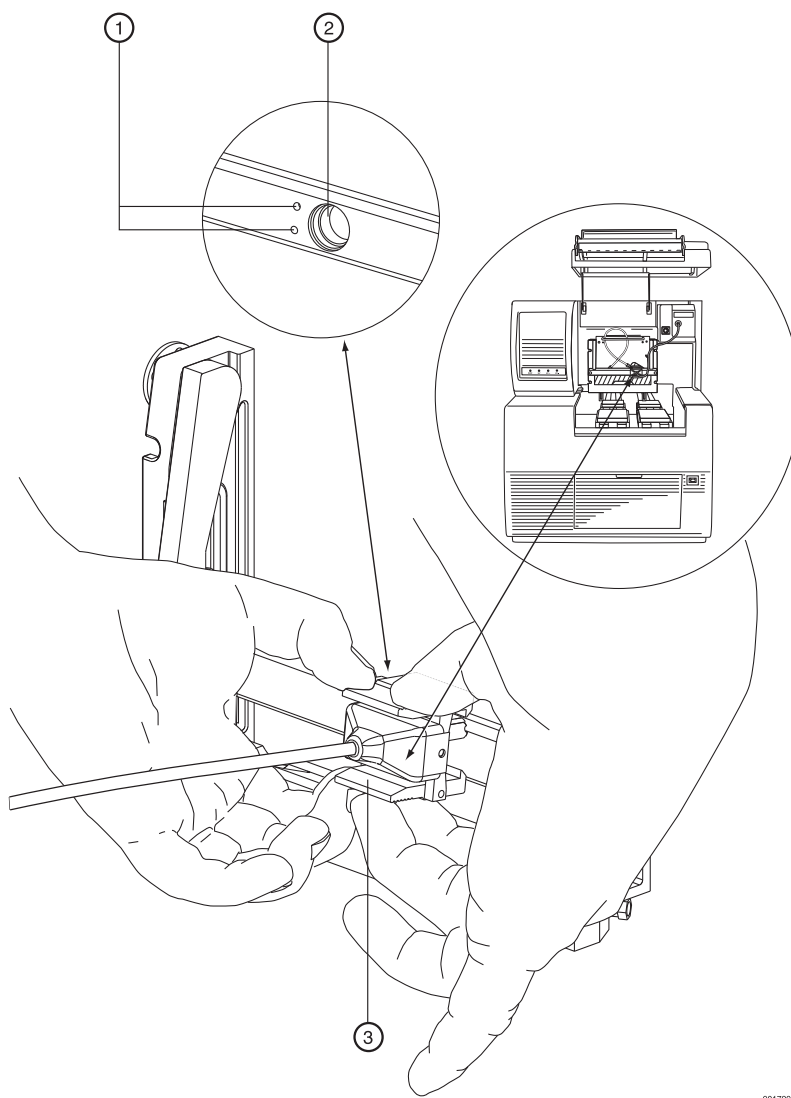
3. Install the MDQ cartridge with LIF plug into the P/ACE MDQ instrument.

Connecting the Probe to the Clamping Bar

The Cartridge must be installed in the instrument before probe can be connected.

1. To connect the probe to the LIF Cartridge, align the two pins on the left side of the probe to the corresponding openings on the clamping bar.
2. Squeeze the probe clamp to open the jaws on the probe, and carefully install the probe onto the clamping bar. Refer to Figure 3.13.

When not in use, install the probe in the Probe Holder (see Figure 3.9) on the Interconnect Module. This provides a mechanical protection for the probe and shields it from dust and other particles.



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Figure 3.13 Connecting the Probe to the LIF Cartridge

1. Alignment Holes in Clamping Bar	3. Probe Clamping Bar
2. Probe Stabilizer	

3.11 Connecting the Computer to the P/ACE MDQ Instrument

Ensure that the GPIB card has been installed as outlined earlier in this section.

The placement of hardware, i.e., computer, instrument, and cable connections will initially be accomplished by the Beckman Coulter Service Engineer. But for reference purposes, refer to Figure 3.14.

Locate the following items in your ship kit:

- r Communications Cable
 - r Power Cable
1. Verify that the P/ACE MDQ power cable is **not** plugged into the AC power outlet and that the computer power is turned off.
 2. Connect the communications cable between the P/ACE MDQ and computer as shown in Figure 3.14.
 3. Connect the P/ACE MDQ and computer power cables to the appropriate AC power outlet.

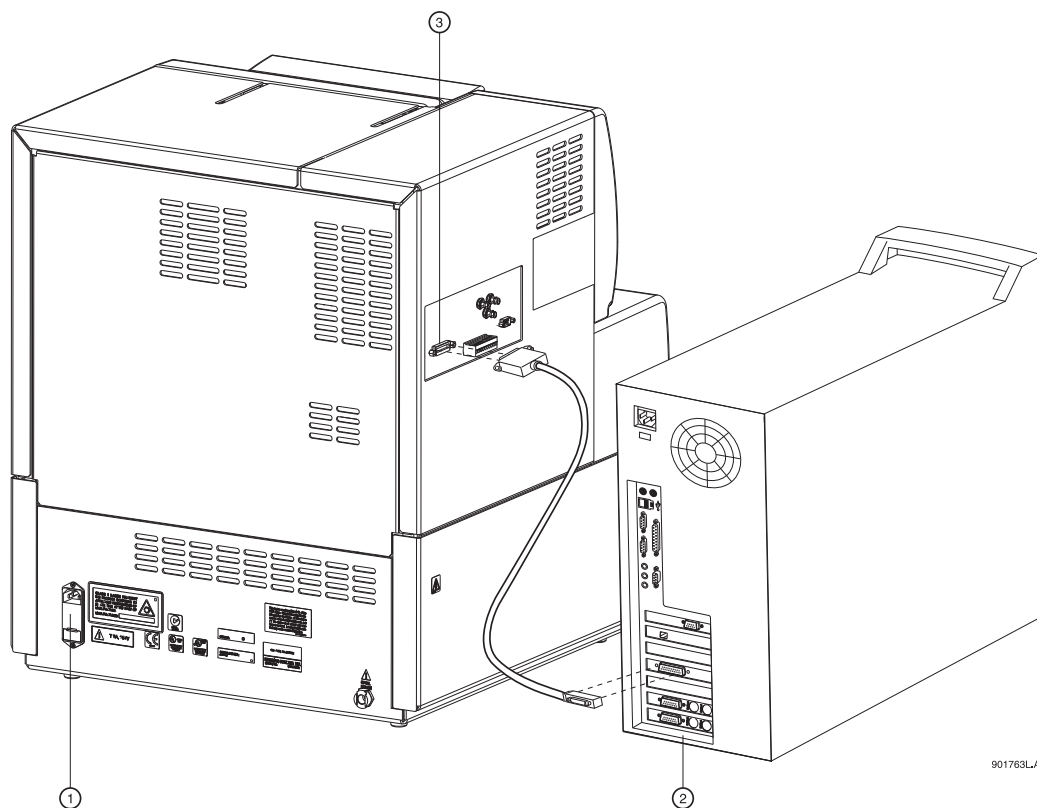
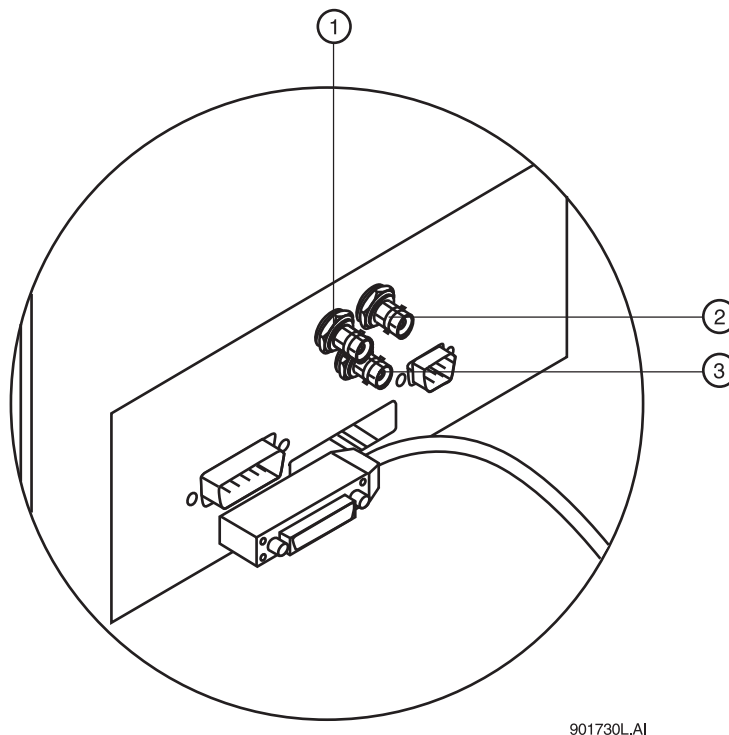


Figure 3.14 Typical Computer/P/ACE MDQ Installation

1. Power Receptacle and Fuse Block	3. Connect Communications Cable Here
2. GPIB Card Interface	

Analog Outputs

Three analog output connectors (BNC type) are available on the P/ACE MDQ connector panel as shown in Figure 3.15. The outputs of these connectors are determined by the type of detector installed (PDA, LIF, or UV).



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Figure 3.15 Location of Analog Outputs

1. Channel 1	3. Channel 3
2. Channel 2	

PDA Detector Outputs

Output 1 is Data Channel 1 and Output 2 is Data Channel 2: Full scale output is 1.0 AN/V software selectable multipliers of 1.0, 0.5, 0.2, 0.05, 0.02, and 0.01 providing lower AU/V values.

Output 3: Current Signal when Voltage is programmed; Voltage signal when either Current or Power is programmed.

UV Detector Outputs

Output 1 is Data: Full scale output is 1.0 AN/V software selectable multipliers of 1.0, 0.5, 0.2, 0.05, 0.02, and 0.01 providing lower AU/V values.

Output 2 not used.

Output 3: Current Signal when Voltage is programmed; Voltage signal when either Current or Power is programmed.

LIF Detector Outputs

Output 1 is Data Channel 1 and Output 2 is Data Channel 2: Full scale output is 1.0 RFU/V software selectable multipliers of 1.0, 0.5, 0.2, 0.05, 0.02, and 0.01 providing lower RFU/V values.

Output 3: Current Signal when Voltage is programmed; Voltage signal when either Current or Power is programmed.

3.12 Configuring the System

The components included with the system must be configured before you can start using the systems. Successfully configuring the hardware indicates a successful hardware/software installation. Please refer to the **P/ACE MDQ User's Guide** for details on configuring the system.

3.13 Installing the Buffer/Sample Tray

During configuration of the system, the type of tray must be entered into the software. However, the trays must be physically installed before the system can be operated.

Before you begin tray installation, locate the following items in your ship kit:

- r Buffer trays (36 positions)
- r Sample tray (48 positions)
- r Well plate (96 positions)

NOTE This procedure requires 32 Karat Software to be installed and running on the system. Perform tray installation after completing software installation. Refer to "**Installing the 32 Karat Software**" on page 13.

1. From Direct Control, click **Load** to bring the trays forward to the load position.
2. Lift the cartridge cover door at the front of the P/ACE MDQ.
3. Install the 48 position sample tray or 96-well plate in the back location as shown in Figure 3.16.

NOTE The 36-Buffer and 48-position trays only fit one way. The 96-Well Plate can be reversed.

4. Install the 36 vial buffer trays in the forward location as shown in Figure 3.16. Refer to NOTE above.

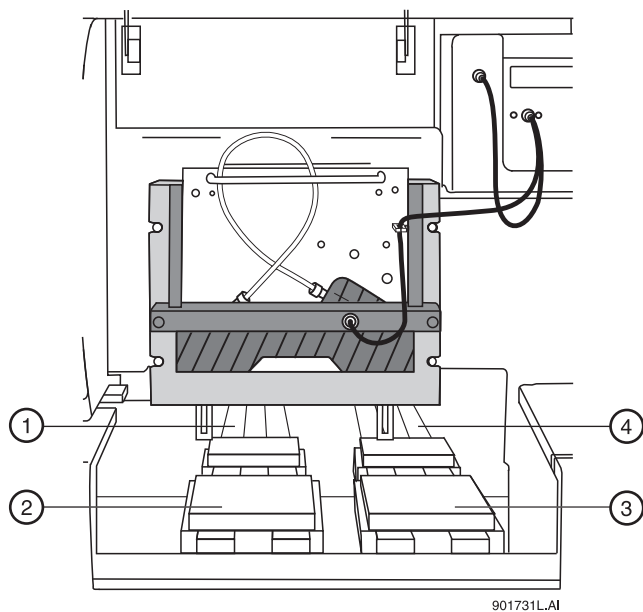


Figure 3.16 Buffer/Sample Tray Installation

- | | |
|--|---|
| 1. Inlet Sample Tray (48) or 96-Well Plate | 3. Outlet Buffer Trays (36 Vials) |
| 2. Inlet Buffer Trays (36 Vials) | 4. Outlet Sample Tray (48) or 96-Well Plate |

3.14 Installation - Additional Features

Buffer Tray Reservoir

The Buffer Reservoir Tray (BRT) has two large capacity buffer reservoirs for use during capillary electrophoretic separations. Each reservoir holds approximately 25 mL of buffer. The tray can simultaneously accommodate ten standard 2 mL buffer vials. Use of this tray requires P/ACE MDQ Software and Firmware Version 1.5 or 32 Karat Software Version 5.0 and Firmware 5.0 or higher.

Installation of the Buffer Tray Reservoir is covered in "Additional Features" on page 79.

External Detector Adapter

The External Detector Adapter (EDA) is designed to allow the capillary to exit the P/ACE MDQ instrument for connection to external detectors or other devices such as mass spectrometers. The EDA consists of instrument modifications, software changes and hardware. It can be used with the standard P/ACE MDQ cartridge or with a special EDA-only cartridge (no on-line detection).

Installation of the External Detector Adapter is covered in "Additional Features" on page 79.



Hardware and Software Installation
Installation - Additional Features

Maintenance

4.1 Maintenance Procedures

This section includes customer performable maintenance procedures for both preventive and corrective actions, which include the following:

- r Capillary cartridge rebuild
- r Filling vials and installing caps
- r Installing UV detector wavelength filters
- r Calibrating the PDA detector
- r Changing the lamp
- r Cleaning the fiber optics
- r LIF care and maintenance
- r Calibrating the LIF detector
- r Instrument care
- r Cleaning the interface block, ejectors and electrodes
- r Refilling the coolant
- r Replacing the electrodes
- r Replacing the quad-rings
- r Replacing the fuses

WARNING Disconnect power before disassembling any instruments. Failure to do so may result in electrical shock or other injury.

WARNING Maintenance or repair procedures not specifically described in this manual present a risk of electrical shock or injury. Refer additional servicing to Beckman Coulter.

WARNING Do not attempt to defeat any of the instrument interlocks or safety mechanisms.

4.2 Rebuilding the Capillary Cartridge

This procedure provides instructions for rebuilding and/or replacing parts, as necessary, for the P/ACE MDQ cartridge assembly. Before rebuilding the cartridge, refer to Figure 4.1, the table of rebuild components, and the following list for items required.

- r Safety Glasses
- r Flathead Screwdriver
- r Forceps

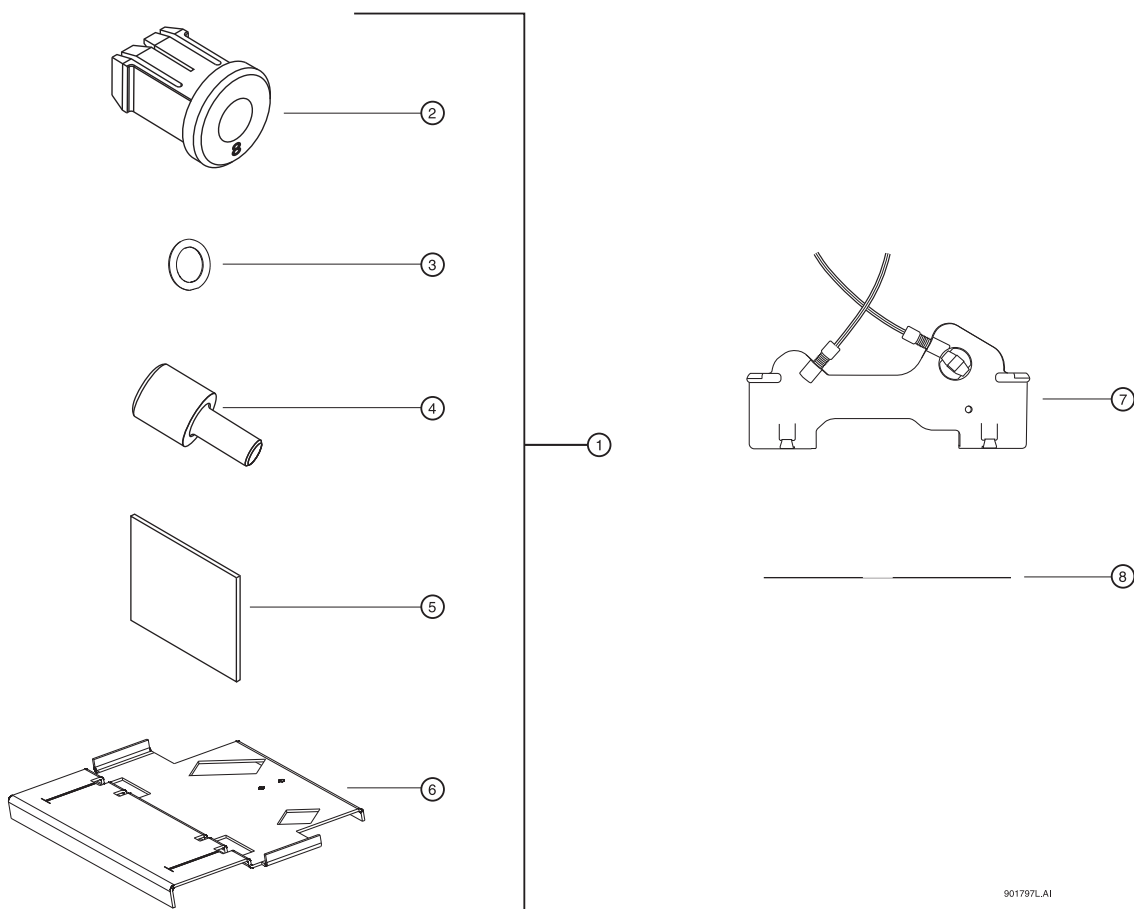


Figure 4.1 Capillary Cartridge Rebuild Components

Table 4.1 Capillary Cartridge Rebuild Components

1. Capillary Rebuild Kit (PN 144645)	5. Cleaving Stone
2. Aperture Plug - UV/PDA (PN 144711)	6. Capillary Length Template (PN 144653)
3. Aperture O-Ring (PN 970297)	7. Cartridge Assembly (PN 144738)
4. O-Ring Installation Tool (PN 177540)	8. Capillary

Removing the Capillary

1. Remove the seal-retainer clips from the capillary cartridge as shown in Figure 4.2 and inspect the seals. If the seals appear to be worn, damaged or leaking, replace the seals.

CAUTION Do not reinstall the seal retainer clips at this time.

WARNING Be careful when handling capillaries. If broken, the capillary ends can be very sharp and can cause a puncture wound.

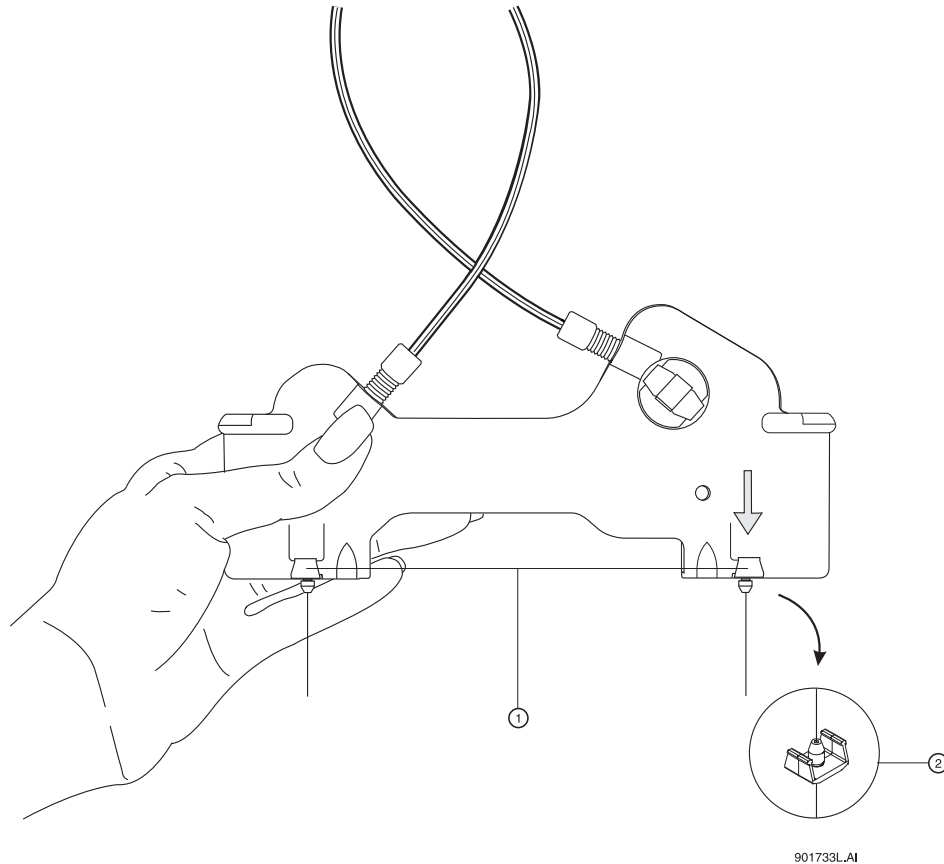


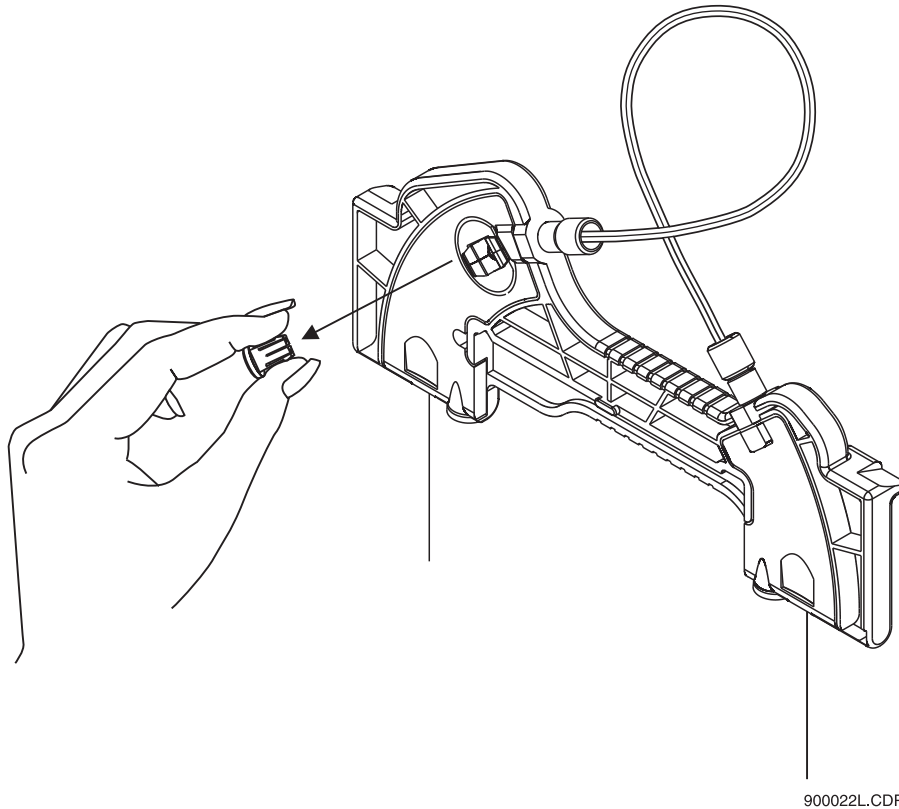
Figure 4.2 Removing Seal-Retainer Clips from Capillary Cartridge

-
1. Gently pry the seal-retainer clips away from the cartridge.
 2. Seal-Retainer Clip and Double Seal
-

Maintenance

Rebuilding the Capillary Cartridge

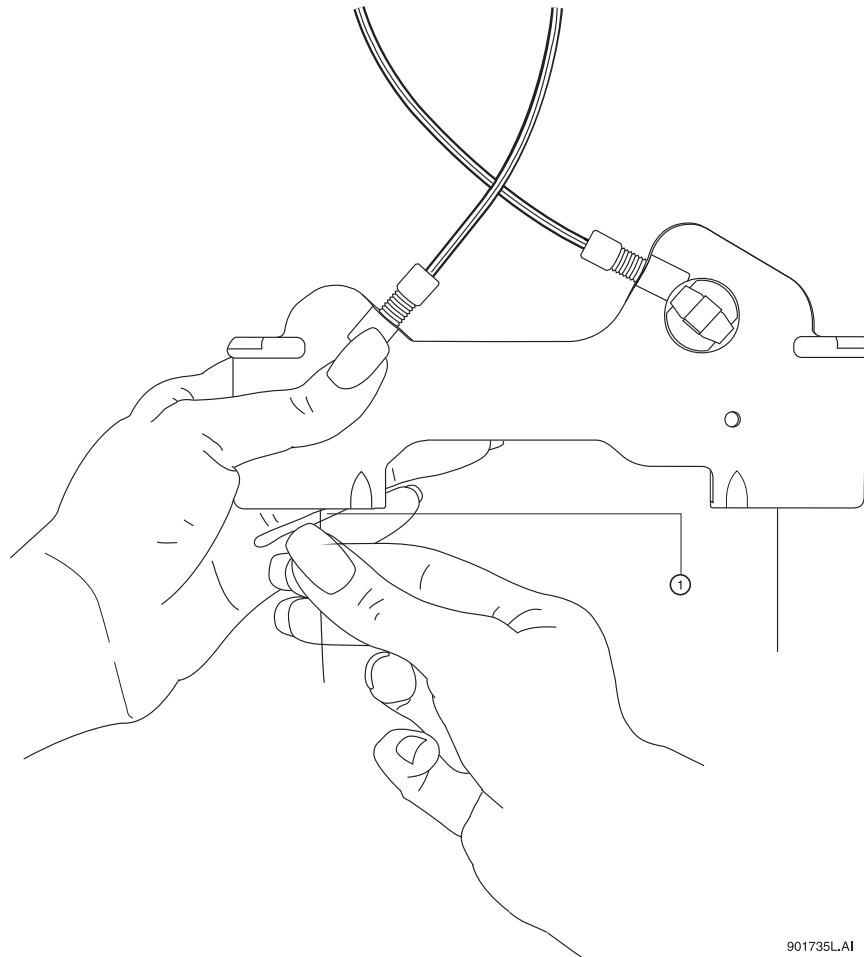
2. Remove the aperture by pushing from the front of the cartridge and pulling out from the back. If the O-Ring inside the aperture does not come out, use a pair of forceps to remove it. Refer to Figure 4.3.



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Figure 4.3 Removing Aperture from Cartridge (Back View)

3. Grasp the capillary at the cartridge inlet and pull firmly to remove it, as shown in Figure 4.4.



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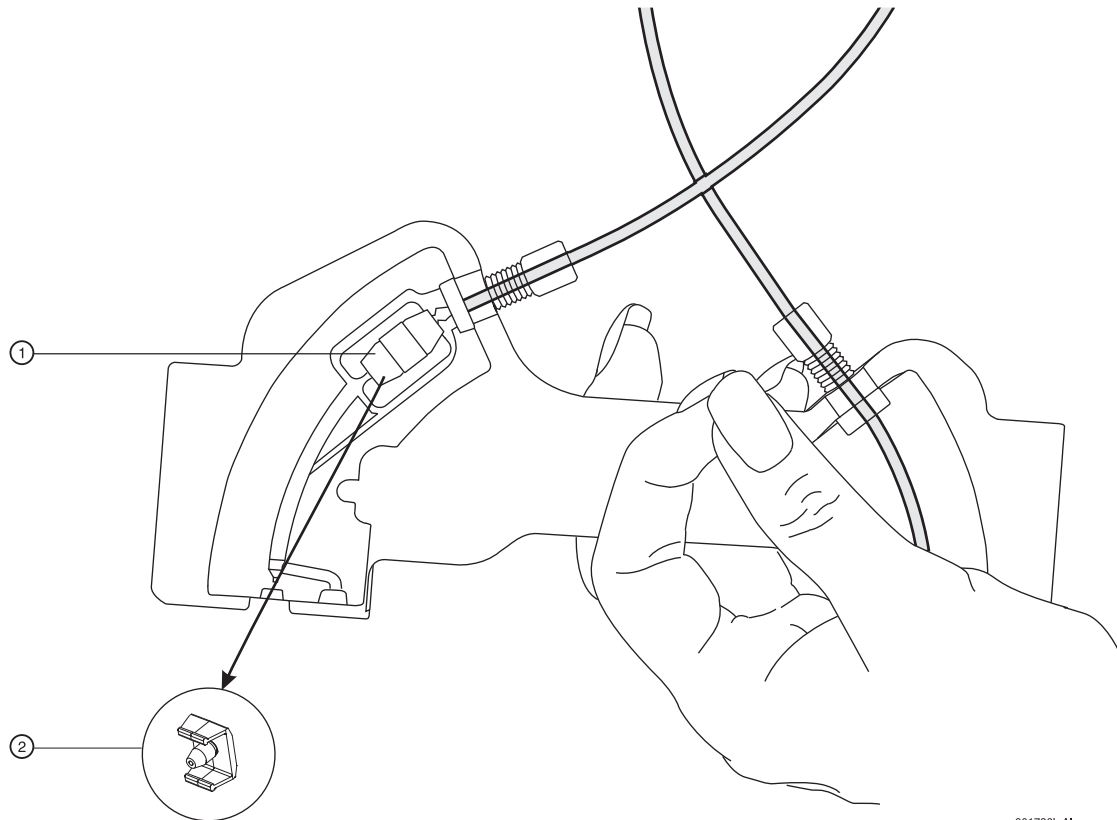
Figure 4.4 Removing the Capillary

1. Inlet

Maintenance

Rebuilding the Capillary Cartridge

- Referring to Figure 4.5, remove the aperture seal clips. If seals appear to be worn, damaged, or leaking, replace the seals. Reinstall the aperture seal clips.



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Figure 4.5 Removing Aperture-Seal Clips

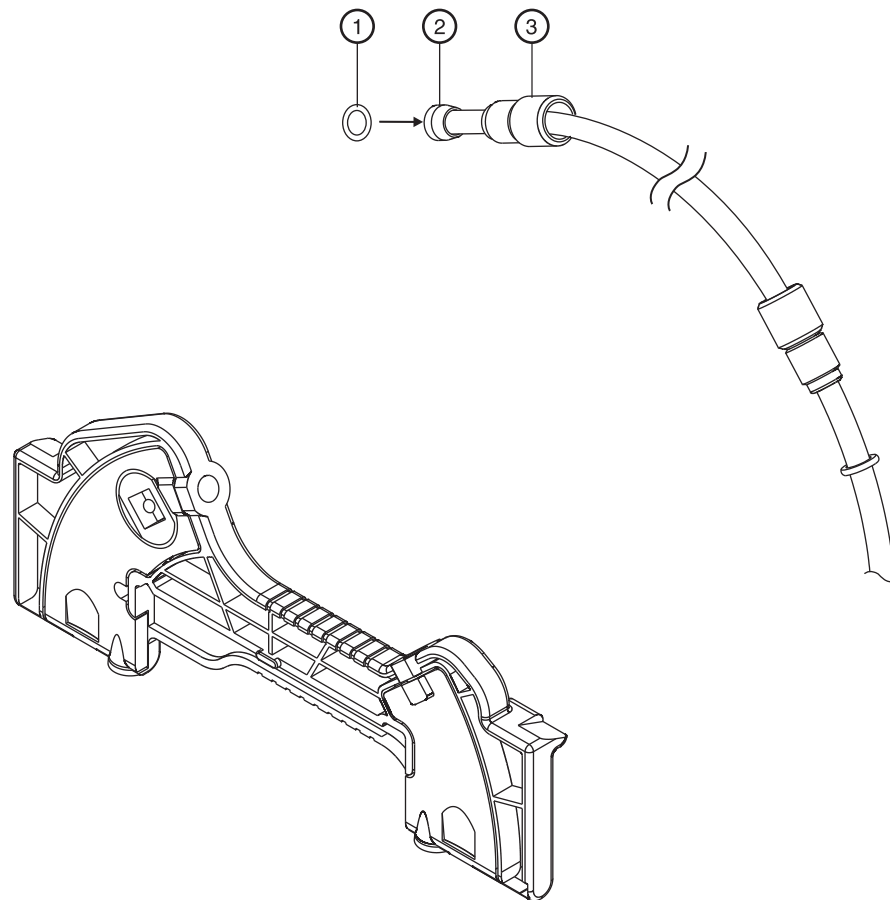
1. Gently pry the aperture clips away from the cartridge.
2. Aperture Seal Clip and Single Seal

- If you are using the same capillary length and no leaks are evident at this time, skip to the "Marking the Capillary" on page 42.

Replacing the Coolant Tubing and Seal

NOTE The following step (6) is necessary only if replacing damaged tubing/O-Ring or selecting different length tubing.

- Loosen and remove the tubing nuts, coolant tubing, ferrule and O-Ring from the cartridge as shown in Figure 4.6.



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Figure 4.6 Removing Tubing Nuts, Coolant Tubing, Ferrule and O-Ring

1. O-Ring	3. Tubing Nut
2. Ferrule	

- Select the desired capillary length from the following table, then select corresponding coolant tubing from the Cartridge Tubing Kit or cut coolant tubing to desired length as specified in the table following. Use a razor blade or X-ACTO® knife to cut tubing.

Capillary Length to Detector	Total Capillary Length	Coolant Tubing Length
21 cm	31.2 cm	14.0 cm*
30 cm**	40.2 cm	22.8 cm*
40 cm**	50.2 cm	32.8 cm*
50 cm	60.2 cm	42.8 cm*
60 cm	70 cm	52 cm
70 cm	80 cm	61.5 cm
80 cm	90 cm	71 cm
90 cm	100 cm	80.5 cm
100 cm	110 cm	90 cm

* Pre-cut capillary tubing lengths are included in the coolant tubing kit.
 ** Pre-formed tubes provided in the tubing kit should be used for these lengths to prevent kinks and flow restrictions. These lengths are only provided in the table for reference.

- Slide one tubing nut, ferrule (tapered edge first) and O-Ring over each end of the new coolant tubing as shown as shown in Figure 4.7. If a ferrule has been removed from the tubing, re-using the same ferrule may cause a leak. Always use a new ferrule.

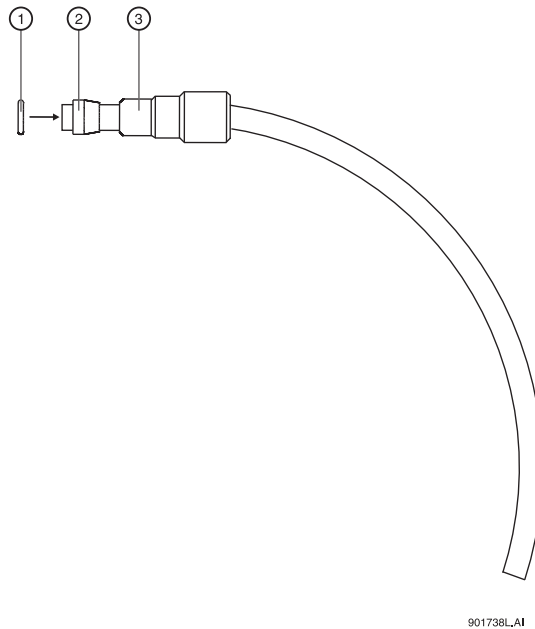


Figure 4.7 Sliding Nut, Ferrule and O-Ring Over End of Coolant Tubing

1. O-Ring	3. Nut
2. Ferrule	

9. Insert the coolant tubing in the cartridge inlet and press firmly into the cartridge base. Be sure the tubing slides all the way into the cartridge base as shown in Figure 4.8.

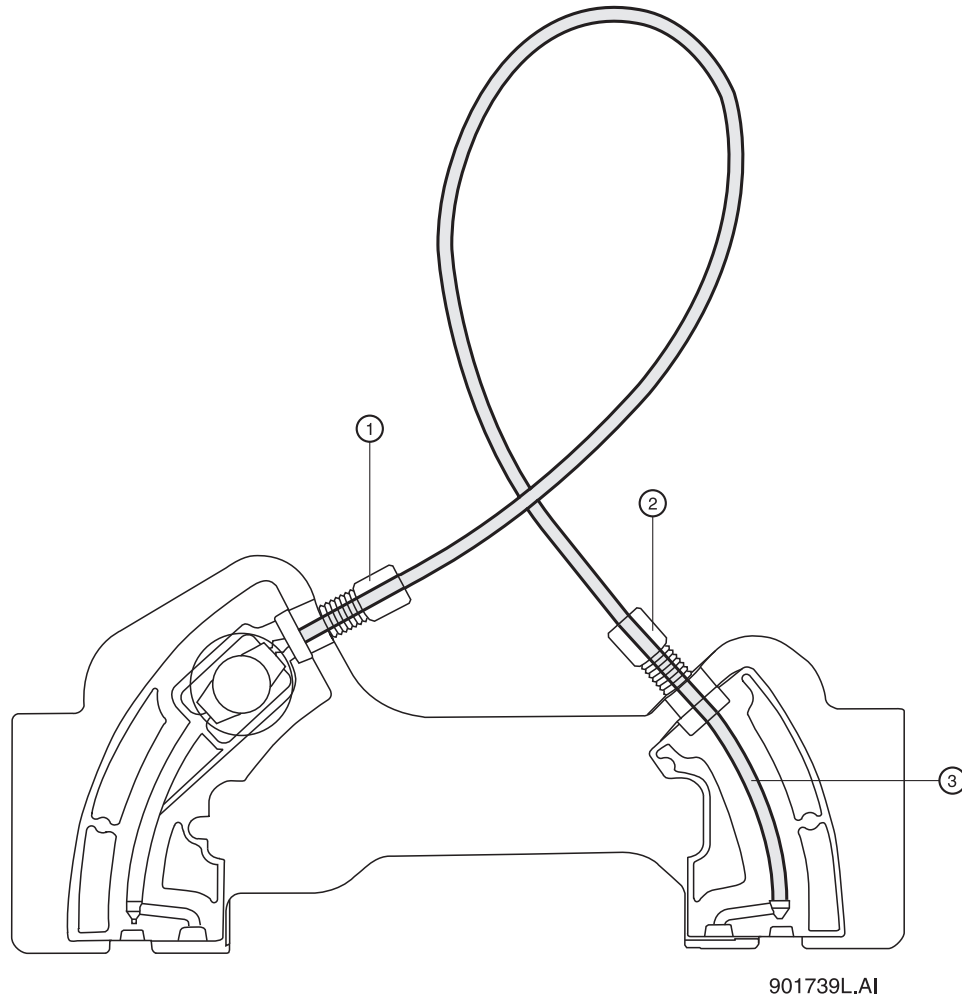


Figure 4.8 Inserting the Coolant Tubing in the Cartridge Inlet (Back View)

1. Cartridge Outlet Side	3. Tubing inserted all the way into the base
2. Cartridge Inlet Side	

10. Push the tubing nut, ferrule, and O-Ring in and tighten the tubing nut finger tight.
- NOTE** For tubing lengths longer than 40 cm, make a loop in the coolant tubing as shown before inserting in the cartridge outlet side. Two loops are required for total capillary lengths greater than 70 cm.
11. Insert the other end of the coolant tubing in the cartridge outlet and press firmly into the cartridge base.
 12. Continue to press the tubing in.
 13. Push the tubing nut, ferrule, and O-Ring in and tighten the tubing nut finger tight.

Marking the Capillary

1. Referring to Figure 4.9, measure 11 cm from capillary window to the outlet end.
2. Mark the capillary window position with a felt tip marker.

NOTE Do not touch the capillary window as it is fragile and finger oils can reduce detection sensitivity.

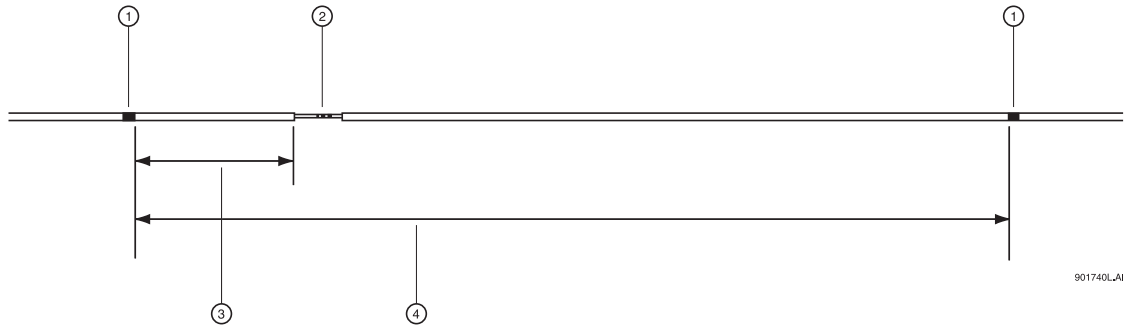


Figure 4.9 Marking Capillary Window Position

1. Mark	3. 11 cm
2. Capillary Window	4. Desired total length plus 5 cm

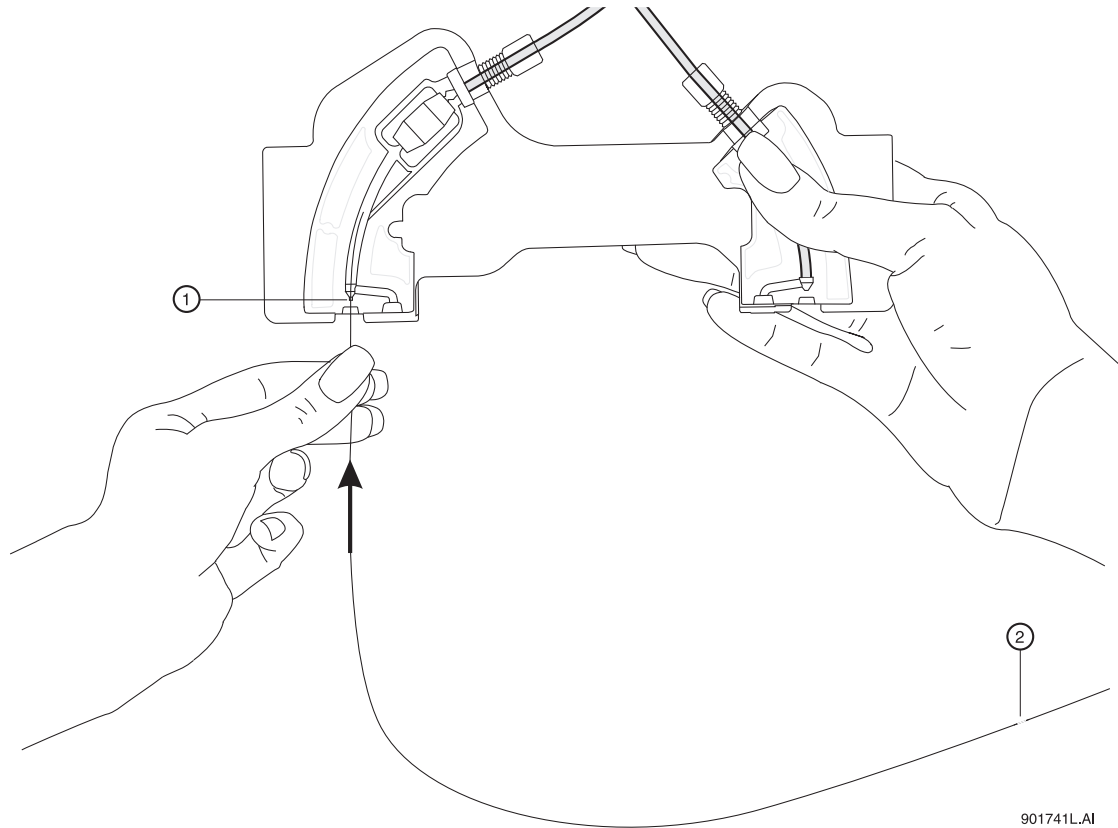
CAUTION Be sure to wear safety glasses when cleaving and breaking the capillary. Remember to handle the capillary safely because the ends are sharp.

3. Using the capillary cleaving stone, score the capillary as marked and carefully pull capillary straight off without bending.

CAUTION Do not saw back and forth with the cleaving stone.

4. Measure the overall length plus 5 cm as shown in Figure 4.9.
5. Use a felt tip marker to mark the capillary.

6. Insert the capillary end farthest from the capillary window into the outlet side of the cartridge as shown in Figure 4.10.



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Figure 4.10 Inserting Capillary End into the Outlet Side of Cartridge

1. Cartridge Outlet

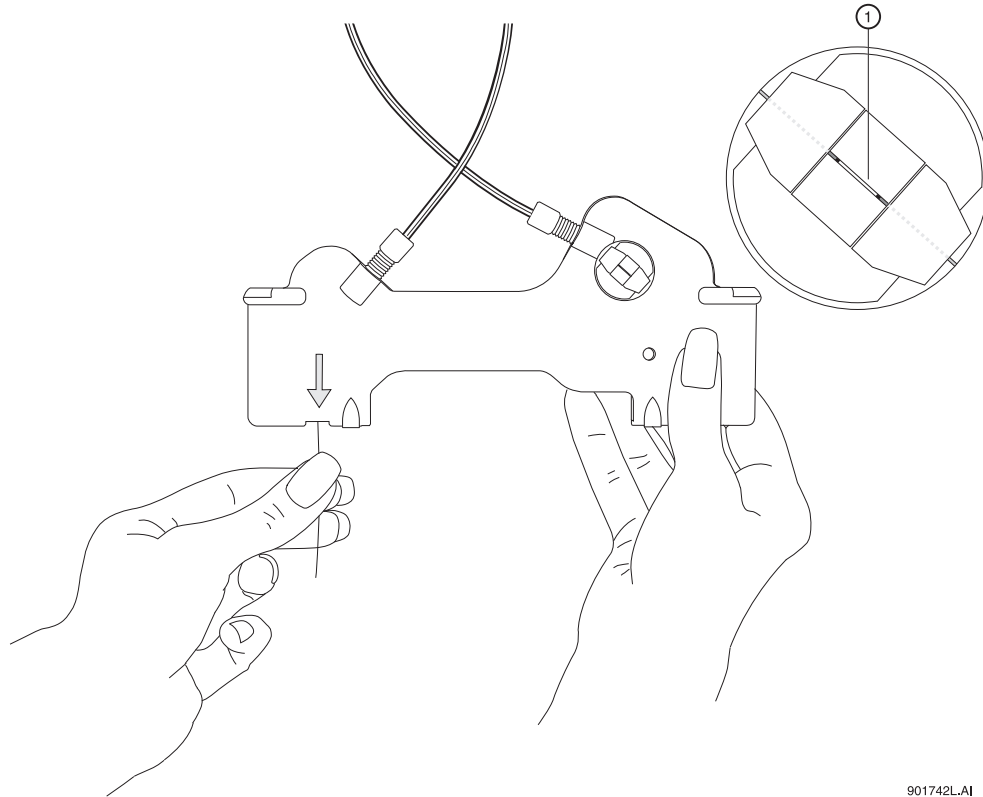
2. Capillary Window

7. Carefully push and twist the capillary through the cartridge until it appears at the cartridge inlet.

Maintenance

Rebuilding the Capillary Cartridge

- Continue by pulling the capillary through the cartridge until the capillary window appears centered in the cartridge window as shown in Figure 4.11.



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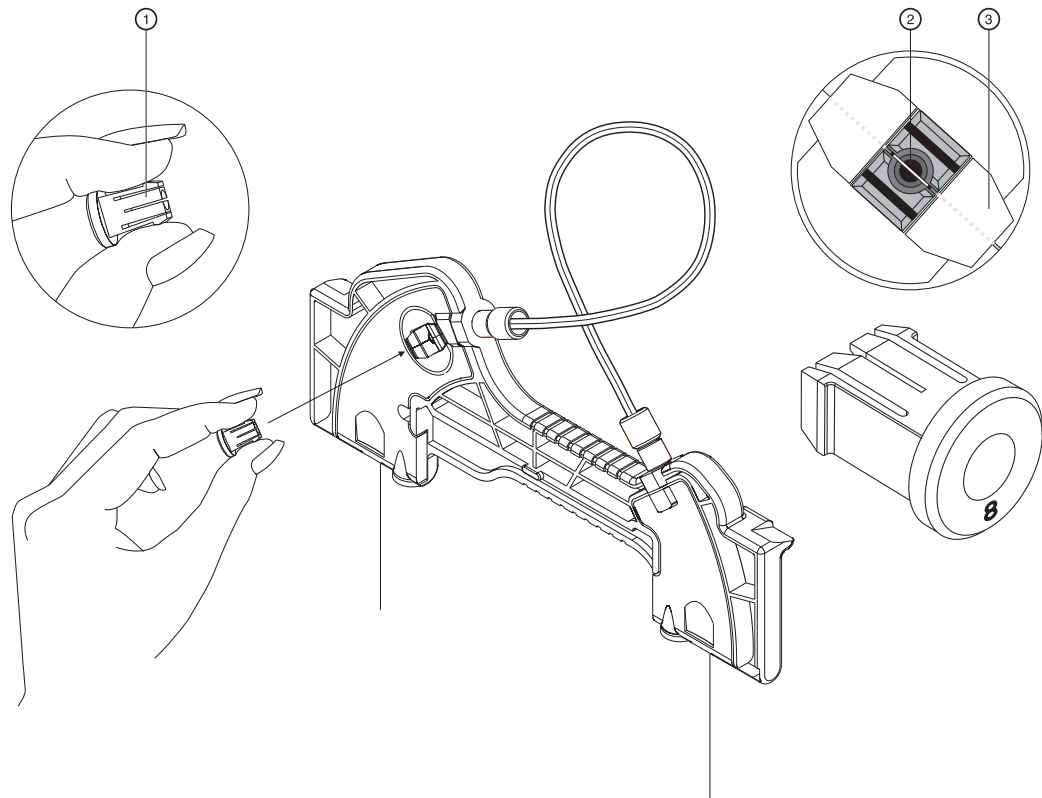
Figure 4.11 Centering Capillary Window in Cartridge Window

1. Capillary Window

Installing the Aperture Clip

1. From the back side of the cartridge, carefully align the center groove of the aperture clip with the capillary window as shown in Figure 4.12 and press it in place.

NOTE Make sure that the previous O-Ring has been removed from the aperture clip before re-installing the clip.



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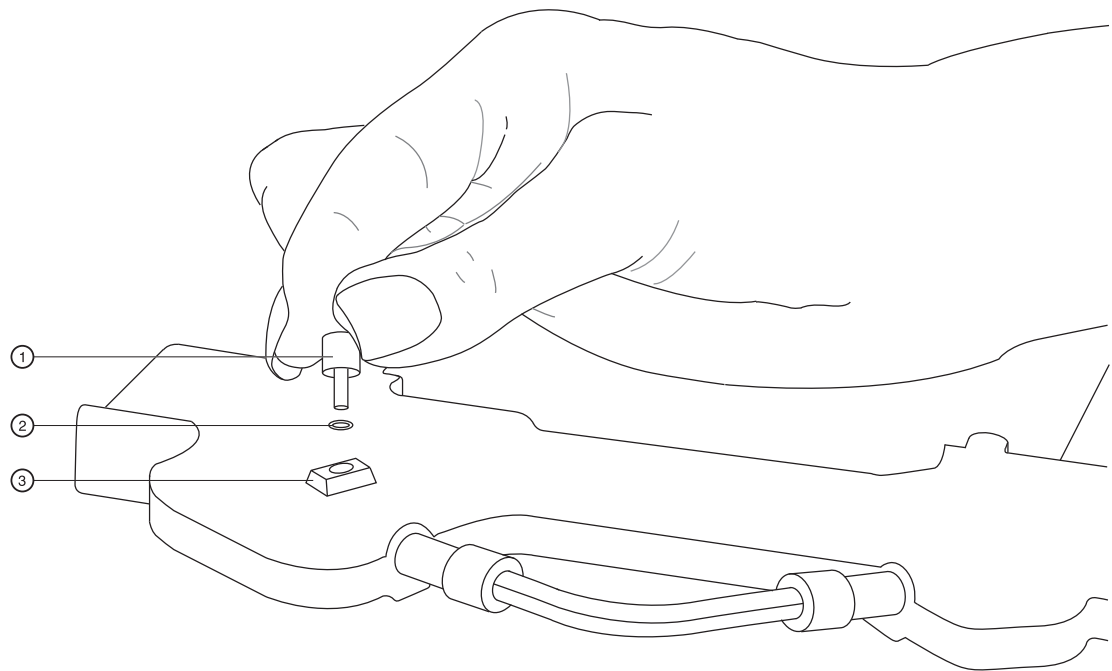
Figure 4.12 Aligning Groove of Aperture Clip with Capillary Window

1. Aperture Clip	3. Capillary
2. Aperture	

Maintenance

Rebuilding the Capillary Cartridge

2. From the front side of the cartridge, place the retainer O-Ring in the aperture clip hole.
3. Next, using the O-Ring insertion tool, carefully press the tool down until the O-Ring is seated in the aperture clip. Refer to Figure 4.13.

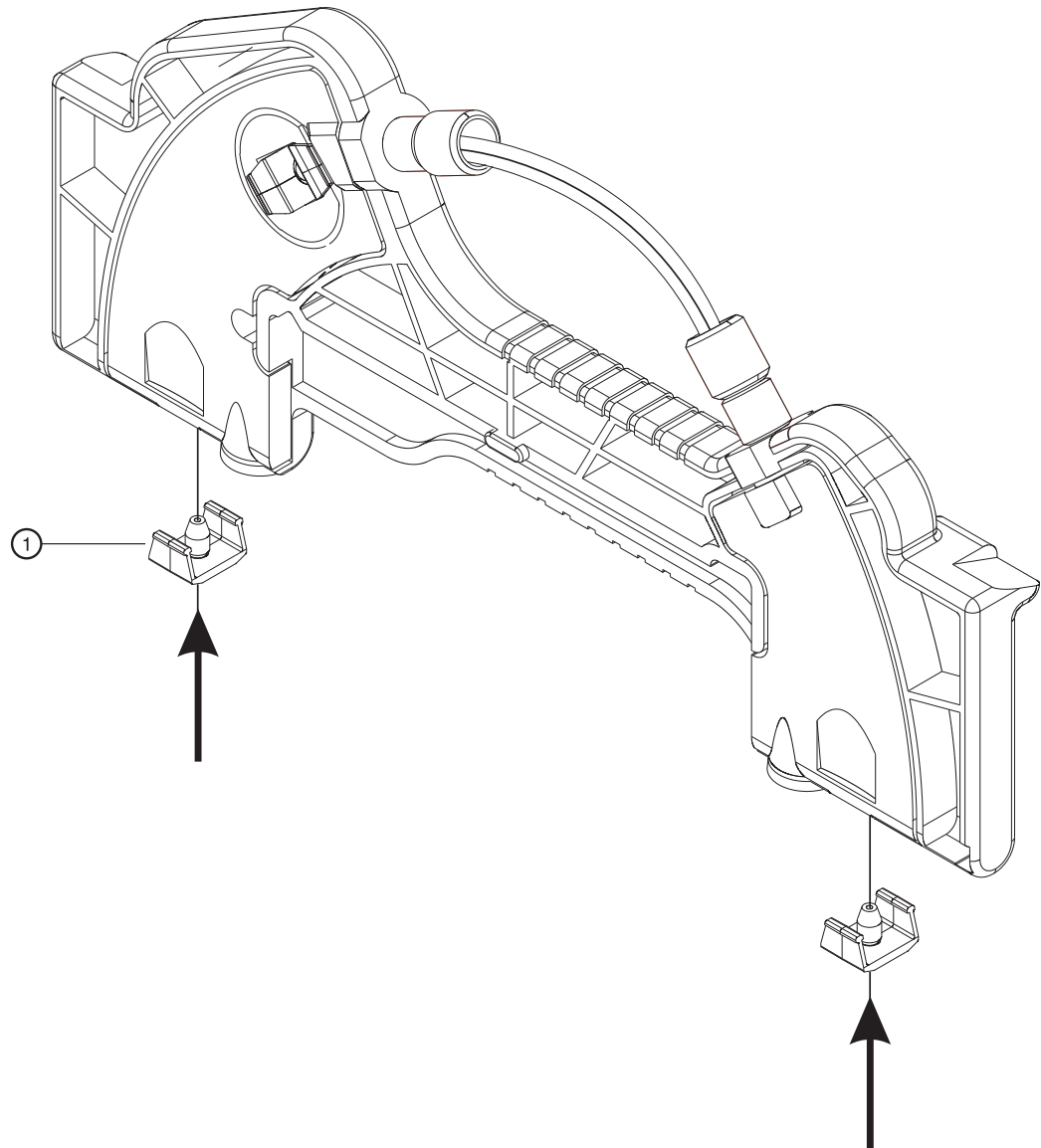


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Figure 4.13 Seating O-Ring in Aperture-Clip Hole (Front View)

1. Insertion Tool	3. Aperture Clip Hole
2. O-Ring	

- Carefully insert the capillary Seal Retainer Clips over the capillary at each end and press up, to snap them into place.
- Be sure both the front and back edges clip into place for each clip. Refer to Figure 4.14.



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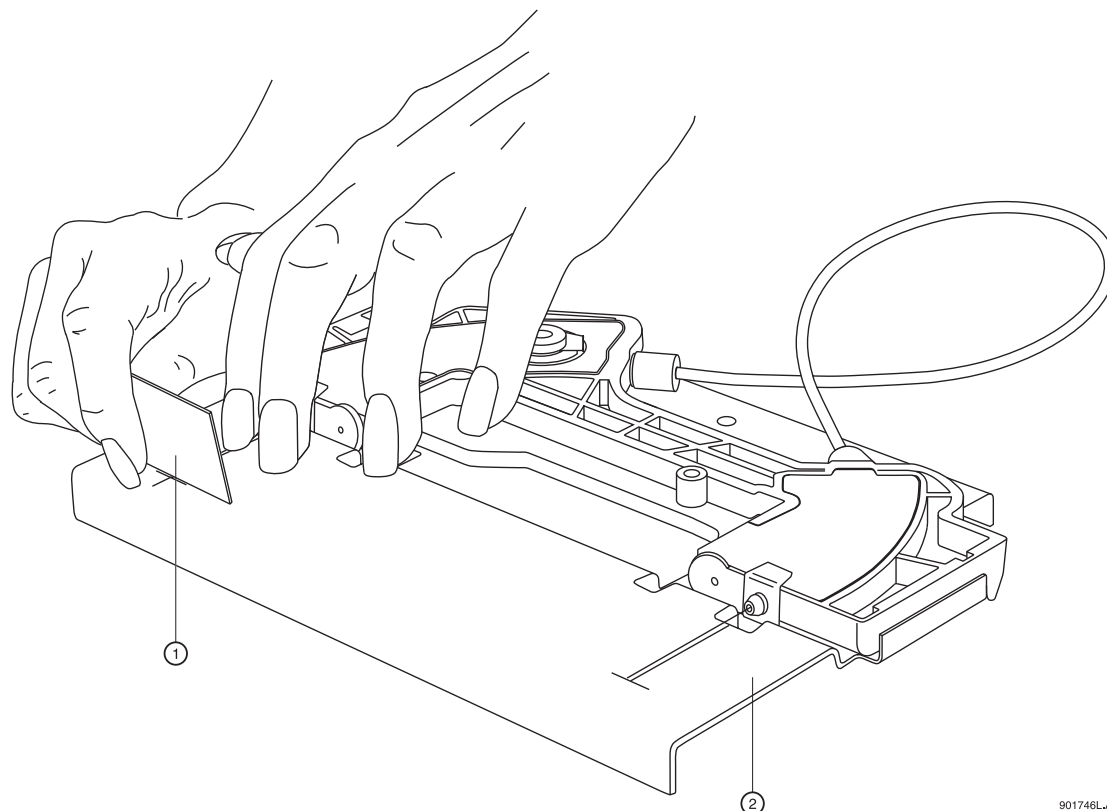
Figure 4.14 Inserting the Capillary-Seal Retainer Clips

1. Seal-Retainer Clips

- Visually inspect that the capillary ends are straight. If not, remove and reinstall the seal-retainer clips.

Trimming the Capillary Ends

1. Position the cartridge against the capillary-length template as shown in Figure 4.15.



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Figure 4.15 Trimming the Capillary Ends

1. Cleaving Stone

2. Template

2. At the cartridge inlet, carefully push the capillary into the cartridge until the capillary stops against the wall of the coolant tubing. By doing this, the excess space in the coolant tubing will be eliminated, which prevents the capillary from movement during use.
3. While holding the capillary against the template, press down to score each end at the cross mark on the template.

IMPORTANT Do not saw back and forth with the cleaving stone.

4. Carefully pull each end of the capillary straight off, without bending it.

The cartridge is now ready for use. Depending on the type of capillary and the application, the capillary may require cleaning, coating or regeneration before use.

Filling Vials and Installing Caps

Three different vials and one plate are available for use with P/ACE MDQ. A separate procedure is provided below for each vial.

The types are:

- r 0.5 mL vials
- r 2.0 mL vials
- r PCR vials
- r 96-well plates

NOTE Vial caps should be clean and completely dry before each use. Do not overfill the vial. Overfilling can cause hydrostatic pressure to push liquid into the gas lines. Do not under fill the vial or let liquid level become too low. Low liquid levels in separation vials can cause poor separation.

Filling 0.5 mL Vials

Before you begin, you will need:

- r 0.5 mL vial
 - r Blue vial caps
1. Fill the vials with at least 200 μ L of degassed liquid.
 2. Be sure to dislodge any bubbles that may form at the bottom of the vials.
 3. Put the vial cap on the vial as shown in Figure 4.16, then press it in place.

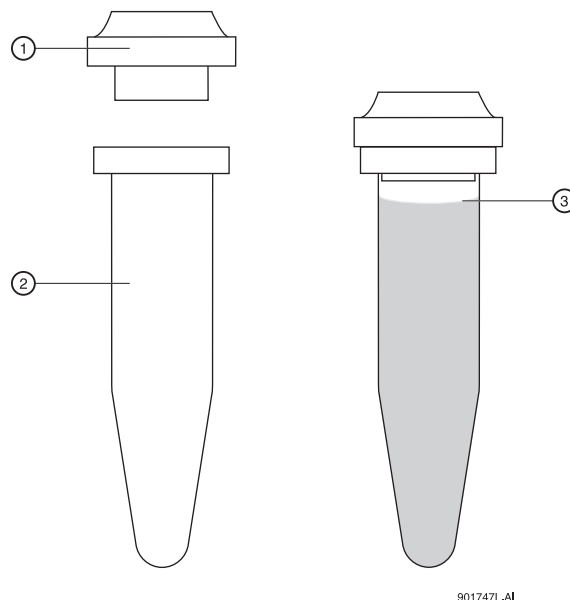


Figure 4.16 Filling 0.5 mL Vials

1. Blue Cap	3. Maximum Fill Level
2. 0.5 mL Vial	

Filling the 2.0 mL Vials

Before you begin, you will need:

- r 2.0 mL vial
- r Red vial caps

1. Fill vials as shown in Figure 4.17.
2. Put the cap on the vial as shown in Figure 4.17, then press in place.

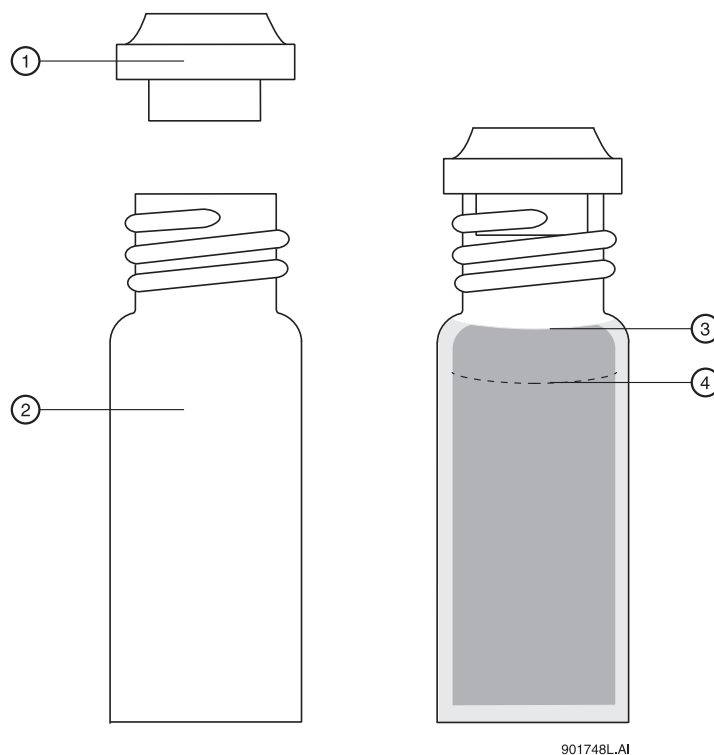


Figure 4.17 Filling 2.0 mL Vials

1. Red Cap	3. Maximum Fill Level
2. 2.0 mL Vial	4. Viscous Fill Level

Filling PCR Vials

Before you begin, you will need:

- r PCR vial
- r Gray vial caps
- r PCR spring adapter
- r PCR vial holder

1. Referring to Figure 4.18, fill the vial with at least 5 μ L of degassed sample. Be sure to dislodge any bubbles that may form at the bottom of the vials.
2. Place the vial cap on the vial.

3. Place the PCR spring adapter inside the vial holder.
4. Place the vial and cap in the vial holder and press in place.

NOTE Very small samples may evaporate into the space inside the vial holder. This effect can be minimized by placing 200 μ L of sample solvent or water in the bottom of the vial holder and by injecting small samples as soon as possible.

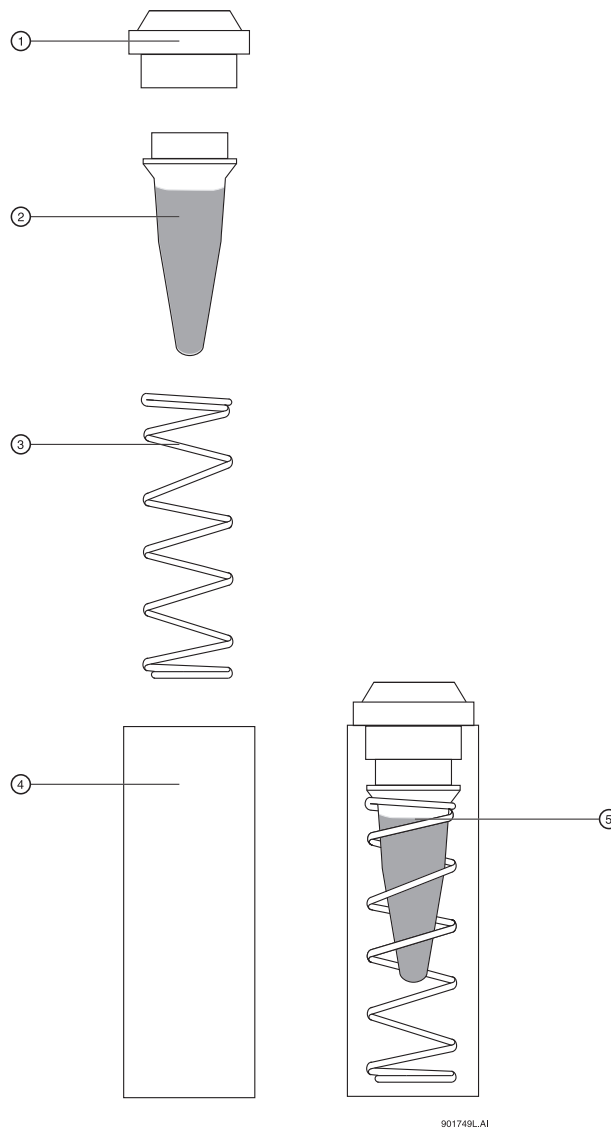


Figure 4.18 Filling PCR Vials

1. Gray Cap	4. PCR Vial Holder
2. PCR Vial	5. Maximum Fill Level
3. PCR Spring	

Filling the 96-Well Plates

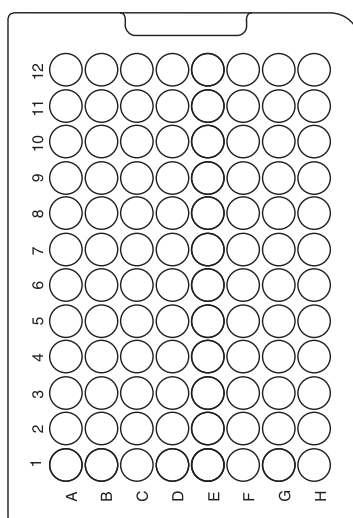
Before you begin, you will need:

- 96-well plate

CAUTION The P/ACE MDQ is not intended to accommodate volatile materials in 96-well plates. Volatile solvents may release hazardous or flammable vapors leading to a risk of fire or explosion. Solvent vapors may also damage the instrument.

WARNING Do not use volatile solvents in 96-well plates.

1. Fill the desired well plate positions with 150 μ L of sample. Refer to Figure 4.19 for position layout.



900039L.CDR

Figure 4.19 Filling 96-Well Plates

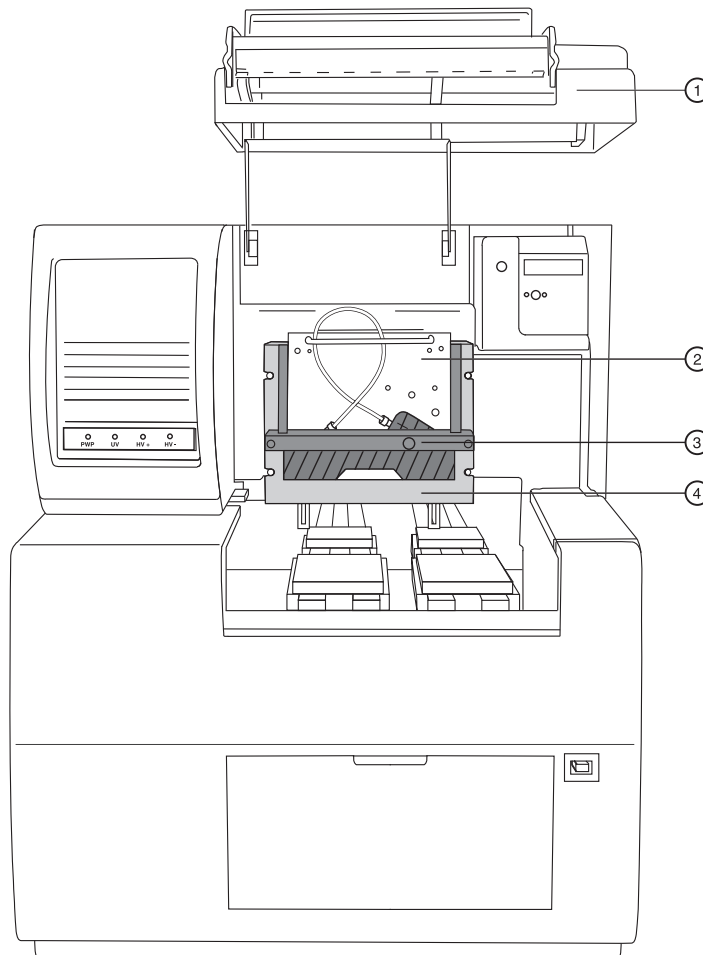
Installing the UV Detector Wavelength Filters

Before you begin, you will need:

- r Desired filters
- r Latex gloves

Referring to Figure 4.20, proceed as follows:

1. From Direct Control, place trays in **LOAD** position
2. Lift the cartridge cover door at the front of the P/ACE MDQ.
3. Turn the system power off.
4. Loosen the two thumb screws and lift the insertion bar.
5. Remove the capillary cartridge from the interface block.



901750L-A1

Figure 4.20 Installing UV Detector Wavelength Filters

1. Cartridge Cover Door	3. Insertion Bar
2. Optics Source Assembly	4. Interface Block

6. Loosen the two thumb screws and remove the optics source assembly.
7. Place the assembly on a clean work surface.
8. Remove the filter wheel access cover and rotate the filter wheel until the desired filter is visible. Refer to Figure 4.21.

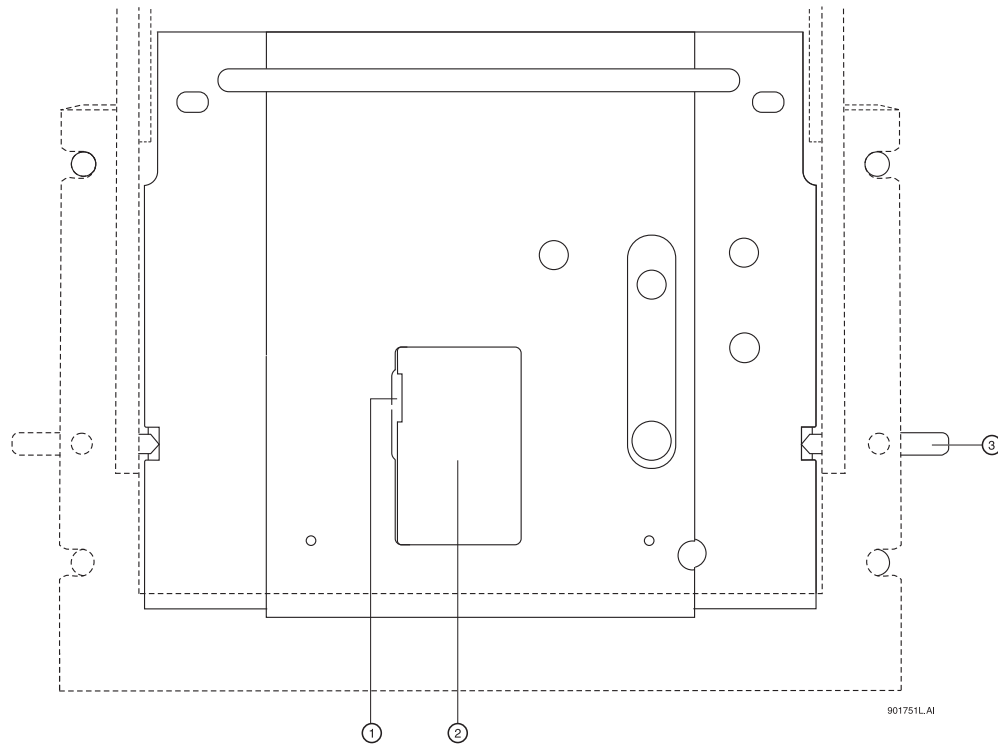


Figure 4.21 Removing Filter Wheel Access Cover

- | | |
|----------------------------------|---------------------------------------|
| 1. Open cover at point indicated | 3. Thumb Screws (2), one on each side |
| 2. Access Cover | |

9. Wearing latex gloves, use small forceps to remove the desired filters from the filter wheel.
NOTE Make sure to wear gloves when touching the optical surfaces of the filters. Without gloves, oils from the skin will cause improper filter performance.
10. Examine each wavelength filter for a burned spot. Replace any filters that appear to be damaged.

11. Insert the new filter with the reflective side facing inward. Refer to Figure 4.22.

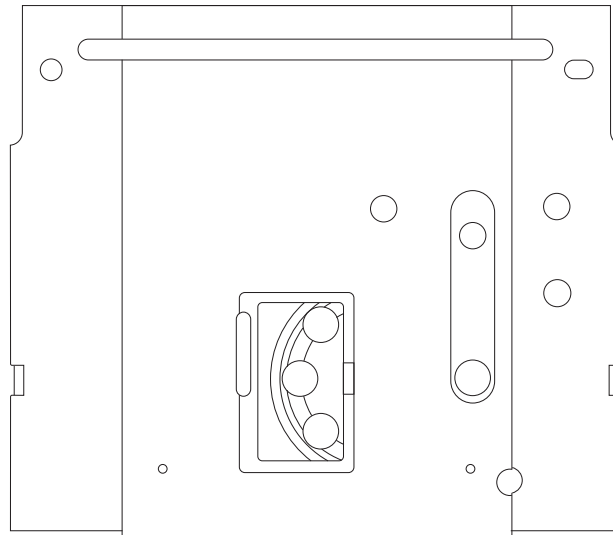


Figure 4.22 Installing New Filter

12. When all of the filters have been inspected or replaced as desired, reinstall the filter wheel access cover.
13. Place the optics source assembly in the mounting location.
14. Align the two upper guide-pins and tighten the two thumb screws.
15. Reinstall the capillary cartridge in the interface block.
16. Lower the insertion bar and tighten the two thumb screws.
17. Close the cartridge cover door.
18. Turn the system power on and start the 32 Karat Software.

19. From the Instrument screen **File Menu**, select **Configuration**. The 32 Karat Software Configuration dialog box appears as shown in Figure 4.23.
20. In the **Filter** dialog, enter the position and type for each of the installed filters.

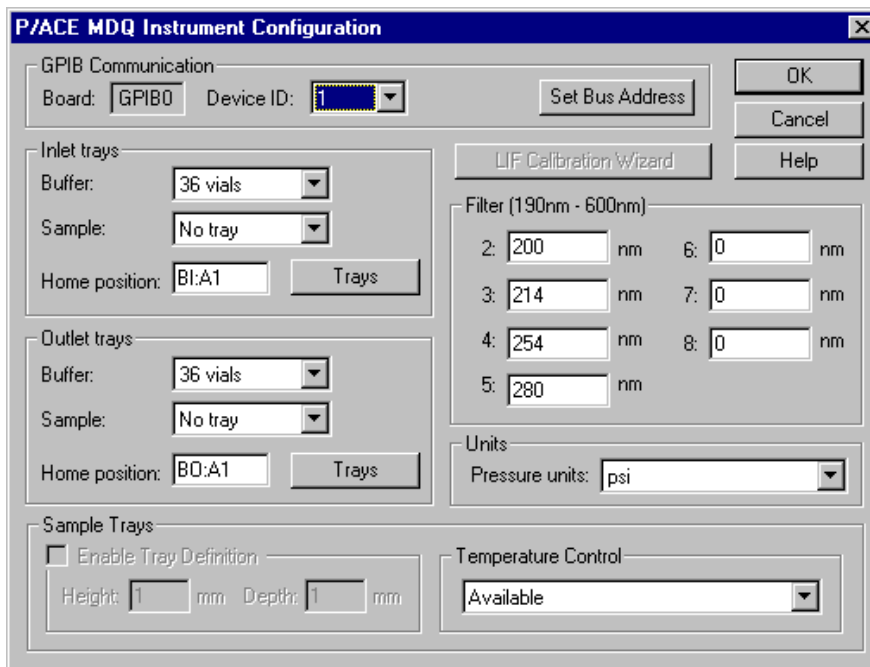


Figure 4.23 Configuration Dialog Box

Calibrating the PDA Detector

The PDA detector should be calibrated following initial installation, after changing lamp or other optical components, and when required as part of maintenance.

Calibrate the PDA detector as follows:

1. From the **Main Menu**, click on the instrument number in which the PDA detector is installed.
2. From the **Control menu**, click on **Direct Control**. The Direct Control screen appears as shown in Figure 4.24.

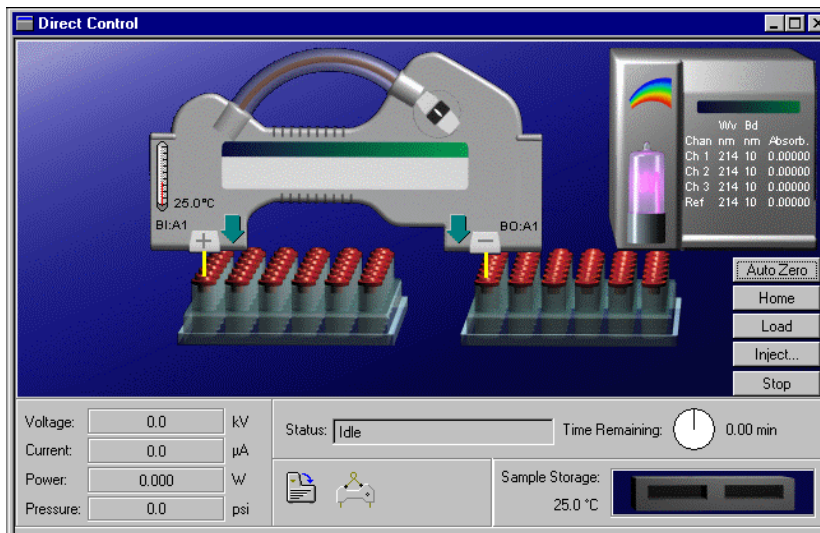


Figure 4.24 Direct Control Screen

3. Click on the **Rainbow** above the lamp graphic. The PDA Detector Parameters screen appears as shown in Figure 4.25.

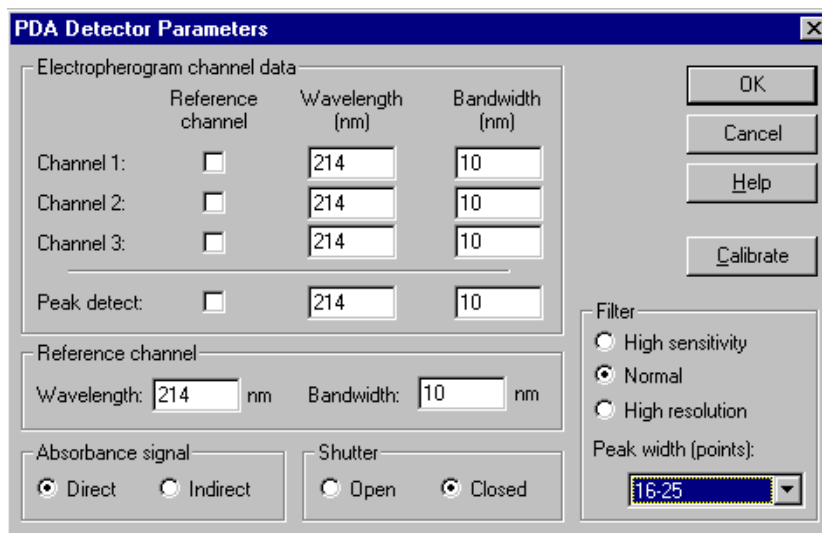


Figure 4.25 PDA Detector Parameters

4. Click **Calibrate** to begin the calibration sequence. Calibration requires approximately 2 minutes. Do not attempt to access the instrument during the calibration process.

Changing the Lamp

If the baseline is excessively noisy or the lamp will no longer strike, it may need to be replaced. The following procedure describes how to change the lamp.

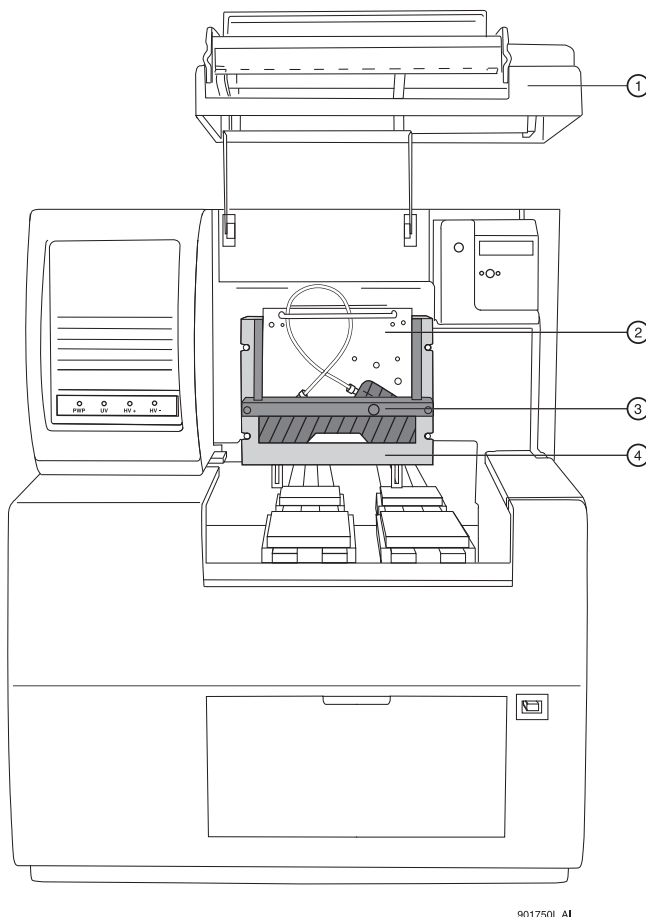
Before you begin, you will need:

- r Deuterium lamp
- r 7/64" hex head wrench

WARNING If the P/ACE MDQ has been on for any length of time, the deuterium lamp will be very hot. To avoid burning your fingers, allow the lamp to cool before replacing it.

Referring to Figure 4.26, proceed as follows:

1. From **Direct Control**, place the trays in the **LOAD** position.
2. Lift the cartridge cover door at the front of the P/ACE MDQ.
3. Turn the system power off and allow sufficient time for the lamp to cool.
4. Loosen the two thumb screws on the insertion bar and lift the insertion bar.
5. Remove the capillary cartridge from the interface block.



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Figure 4.26 Changing the Lamp

1. Cartridge Cover Door	3. Insertion Bar
2. Optics Source Assembly	4. Interface Block

6. Referring to Figure 4.27, loosen the two thumb screws and pull forward, remove the optics source assembly.
7. Place the assembly on a clean work surface.

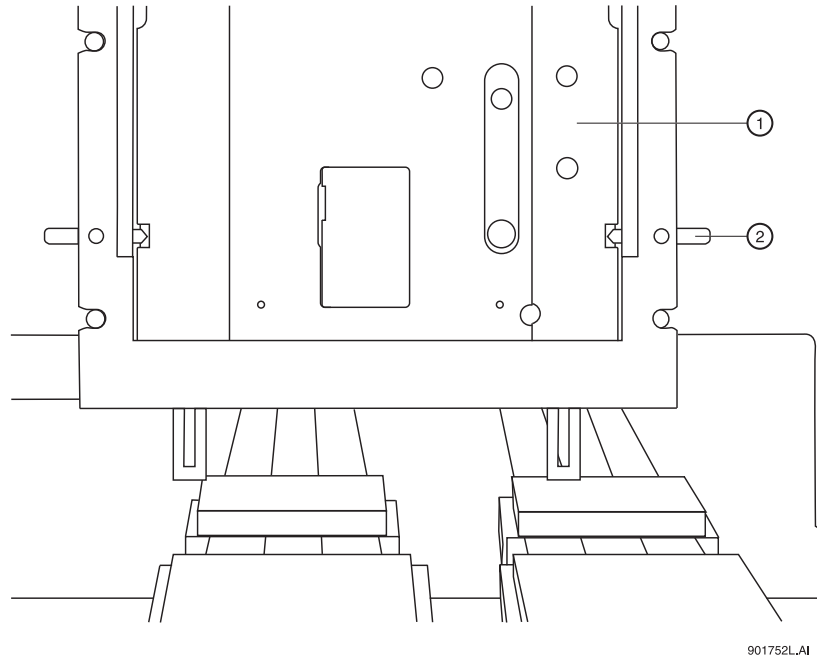


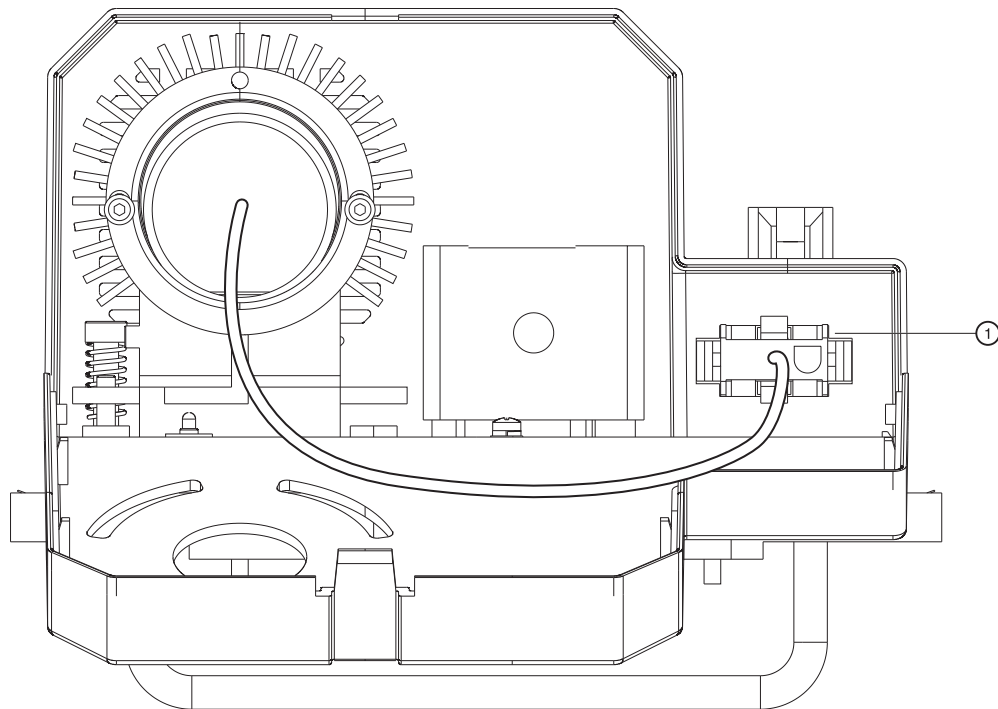
Figure 4.27 Removing the Optics Assembly

1. Optics Source Assembly

2. Thumb Screws (2)

8. Open the deuterium lamp access cover on the back of the optics source assembly.

9. Disconnect the lamp power plug. Refer to Figure 4.28.



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Figure 4.28 Disconnecting the Lamp Power Plug

1. Power Plug

10. Using a 7/64" hex head wrench, remove the two hex screws securing the deuterium lamp and remove the lamp from the lamp housing.

WARNING Do not touch the envelope of the lamp, because oils from your skin will damage the lamp.

NOTE Ensure that an orange O-Ring is installed on the lamp flange before installing it. A missing O-Ring will decrease lamp performance.

11. Install the new deuterium lamp by aligning the flange guide notch in the lamp, with the housing guide pin.
12. Install the two hex screws and tighten them until they are snug.
13. Reconnect the power plug and close the lamp access cover.
14. Place the optics source assembly in the mounting location.
15. Align the two upper guide pins and tighten the two thumb screws.
16. Reinstall the capillary cartridge in the interface block.
17. Lower the insertion bar and tighten the two thumb screws.
18. Close the cartridge cover door.
19. Turn on power to system and then start the 32 Karat Software.

20. From the Instrument screen **Control menu**, select **Diagnostics**. The PDA (PDA detector installed) or UV (UV detector installed) diagnostic dialog box appears as shown in Figure 4.29.

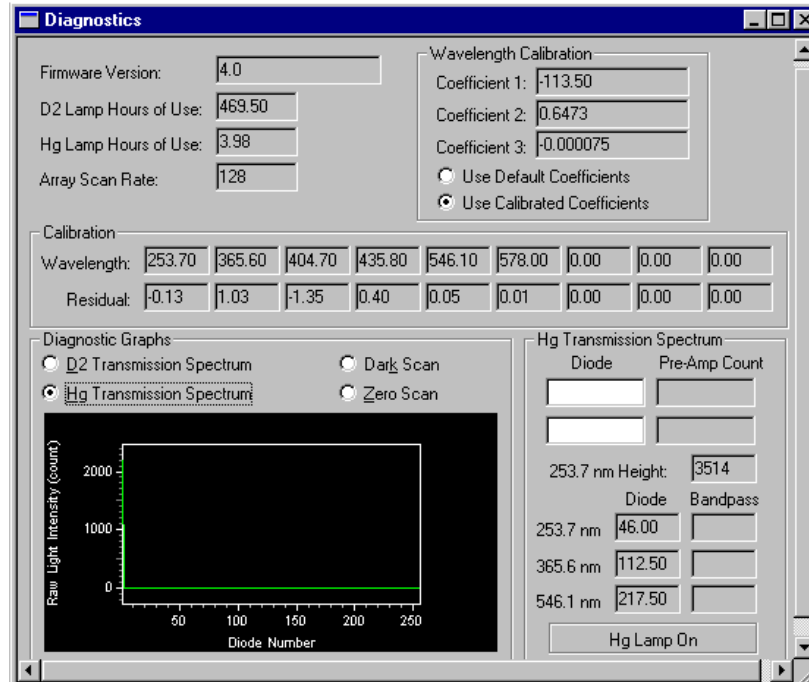


Figure 4.29 PDA Diagnostics Screen

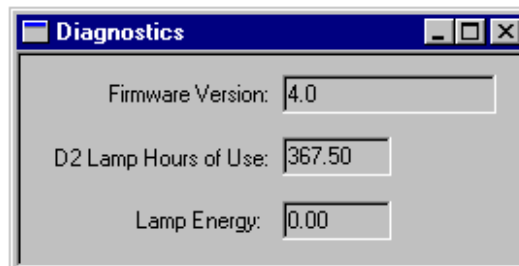


Figure 4.30 UV Diagnostics Screen

21. Select **Control | Diagnostics | Set Lamp Hours**. The Lamp Hours of Use dialog box appears as shown in Figure 4.31.
22. Enter a value of zero in the dialog box.

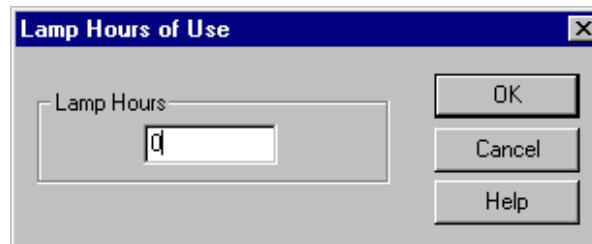


Figure 4.31 Lamp Hours of Use Dialog

Cleaning the Fiber Optics (UV and PDA Detectors)

Before you begin, you will need:

- r Non-abrasive lens tissue
- r HPLC grade methanol, ethanol or isopropanol

CAUTION Do not touch the fiber optic surface with your fingers, because oils from your skin can degrade performance.

1. From Direct Control, place the trays in the **LOAD** position.
2. Lift the cartridge cover door at the front of the P/ACE MDQ. Refer to Figure 4.32.
3. Turn the system power off.
4. Disconnect the fiber optic cable at the detector first, then at the clamp arm.
5. Moisten the lens tissue with HPLC grade alcohol.
6. Clean the surface of each connector on the fiber optic cable and allow them to dry before reconnecting.
7. Reconnect the fiber optic cable at the clamp arm first, then at the detector.
8. When all of the fiber optic cable connectors have been cleaned and reconnected, close the cartridge cover door. Refer to Figure 4.32.

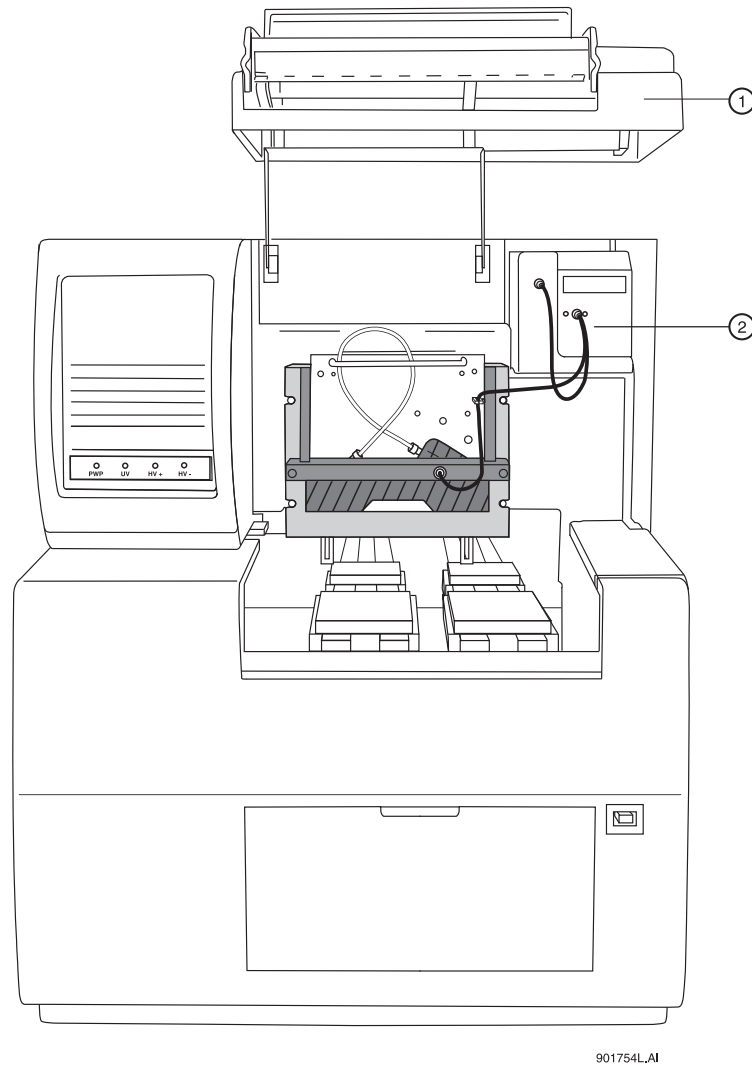


Figure 4.32 Location of Fiber Optic Cable

1. Cartridge Cover Door

2. Fiber Optic Cable (PDA Detector, UV
Detector is similar)

LIF Care and Maintenance

WARNING The Beckman Coulter 488 nm and 635 nm laser modules operate at high voltages and emit laser light that can cause serious damage to the eyes. Servicing of the laser should be done only by a Beckman Coulter Field Service Representative.

Inspecting the System

The LIF detector system is designed to prevent laser light exposure outside the laser box, fiber cable, and detector. To ensure continued laser light containment, regularly check the following parts of the system.

- r Visually inspect the full length of the fiber cable to make sure it is in good condition.
- r Visually inspect the laser module housing to verify that no panels are loose, since this could provide access to laser energy inside the module.
- r Verify operation of the interlock.

CAUTION If the interlock is defeated, potentially harmful laser power of up to 3mW could be accessible in the interior or could be emitted from the fiber.

Cleaning

The exterior surfaces of the detector and laser module should be cleaned regularly by wiping with a clean, damp cloth. If necessary, a mild detergent can be used. Finish by wiping with a soft, dry cloth.

The filters are delicate optical components that must be protected from dirt, dust, and fingerprint contamination. Once installed in the filter housing, they are protected from contamination and normally do not require cleaning. Because of the risk of damaging the filter during the cleaning process, DO NOT clean the filter unless it is dirty enough to affect system performance

Storage

When not in use, install the probe in the Probe Holder on the Interconnect Module. This provides a mechanical protection for the probe and shields it from dust and other particles.

Calibrating the LIF Detector

When a Laser Induced Fluorescence (LIF) Detector is the configured detector type, the LIF Calibration Wizard feature will become active in the P/ACE MDQ Instrument Configuration window.

NOTE The following calibration method should only be used with bare fused silica capillaries. For coated capillaries, please see the Application Guide or contact your local Beckman Coulter representative.

Accessing the LIF Calibration Wizard

1. Open the P/ACE MDQ Instrument for Configuration from the **Enterprise** Screen.

- Double-click on the **LIF module** displayed in the configured modules pane of the P/ACE System MDQ window. The P/ACE MDQ Instrument Configuration window will be displayed.

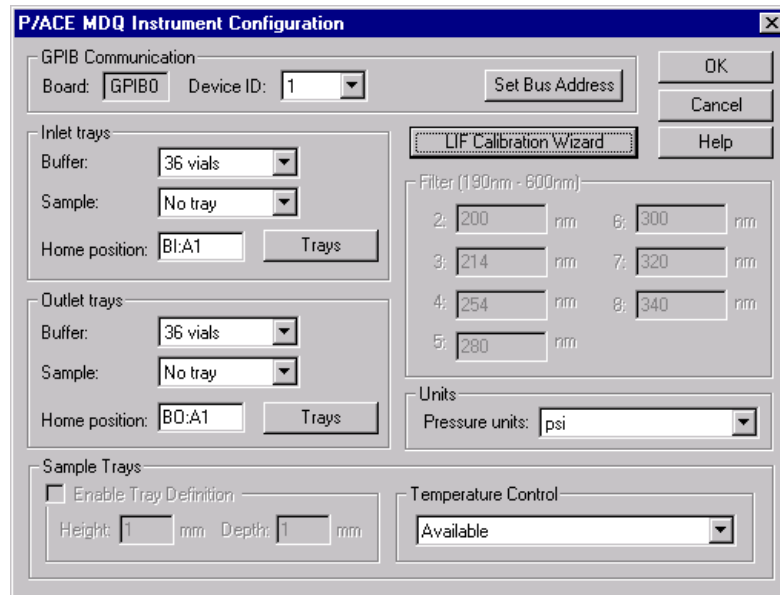


Figure 4.33 P/ACE System MDQ Configuration Window

- Click on the **LIF Calibration Wizard** to begin the calibration.

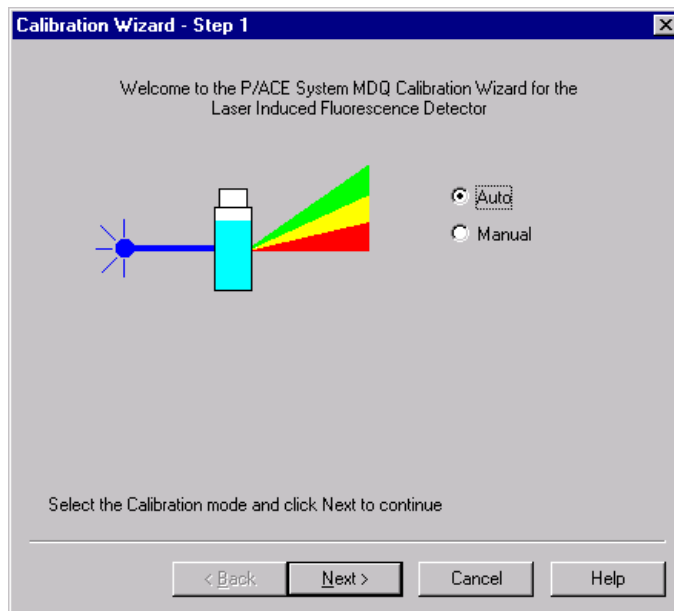


Figure 4.34 LIF Calibration Wizard

The purpose of the LIF Test Mix Calibration is to normalize the response of the system when some part of the optical path has been changed.

The LIF detector calibration values can be input manually or automatically by the system using the LIF Test Mix.

Manual Calibration

1. Select the **Manual Option** button to manually input the values of the Calibration Correction Factors.

This selection bypasses the calibration test mix to determine the correction factors.



Figure 4.35 Calibration Wizard Calibration Correction Factor

2. Input the Calibration Correction Factor for each of the detector channels.

Auto Calibration

1. Select the **Auto Option** button to begin an auto-calibration process using the calibration test mix.
2. Before performing an auto-calibration procedure, use the manual calibration option to set the **CCF value** to 1.0.

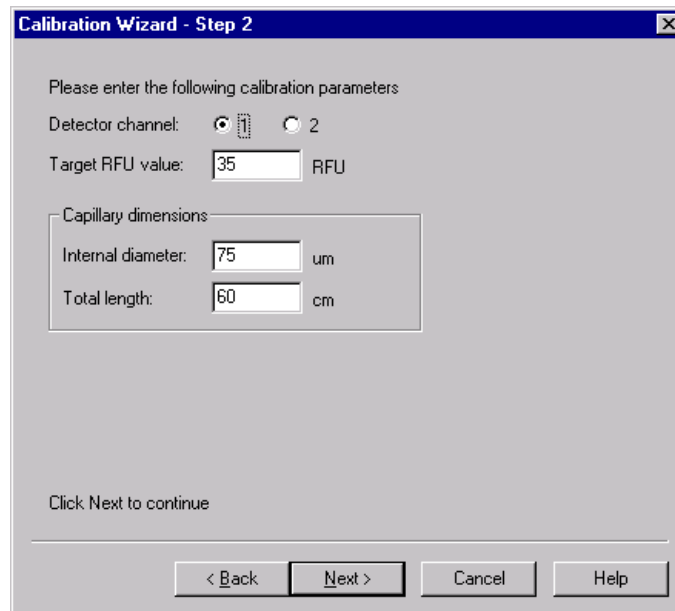


Figure 4.36 Calibration Wizard Step 2

Step 3 of the Calibration Wizard prompts you to install the appropriate calibration vial samples into the instrument before the calibration process can begin.

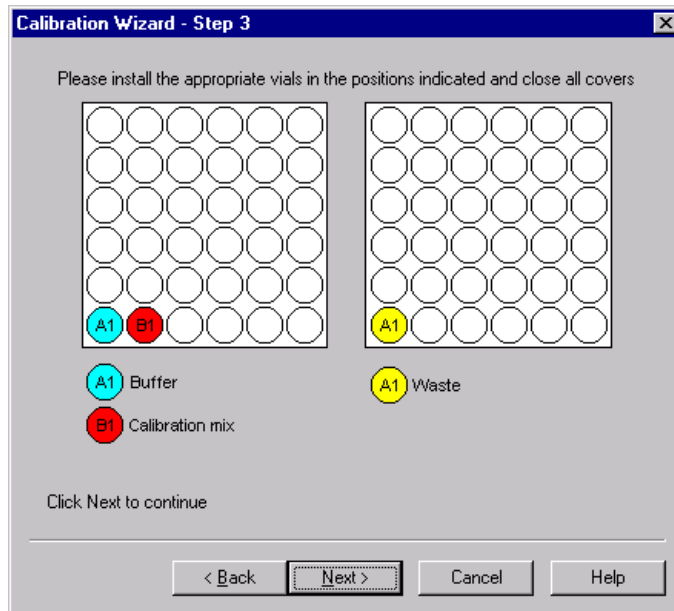


Figure 4.37 Calibration Wizard Step 3

- Once the calibration vials are installed in the instrument and their positions configured, click **Next** to begin the calibration.

The Calibration Wizard - Running window will be displayed while the calibration is in progress.

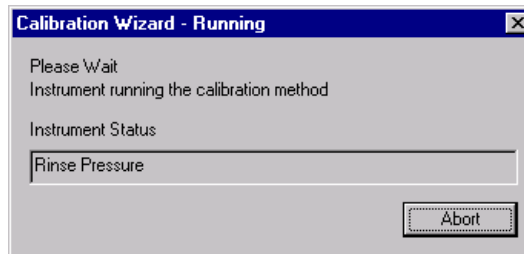


Figure 4.38 Calibration Wizard Running Window

- When the calibration is complete, the final step in the calibration wizard prompts you to accept or cancel the correction factor calculated in the calibration.

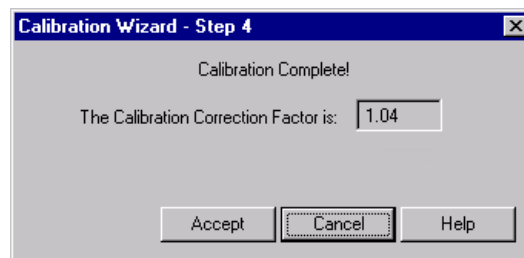


Figure 4.39 Calibration Wizard Calculated Calibration Factor

Calibration Standard

Changes can be made to the calibration procedure if a different fluorescent compound is used or if the capillary diameter is changed.

After the detector has been calibrated using the recommended procedure and test mix, run the method below using the new calibration standard and capillary.

Forward rinse with buffer:

r 2 minutes @ 20 psi

Forward pressure separation from test mix to waste:

r 3 minutes @ 5 psi

r Autozero @ 0.1 minute

NOTE Times and pressure may vary with capillary dimension and buffer viscosity.

The method should yield a trace that has a distinct “step” shape to it.

1. Measure the RFU difference between the first part of the trace and the second part of the trace.
2. Repeat the method several times to ensure that the RFU difference is reproducible.
3. Use the average RFU difference as your new target value for the test mix calibration with the new standard.

Capillary Diameter

The test mix calibration target value is specified for a 75 mm bare fused silica capillary. If a different capillary is used, a different target value must be determined. Because the response factor is directly proportional to the cross sectional area of the capillary, the new target value can be easily calculated by applying the ratio of the capillary cross sectional areas to the 75 mm target value.

NOTE For installation purposes, the detector should first be calibrated using the recommended 75mm capillary and test mix. Subsequently, the calibration can be modified as follows.

Below are some examples of common bare fused capillary diameters and their associated target RFU values for various reagent types and listed dyes:

Cy5

r 20 mm diameter: RFU = 0.4 (use a different standard - the calibration wizard will not accept a target value below 1.0)

r 50 mm diameter: RFU = 2.2

r 75 mm diameter: RFU = 5

r 100 mm diameter: RFU = 8.9

Sodium Fluorescein

r 20 mm diameter: RFU = 2.5

r 50 mm diameter: RFU = 15.6

r 75 mm diameter: RFU = 35

r 100 mm diameter: RFU = 62.2

For coated capillaries, such as carbohydrate, please see the appropriate Application Guide or kit insert for calibration details. This concludes the Calibration Wizard - Auto Configuration process. For additional information, refer to the Online Help.

4.3 Instrument Care

When P/ACE MDQ service is requested, the instrument must be decontaminated. The following procedure outlines these requirements.

Before you begin, you will need:

- r Cleaning solution (90% HPLC grade water, 10% Household Bleach)
- r Safety goggles
- r Latex gloves

CAUTION Do not perform this procedure without protective gloves and goggles. If the cleaning solution is comes in contact with skin or eyes, rinse immediately with water or eye wash equipment in your facilities and seek medical attention.

NOTE All surfaces that come into contact with samples must be treated. Notify the service engineer of the type of sample used and the manner of decontamination.

Referring to Figure 4.40, proceed as follows:

1. Lift the cartridge cover door at the front of the P/ACE MDQ.
2. Turn the system power off.

CAUTION All surfaces that come into contact with samples must be treated. Notify the service engineer of the type of sample used and the manner of decontamination.

3. Remove the capillary cartridge and buffer/sample trays as required to clean all internal surface areas.
4. Clean each surface at least two times and allow the instrument to dry completely.
5. Clean all external instrument surface areas thoroughly, at least two times and allow the instrument to dry completely.

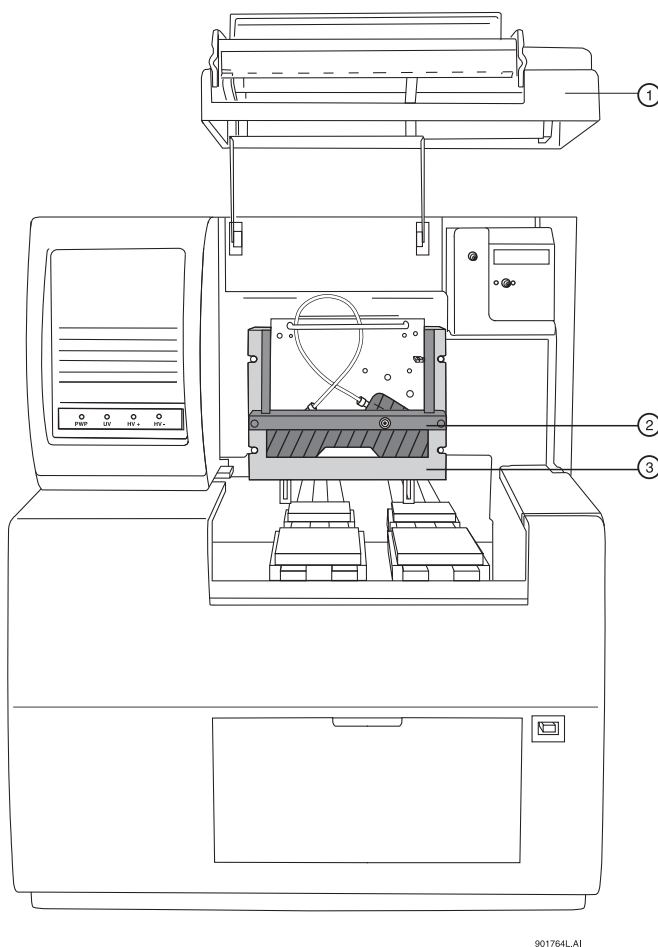


Figure 4.40 Instrument Care

1. Cartridge Cover Door	3. Interface Block
2. Insertion Bar	

4.4 Cleaning the Interface Block, Ejectors and Electrodes

Before you begin, you will need:

- r Cotton swabs
- r HPLC grade water

Referring to Figure 4.41, proceed as follows:

1. Lift the cartridge cover door.
2. Loosen the two thumb screws and lift the insertion bar.
3. Remove the capillary cartridge from the interface block.
4. Remove the ejector covers and ejectors for cleaning, as shown in Figure 4.41.

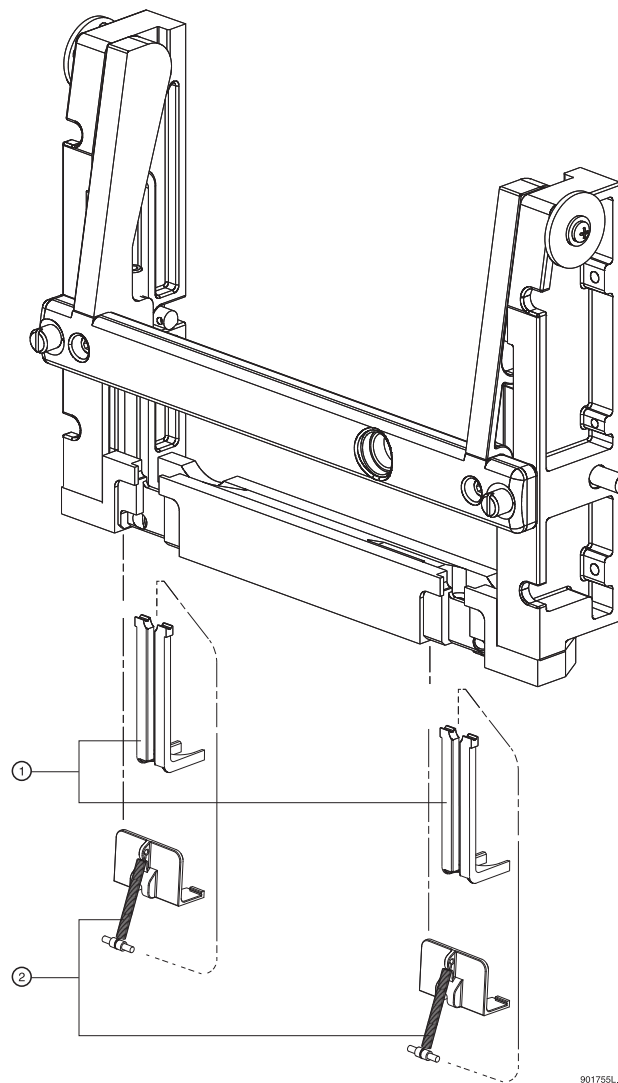


Figure 4.41 Cleaning Interface Block and Ejectors

1. Ejector/Electrode Location

2. Injector Covers and Spring Retainers

Maintenance

Cleaning the Interface Block, Ejectors and Electrodes

5. Using cotton swabs, clean the interface block, electrodes and ejector surfaces with water, followed by methanol, then allow the parts to dry.
6. Reinstall the capillary cartridge in the interface block.
7. Lower the insertion bar and tighten the two thumb screws.
8. Close the cartridge cover door.

Refilling the Coolant

Before beginning, locate the following items in your ship kit:

- r Capillary cartridge coolant
- r 150 mL syringe
- r Coolant fill adapter

NOTE Discard the syringe plunger. Use of the plunger can apply excessive pressure to the cooling system and cause damage.

Referring to Figure 4.42, proceed as follows:

1. Lower the coolant fill door at the front of the P/ACE MDQ.
2. Attach the coolant fill adapter to the coolant fill port.
3. Pour approximately 120 mL of coolant into the syringe.
4. Fill the coolant supply until the sight tube shows approximately $\frac{3}{4}$ full.
5. Remove the syringe and close the coolant fill door.

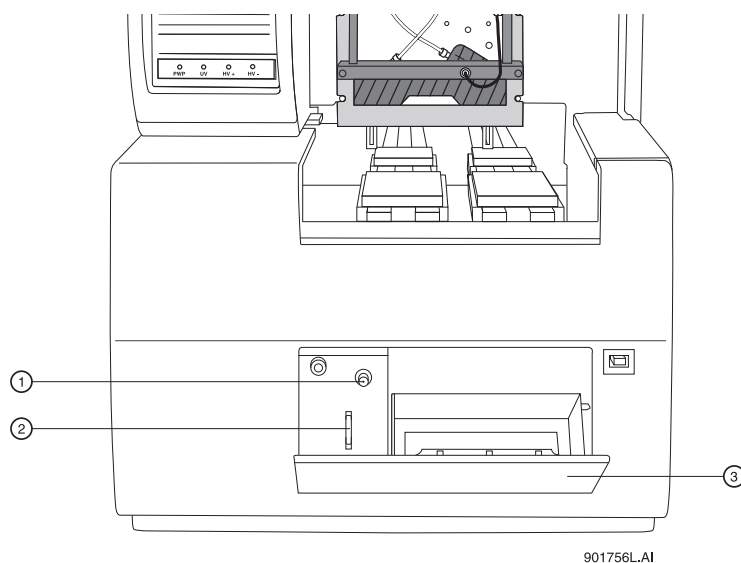


Figure 4.42 Capillary Coolant Installation

1. Coolant Fill Port

3. Coolant Fill Door

2. Sight Tube

4.5 Replacing the Electrodes

If the electrodes are bent or broken, they will need to be replaced. The following procedure describes how to clean and replace the electrodes.

Before you begin, you will need:

- r Electrodes for replacement
- r Flathead screwdriver, #2

CAUTION Be careful when cleaning or replacing the electrodes as the electrode ends are very sharp and can cause a puncture wound.

Referring to Figure 4.43, proceed as follows:

1. Lift the cartridge cover door.
2. Loosen the two thumb screws and lift the insertion bar.
3. Remove the capillary cartridge from the interface block.

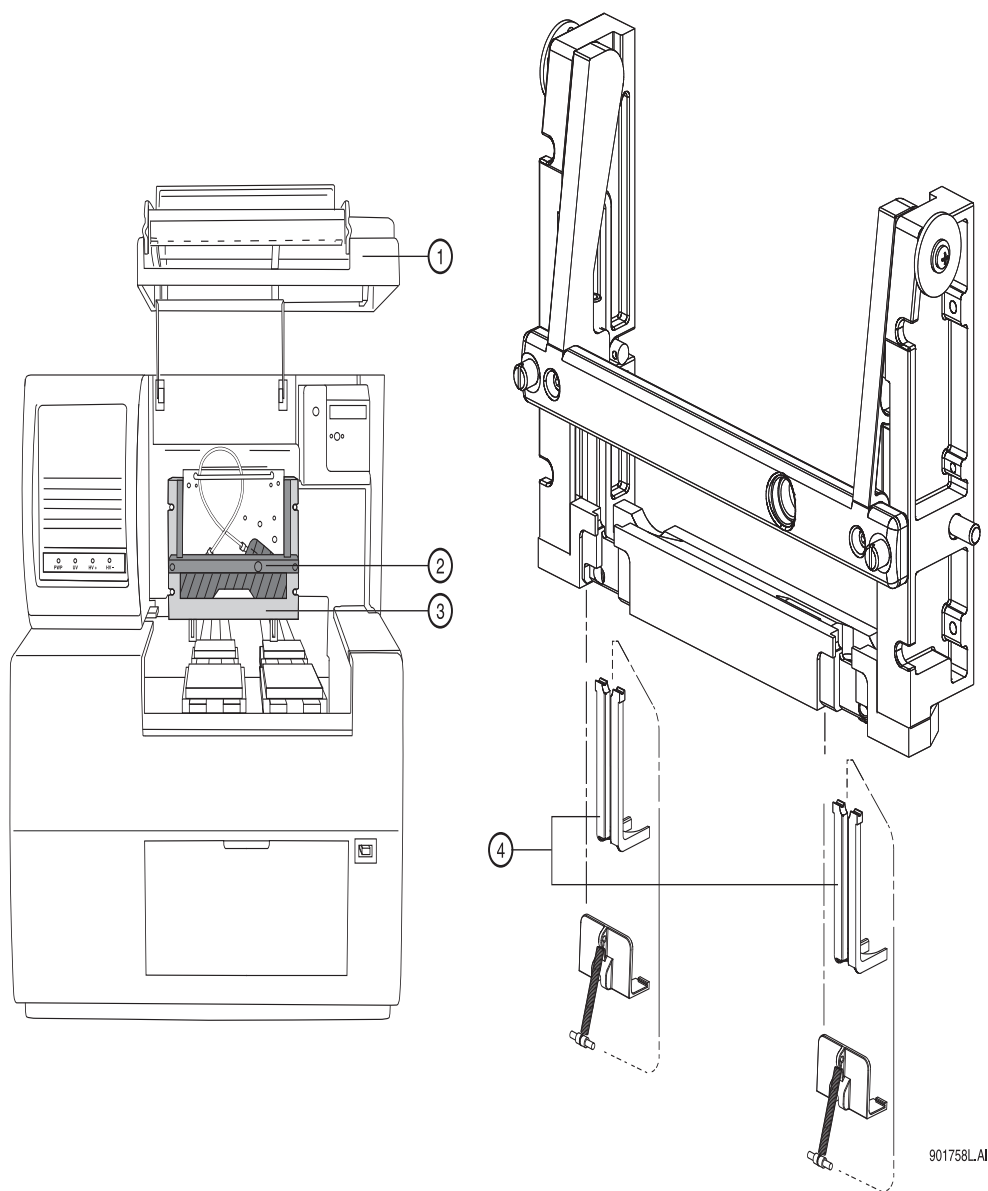


Figure 4.43 Cleaning and Replacing the Electrodes

1. Cartridge Cover Door	3. Interface Block
2. Insertion Bar	4. Ejector/Electrode Location

Cleaning

1. The electrodes are attached to the underside of the interface block as shown in Figure 4.43. To access the electrodes for cleaning, remove the ejector and ejector cover in front of the electrode as shown in Figure 4.44.
2. Using a cotton swab and HPLC grade water, clean the electrode surfaces.
3. Reinstall the ejector and ejector cover.

Replacement

NOTE Replacing one electrode at a time provides an example for the opposite side during replacement.

1. To replace the electrodes, locate the ejector cover and spring retainer as shown in Figure 4.44. To remove the ejector cover and spring retainer, pull out then down to remove.

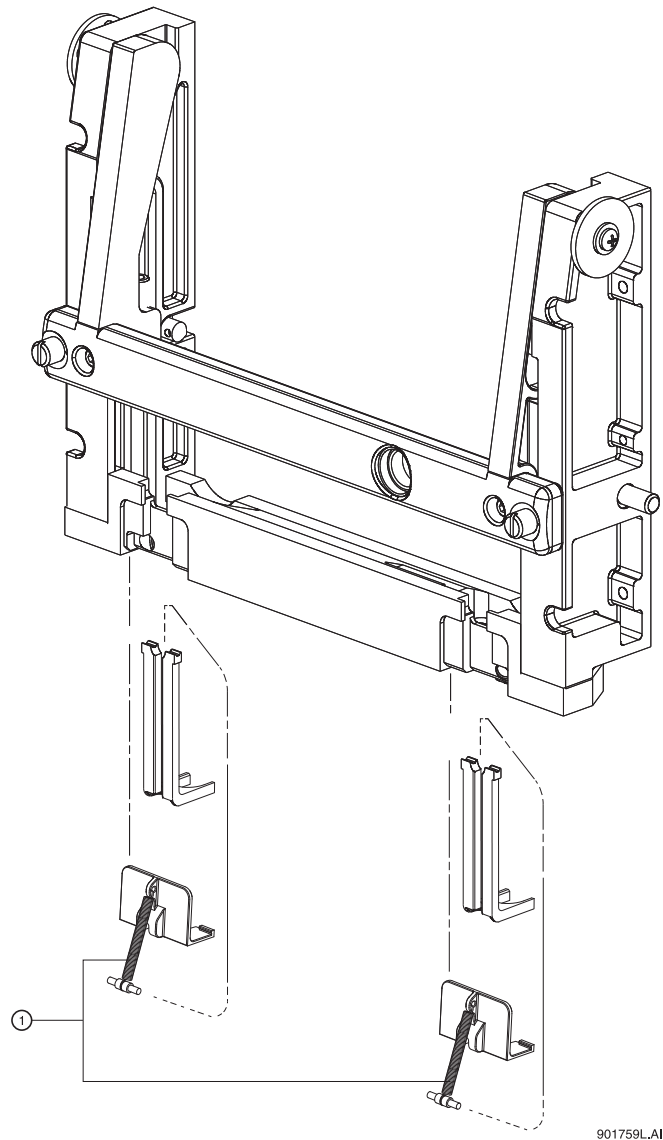


Figure 4.44 Replacing the Electrode

1. Injector Covers and Spring Retainers

2. Pinch and remove the ejector in front of the electrode.
3. Using a #2 flat tip screwdriver, loosen the nylon screw in the interface block two or three turns as required and pull down to remove the electrode.
4. Replace with a new electrode and tighten the nylon screw until snug.
5. Reinstall the ejector in front of the electrode.

6. Reinstall the spring retainer and ejector cover.
7. Reinstall the capillary cartridge in the interface block.
8. Lower the insertion bar and tighten the two thumb screws.
9. Close the cartridge cover door.

4.6 Replacing the Quad-Rings

If coolant is leaking between the interface block and cartridge, the quad-rings may require replacement. The following procedure describes how to change the quad-rings.

Before you begin, you will need:

- r Quad-rings for replacement

Referring to Figure 4.45, proceed as follows:

1. Lift the cartridge cover door.
2. Loosen the two thumb screws and lift the insertion bar.
3. Remove the capillary cartridge from the interface block.

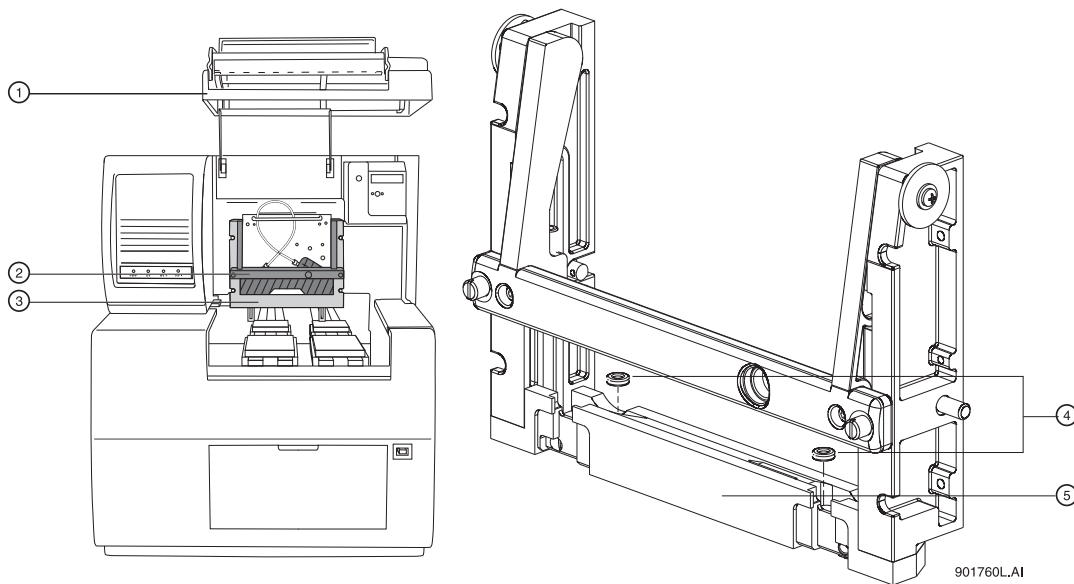


Figure 4.45 Replacing Quad Rings

1. Cartridge Cover Door	3. Interface Block
2. Insertion Bar	4. Quad Rings

4. Locate the quad-rings in the interface block, then use thumbnail and index finger to remove the quad rings.
5. Install the new quad ring in the recess provided in the interface block.
6. Reinstall the capillary cartridge in the interface block.
7. Lower the insertion bar and tighten the two thumb screws.

8. Close the cartridge cover door.

4.7 Replacing the Fuses

Before you begin, you will need:

- r #2 Flathead screwdriver
 - r Replacement fuses (as required)
1. Turn off instrument power and disconnect power plug from the AC power outlet.
 2. Using the flathead screwdriver, remove the fuse block. Refer to Figure 4.46 for the location of the fuse block.

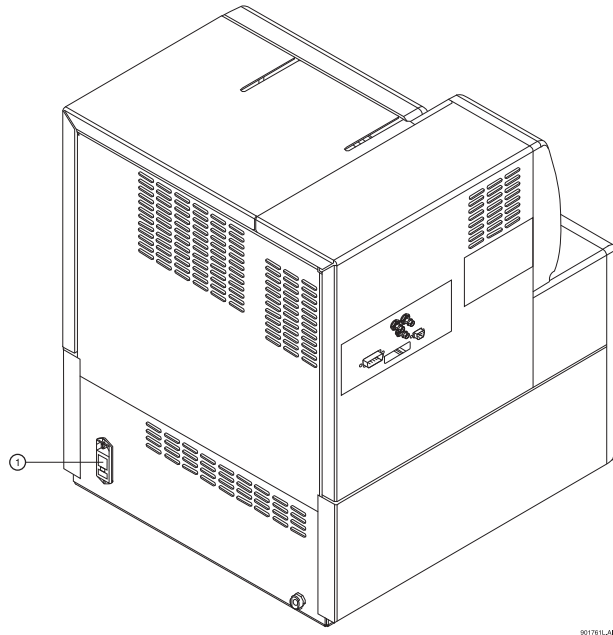


Figure 4.46 Replacing Fuses

1. Fuse Block

CAUTION It is very important to determine the cause of fuse failure before replacing the fuses.

Be sure to replace the fuses with the correct type and rating for continued protection against the risk of fire and/or improper instrument operation.

If the fuses continue to blow after being replaced, contact Beckman Coulter service for additional assistance.

3. Visually inspect or verify fuse continuity with an ohmmeter and replace the fuses with the values described below:

Line Voltage	100 - 120 VAC	200 - 240 VAC
Fuse Type and Rating	8.0 A Slow Blow; ¼ inch (2 ea.)	6.3 A Time Delay; 20 mm (2 ea.)

4. Reinstall the fuse block and reconnect power cable.



Maintenance
Replacing the Fuses

Additional Features

5.1 Introduction

This section includes instructions for installing and configuring the following available devices/accessories for P/ACE MDQ:

- r SS420X (External Unit)
- r Buffer Reservoir Tray
- r External Detector Adapter

5.2 Connecting Detectors

Instrument connections (analog input, triggers, external events) are made using the Terminal Panel supplied with the system. The Terminal Panel is located inside the black cover. To access the Terminal Panel, remove the four screws holding the box cover.

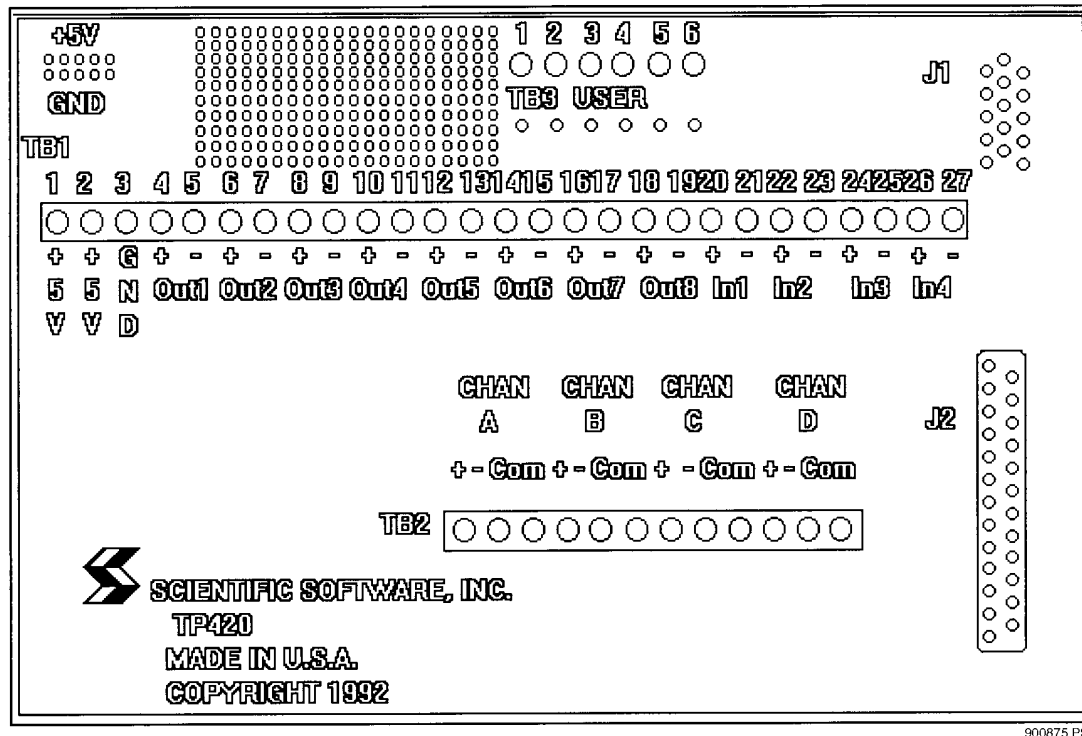


Figure 5.1 TP420 Terminal Panel

The Terminal Panel contains the following set of connections which are used in connecting the instrument(s) to the host computer:

- r 4 Analog Connections labeled CHAN A - D (+/-/com)
- r 4 Digital Input Connections labeled IN1 - 4 (+/-)
- r 8 Digital Output Connections labeled OUT1 - 8 (+/-)
- r Digital ground connection labeled GND
- r Two connectors labeled +5V

Locate the above mentioned connections before proceeding.

1. Connect the analog lines from each detector from which you intend to acquire data. Each detector is connected to one of the 4 analog connections labeled CHAN A through CHAN D.
2. In order to reduce noise, always use a shielded twisted pair cable for each detector connection. The two wires are used for the signal HIGH (+) and signal LOW (-) connections (e.g. CHAN A+ and CHAN A-).
3. Connect the shield at only one end, preferably to a COM terminal on the SS420X end.

NOTE The box surrounding the Terminal Panel is designed to provide electrical shielding from noise sources and provides protection from air currents that can cause drift. After making your detector connections, replace the Terminal Panel cover. Always allow 15 minutes after power up for the electronics to stabilize before running samples which may require sensitive measurements.

Connecting (Remote Start) Trigger Signals

Trigger Start of Data Acquisition

1. To trigger the start of data acquisition, connect a trigger signal cable to the Terminal Panel. The trigger signal is connected to one of the four digital-input connectors on the Terminal Panel of the SS420X.
2. Connect the HIGH side of the trigger to one of the connectors labeled IN (+), and the LOW side of the trigger lead to the associated connector labeled IN(-).

NOTE In order for the trigger and ready relays to operate properly, the trigger and/or ready connection channel must be specified in the System Configuration screen. To access this screen, select **Configuration** from the 32 Karat Software main menu, then **Instruments**.

Hold Off Injection

3. To connect a READY line to hold off injection (instrument not ready to acquire data), connect one line from the output of one of the Digital output channels OUT(+) of the Terminal Panel to the ready input line of your instrument and the other line to the associated connector labeled OUT(-).

Stop Data Acquisition

4. To allow the instrument to stop data acquisition, connect the high side of the stop output line of the instrument to the input from one of the Digital input channels IN(+) on the Terminal Panel.
5. Connect the low side of the stop output line of the instrument to the corresponding connector labeled IN1(-).

Outputs 1 & 2

Outputs 1 & 2 close on computer power on and open when the 32 Karat Software is started.

Outputs 3 & 4

Outputs 3 through 8 open on computer power on and remain open until closed by an external event.

Connecting External Devices

External devices are connected using the Digital out connectors on the Terminal Panel.

The SS420X inputs can detect switch closures or can be driven by TTL compatible logic. The output switches are open collector types. These switches do not supply power to the circuit. For relay connections, it is not necessary to install a pull-up resistor between the output connector and +5 V. The relay coil will take the place of a resistor.

Connect an output switch to an external devices as follows:

1. Connect one lead from the cable between the device and the SS420X to one of the output low connectors OUT1(-).
2. Connect the corresponding lead on the other end of the cable to a ground terminal on the device.
3. Connect the other leads on the cable to the corresponding SS420X output connector OUT(+) and the input terminal on the device.

5.3 SS420X External Unit

The SS420X External Unit includes:

- r SS420X device
- r RS232 Cable (connects SS420X to serial port on computer)

Installing the SS420X External Device

The SS420X board is enclosed in a stand-alone cabinet. At the rear of the cabinet is a terminal strip which provides input/output connections for interfacing with the external devices and the computer.

Referring to Figure 5.2, install the SS420X external device:

1. Place SS420X external device next to the computer and external devices.
2. Plug one end of the 9-pin plug on the RS-232 cable into the 9-pin connector labeled **RS232** on the rear of the SS420X device.
3. Plug the other end of the cable into the 9-pin connector labeled Serial Port 1 (Com 1) on the rear panel of the computer.

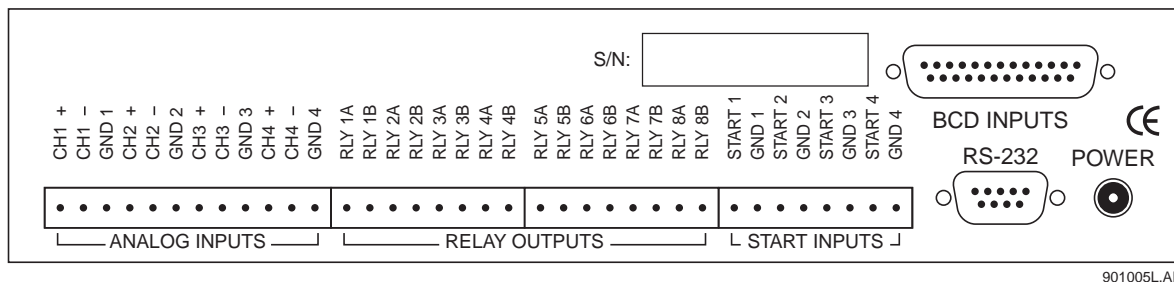


Figure 5.2 SS420X External Device Rear Panel

Connecting Detectors

Instrument connections (Analog Inputs, Relay Outputs, Start Inputs) are made using the terminal strip located on the rear panel of the SS420X Unit.

The Terminal Strip shown in Figure 5.2 contains the following set of connections which will be used in connecting the external devices to the host computer:

- r 4 Analog Connections labeled **CH1 - CH4 +/-GND**
- r 8 Relay Outputs labeled **RLY1A/1B - RLY 8A/8B**
- r 4 Start Inputs labeled **START 1/GND 1 - START 4/GND 4**

Locate these connections before you proceed:

1. Connect the analog output lines for each detector from which you intend to acquire data. Each detector is connected to one of the 4 analog connections labeled **CH1 +** and **CH1-** through **CH4 +** and **CH 4 -**.

In order to reduce noise, always use a shielded twisted pair cable for each detector connection. The two wires are used for the signal High (+) and signal Low (-) connections (e.g. **CH 1+** and **CH 1-**).

2. Connect one end of the shield, preferably, to **GND**.

NOTE The cabinet enclosing the SS420X board and part of the terminal strip is designed to provide electrical shielding from noise sources and provides protection from air currents that can cause drift. After making your detector connections, allow 15 minutes after power up, for the electronics to stabilize, before running samples that require sensitive measurements.

Connecting Start Inputs (Trigger Signals)

Trigger Start of Data Acquisition

3. To trigger the start of data acquisition, connect a trigger signal cable to the terminal strip. The trigger signal connects to one of the four Start Input connectors on the terminal strip. The Start Input connectors accept contact closures or TTL signals.
4. Connect the High side of the trigger to one of the connectors, e.g., **Start 1**, and the Low side of the trigger lead to the associated connector **Gnd 1**.

NOTE In order for the trigger and ready relays to operate properly, the trigger and/or ready connection channel must be specified in the system configuration screen. To access this screen, select **Configuration** from the P/AGE MDQ main menu, then **Instruments**.

Hold Off Injection

To connect a READY line to hold off injection (instrument not ready to acquire data), connect one line from the output of one of the Digital output channels OUT(+) of the Terminal Panel to the ready input line of your instrument and the other line to the associated connector labeled OUT(-).

Stop Data Acquisition

To allow the instrument to stop data acquisition, connect the high side of the stop output line of the instrument to the input from one of the Digital input channels IN(+) on the Terminal Panel. Connect the low side of the stop output line of the instrument to the corresponding connector labeled IN(-).

Outputs 1 & 2

Outputs 1 & 2 close on computer power on and open when the 32 Karat Software is started.

Outputs 3 through 8

Outputs 3 through 8 are open on computer power on and remain open until closed by an external event.

Connecting External Devices

If you are using an external device which requires a contact closure or TTL, you must connect these properly so they can be controlled during the run. External devices are connected using the Digital out connectors on the Terminal Panel.

The SS420X inputs can detect switch closures or can be driven by TTL compatible logic. The output switches are open collector switches. For relay connections, it is not necessary to install a pull-up resistor between the output connector and +5 V. The relay coil will take the place of a resistor.

Connect an output switch to an external device as follows:

1. Connect one lead from the cable between the device and the SS420X to one of the output low connectors OUT(-).
2. Connect the corresponding lead on the other end of the cable to a ground terminal on the device.
3. Connect the other leads on the cable to the corresponding SS420X output connector OUT(+) and the input terminal on the device.

NOTE The output switches do not supply power to the circuit.

Configuring the SS420X External Device

Referring to Figure 5.3, configure the SS420X device as follows:

4. From the **Tools** menu, select **Interface Configuration**, then the **SS420X** icon.
Set the board configuration as follows:
5. Click on board number. **1** is default value.
6. Enter the base address for the hardware value set on the board. The recommended value is 360 hex.
7. Accept other defaults.
8. Click **OK** to accept values.

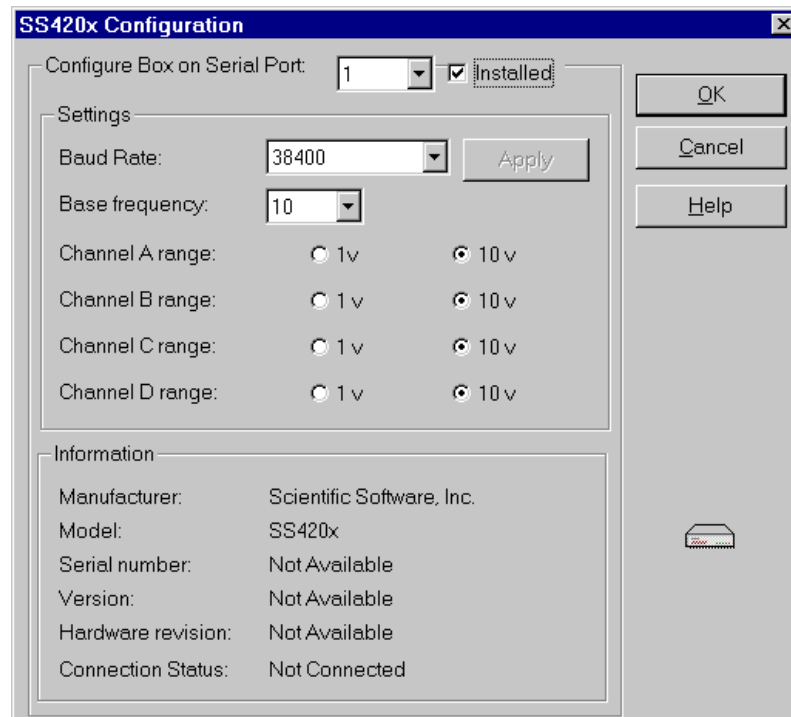


Figure 5.3 SS420X Configuration Screen

5.4 P/ACE™ MDQ External Detector Adapter

The External Detector Adapter (EDA) allows the capillary to exit the P/ACE MDQ instrument for connection to an external device, e.g., detector or mass spectrometer. The EDA includes instrument modifications and hardware. It can be used with the standard P/ACE MDQ cartridge or with a special EDA-only cartridge.

The standard cartridge accommodates capillaries with an external diameter of 150 to 375 µm and allows use of the P/ACE MDQ detector.

The EDA-only cartridge accommodates capillaries down to an external diameter of 150 µm. With the EDA-only cartridge, the P/ACE MDQ detector is not available and the length of capillary from the point of sample injection to the outside of the instrument is substantially reduced.

The EDA requires P/ACE MDQ Software and Firmware Version 1.5 or 32 Karat Software Version 5.0 or above and Firmware Version 5.0 or above.

The following instructions describe only how to configure and program the MDQ for operation with the adapter installed. For directions on connecting the capillary to the external device consult the manufacturer of that device.

Safety

WARNING To avoid the risk of electric shock, do not touch the capillary when the high voltage is turned on.

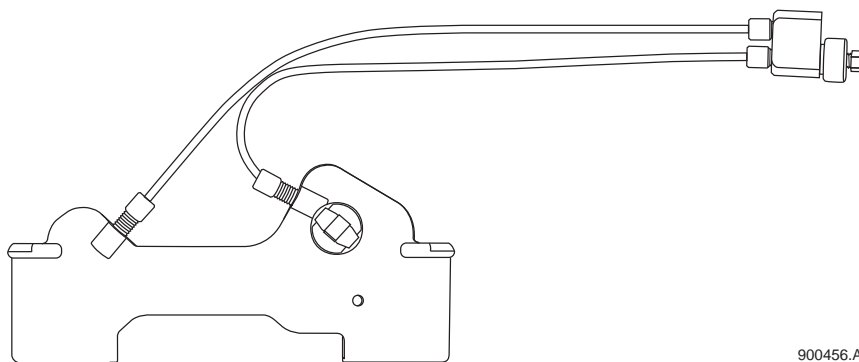
WARNING The end of the capillary is sharp. To avoid risk of injury, handle the capillary with care when inserting it into the EDA cartridge, or when handling the EDA cartridge and attaching the external devices.

5.5 Initial Installation

The EDA modification is not user-installed. It must be installed by a qualified Beckman Coulter Service Engineer. Please contact your local Beckman Coulter office for installation.

Once the required changes are made to the P/ACE MDQ instrument, the instrument can be operated in either EDA or “normal” mode.

5.6 Installing the Capillary



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Figure 5.4 Standard Cartridge

Installing the Capillary in the Standard Cartridge

1. Referring to Figure 5.4, remove the existing capillary, aperture, and end seals. If converting a standard cartridge for EDA use, remove the coolant tubing. If rebuilding a standard cartridge that has already been converted to EDA mode, skip steps 2 and 3.
2. Connect the coolant tube marked “Inlet-Std” from the INLET side coolant tube connector on the cartridge to the upper connector on the capillary adapter body.
3. Connect the coolant tube marked “Outlet-Std” from the OUTLET side coolant tube connector on the cartridge to the lower connector on the capillary adapter body.
4. Loosen but do not remove the nut (see Figure 5.6). Remove the nut only to install a new seal (which is not normally replaced when rebuilding an EDA assembly). If a seal must be replaced, remove the nut then remove the old seal before installing the capillary. The new seal will be installed in step 11.
5. Insert the capillary through the OUTLET side of the cartridge, starting with the end of the capillary away from the window.
6. Push the capillary through the window area and the outlet side coolant tube, until it emerges from the capillary adapter body.
7. Grasp the capillary at the capillary adapter body and it. Pull it until the window area is centered in the aperture.
8. Install an aperture plug and O-Ring as described in the P/ACE MDQ manual.
9. If a new seal is not to be installed, go to step 11. After removing the nut, install a new seal (PN 144818) on the capillary emerging from the capillary body.
10. The narrow end of the seal must point toward the capillary adapter body.
11. Push the seal down the length of the capillary and into the capillary adapter body (see Figure 5.6). Re-install the nut (PN 144817).
12. Tighten the nut finger-tight only.
13. Place a red seal and clip (PN 144864) over the capillary emerging from the bottom of the cartridge. Place a second red seal and clip over the unused port on the bottom of the cartridge.

IMPORTANT Do not use the older-style blue double seals.

14. Trim the capillary to length using the trimming template before installing it in the instrument.

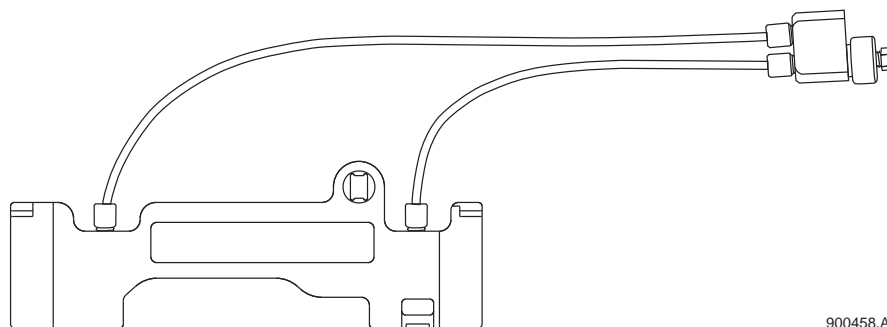


Figure 5.5 EDA-Only Cartridge

Installing the Capillary in the EDA-Only Cartridge

1. Referring to Figure 5.5, remove any existing capillary and end seals. If rebuilding an EDA-only cartridge, skip steps 2 and 3.
 2. Connect a coolant tube marked “Inlet-EDA” from the INLET side coolant tube connector on the cartridge to the upper connector on the capillary adapter body.
 3. Connect a coolant tube marked “Outlet-EDA” from the OUTLET side coolant tube connector on the cartridge to the lower connector on the capillary adapter body.
 4. Loosen but do not remove the nut. Refer to Figure 5.6.
 5. Remove the nut only to install a new seal. The seal is not normally replaced when rebuilding an EDA assembly. If a seal must be replaced, remove the nut then remove the old seal before installing the capillary. The new seal will be installed in step 8.
 6. Insert the capillary through the OUTLET side of the cartridge.
 7. Push the capillary through the cartridge and the outlet side coolant tube until it emerges from the capillary adapter body.
 8. Grasp the capillary at the capillary adapter body and pull it, leaving sufficient capillary below the cartridge to allow it to be trimmed to length.
 9. Install an aperture plug as described in the P/ACE MDQ manual. Note that the capillary does not pass through the aperture plug in this cartridge. Once installed, the plug may be left in place.
 10. If a new seal is not to be installed, go to step 11. After removing the nut, install a new seal (PN 144818) on the capillary emerging from the capillary body. The narrow end of the seal must point toward the capillary body.
 11. Push the seal down the length of the capillary and into the capillary adapter body (see Figure 5.6). Re-install the nut (PN 144817).
 12. Tighten the nut finger-tight only.
 13. Place a red seal and clip (PN 144864) over the capillary emerging from the bottom of the cartridge. Do not install a second seal and clip on the cartridge.
- NOTE** Do not use the older-style blue double seals.
14. Trim the capillary to length using the trimming template, before installing it in the instrument.

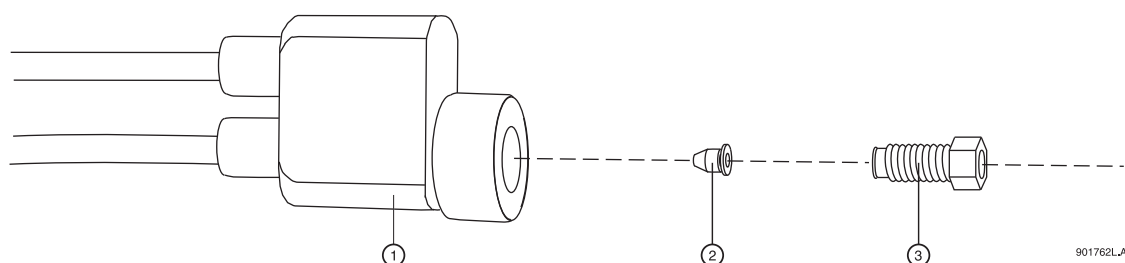


Figure 5.6 Capillary Adapter Block Assembly

1. Capillary Adapter Body	3. Nut (PN 144817)
2. Seal (PN 144818)	

Installing the Cartridge in the Instrument

Installation of the EDA configured cartridge is similar to installation of a cartridge in the standard mode. Refer to Figure 5.7.

1. Open the instrument doors.
2. Loosen the cartridge clamping bar screws and swing the clamping bar up. Remove the cartridge.
3. Install the EDA-configured cartridge.
4. Guide the coolant tubes through the slot in the right-side in an upright position.
5. Lower the bar and tighten the screws.
6. Insert the capillary adapter body into the slot in the right side of the instrument and secure it with the locking ring.
7. Close and latch the doors.

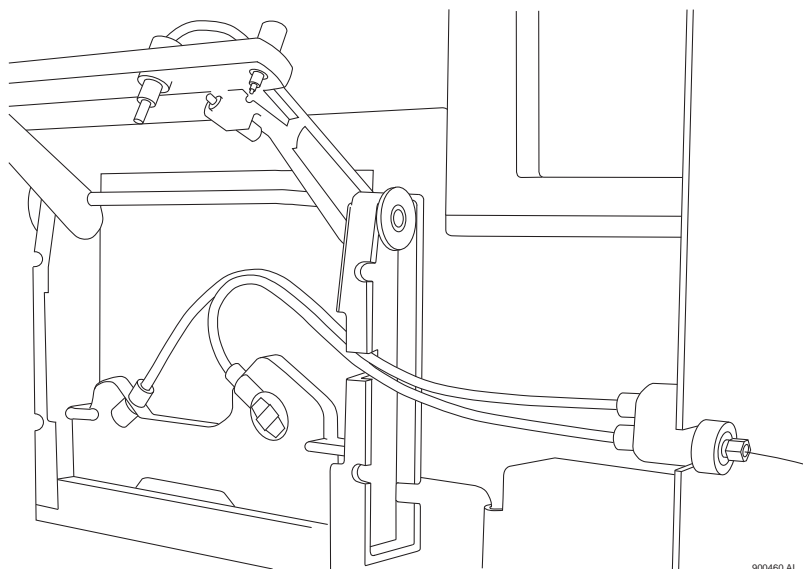


Figure 5.7 Cartridge Installation

Programming for EDA Operation

The EDA mode must be selected in the P/ACE MDQ 32 Karat Software in order for the adapter to function properly. The EDA option is available in the Voltage, Current, and Power dialogs in **Direct Control**, and in the Separate dialog in **Time Program**. See the P/ACE MDQ Online Help for more information on these dialogs.

NOTE It is important to remember that in EDA configuration, the capillary INLET is on the right (OUTLET) side of the instrument. This affects programming for both voltage and pressure.

Connecting to an External Device

For information about connecting a capillary from the instrument to an external device, consult with the manufacturer of that device.

A ground connection is provided to simplify power returns to the instrument. A wire connected to the banana plug (provided) can connect to the instrument via the banana jack on the right side of the instrument, to complete the high voltage electrical circuit.

5.7 Additional Information

When the EDA is installed, the function of the polarity indicator lights on the front of the P/ACE MDQ instrument will be reversed (the REVERSE indicator light will light in NORMAL polarity and vice versa.)

Do not select the EDA option when the instrument is running in the “standard” mode (capillary fully contained inside the instrument).

5.8 Parts List

Part Number	Description
144821	P/ACE MDQ EDA Accessory Kit Replacement skins for right and back panel, interface upright, lower side panel assembly, banana jack, banana plug, grounding harness, EDA cartridge assembly, EDA capillary adapter assembly, EDA instruction sheet and installation by Beckman Coulter Service Engineer.
144829	EDA Cartridge Assembly cartridge body, cartridge seal, seal retainer clip 100 x 800 slit, capillary adapter assembly and instruction sheet.
144822	EDA Tubing Kit Pre-cut EDA tubing (4 pieces), tubing nuts (4 pieces), O-Rings (4 pieces) and ferrules (4 pieces).
144834	EDA Capillary Adapter Assembly EDA capillary adapter body, capillary adapter nut, seal, fittings and tubing kit.

5.9 P/ACE MDQ™ MDQ Buffer Reservoir Tray

The P/ACE MDQ Buffer Reservoir Tray (PN 144824) has two large capacity buffer reservoirs for use during capillary electrophoretic separations. Each reservoir holds approximately 25 mL of buffer. The tray can simultaneously accommodate ten standard 2 mL buffer vials. These smaller vials are useful for high pressure rinse and wash solutions. Use of this tray requires P/ACE MDQ Software and Firmware Version 1.5 or 32 Karat Software Version 5.0 and Firmware 5.0 or higher.

Filling the Tray

Fill the reservoirs before the tray is installed in the instrument.

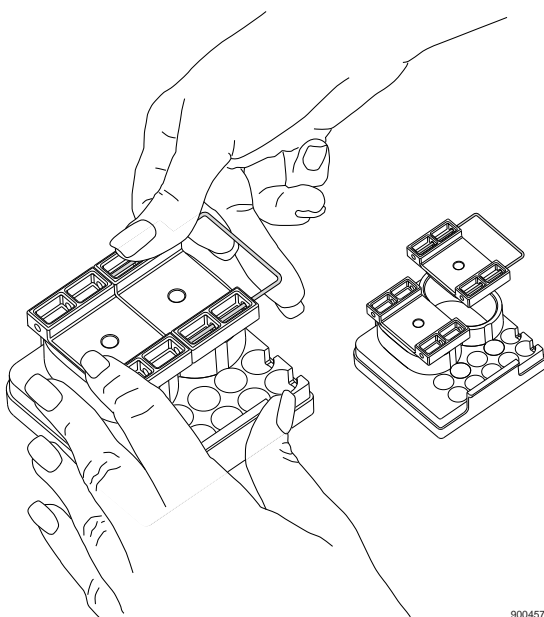
Proceed as follows:

NOTE If the reservoirs already contain liquid, take care not to spill the contents during this operation.

1. Remove the lids by using the tool provided as shown in Figure 5.8.
2. Insert the tool into the holes in the lid; hold the tray down and pull up with the tool.

CAUTION The tight fit of the lid is required to allow the application of up to a maximum 20 psi.

3. Fill the reservoirs with the desired buffer solution. Note the solvent limitations in Table 1.
4. To prevent the liquid from emerging from the cap when the lid is inserted, make sure that the liquid level is not above the bottom of the lid.
5. Push down firmly to replace the lids. The lids must be completely seated.
6. Install a RED vial cap in the hole in the center of the lid. This is the same cap as used on the 2 mL buffer vials.



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Figure 5.8 Lid Removal

Installing the Tray

The tray replaces the 36-position buffer tray used in the BI (buffer inlet) and BO (buffer outlet) positions on the P/ACE MDQ sample handling system. To install the new trays insert them in the white tray holders with the large reservoirs to the right (as viewed from the front of the instrument).

CAUTION The trays will only install one way. Do not force them into place.

Programming the Tray

The reservoir tray has twelve valid positions. The 2 mL vials are in positions A1-A5 and B1-B5. The front reservoir is position E2. The rear reservoir is position E4. The positions are entered into the Time Program in the same manner as positions in the 36-position tray.

The instrument will sense when the buffer reservoir tray is installed. If an invalid position has been programmed an error will be generated when the method is run. No error checking is performed during method editing.

There is a pressure limit of 20 psi when rinsing from the reservoirs. Attempting to use higher rinse pressures will generate an error message and the process will abort. The 2 mL vials can be pressurized to 100 psi. No error checking is performed during method editing.

Solvent Compatibility

The reservoir tray is made from polypropylene. The O-Ring and cap are made of silicone rubber. The compatibility at room temperature (25°C) of polypropylene to some solvents commonly used in capillary electrophoresis is listed in the table following:

CAUTION The use of inappropriate solvents may weaken the plastic permanently. This could create a hazardous situation when pressure is applied. If exposed to such solvents the unit should be discarded.

Ratings of chemical behavior listed in this table apply to a 48-hour exposure. This information has been obtained from standard reference sources. The effect of combinations of chemicals may be different from the effect of the individual chemicals alone.

IMPORTANT Beckman Coulter does not warrant (express or implied) that the information in this chart is accurate or complete.

Solvent	Effect
Acetic Acid, 20% in water	No effect
Acetic Acid, Glacial	Minor effect
Acetonitrile	No effect
Dimethyl formamide	No effect
Ethanol	No effect
Formic acid	No effect
Hydrochloric acid, 20%	Minor effect
Hydrochloric Acid, 37%	Moderate effect
Isopropyl Alcohol	No effect
Methanol	No effect
Phosphoric acid, <40%, aqueous	No effect
Sodium dodecyl sulfate solutions	No effect
Sodium hydroxide, 10% aqueous	No effect
Tetrahydrofuran	Moderate effect
Water	No effect

Parts List

Refer to the table below for part numbers and description of Buffer Reservoir Tray Parts List.

Part Number	Description
144824	Accessory Kit, Buffer Reservoir Tray 2 trays, 4 lids, lid removal tool, instruction sheet
144824	Lid only
144858	Lid removal tool
144865	Replacement O-Rings for lid (3)



Additional Features

P/ACE MDQ™ MDQ Buffer Reservoir Tray

www.beckmancoulter.com

