**BECKMAN COULTER** ™

# P/ACE™ MDQ
# Installation & Maintenance Guide

## Hardware Installation, Maintenance and Troubleshooting

**P/N 149923 AB**
**August 2001**

# Safety Information

This section provides safety information and instructions for the hardware and accessories of the system.

## Safety Symbols

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.

When symbols are displayed in this manual, pay particular attention to the safety information associated with the symbol.

| ⚠ **WARNING** | This icon accompanies text and/or other international symbols dealing with hazards to personnel. When present, it indicates that a potential hazard to your personal safety exists if information stated within the "**WARNING**" paragraph is not adhered to or procedures are executed incorrectly. |
|---|---|

| ⚠ **CAUTION** | This icon accompanies text and/or other international 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. |
|---|---|

| WARNING | **HIGH VOLTAGE** |
|---|---|
| | Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a high voltage source. In this document, the "**WARNING**" icon will accompany this symbol. |
| | To reduce risk of electrical shock, all devices employ a three-wire electrical cable and plug to connect the equipment to earth ground. |
| | **Ensure that the wall outlet receptacle is properly wired and earth grounded.** |
| | **DO NOT use a three-to-two wire plug adapter.** |
| | **DO NOT use a two wire extension cord or a two wire multiple-outlet power strip.** |
| | **Disconnect power to the system before performing maintenance.** |
| | **DO NOT remove any panels; panels should be removed only by qualified service personnel.** |

| | BIOHAZARD |
|---|---|
| **WARNING** | Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a biological source. In this document, the "**BIOHAZARD**" icon will accompany this symbol. |
| | **Normal operation of the instrument can involve the use of solvents and reagents that are toxic, flammable or biologically harmful.** |
| | • **Observe all precautionary information printed on the original solution containers.**<br>• **Operate the system in the appropriate environment.**<br>• **Take all necessary precautions when using pathology or toxic materials to prevent the generation of aerosols.**<br>• **Observe all applicable precautionary procedures when using flammable solvents in or near the instrument.**<br>• **Wear appropriate laboratory attire, e.g., safety glasses, gloves, lab coat and breathing apparatus, when working with hazardous materials.**<br>• **Dispose of all waste solutions in a proper manner.** |

| | SHARP OBJECTS/MOVING PARTS |
|---|---|
| **WARNING** | 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 and to moving parts. In this document, the **"WARNING"** icon will accompany this symbol. |
| | **To avoid injury due to moving parts, observe the following:** |
| | • **Keep loose clothing and hair away from moving parts.**<br>• **Never attempt to physically restrict movement of moving parts.** |

| | **HOT SURFACES** |
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| **WARNING** | 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. In this document, the **"WARNING"** icon will accompany this symbol. |

| | **LASER LIGHT** |
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| **WARNING** | Paragraphs marked by this symbol indicate that a potential hazard to your personal safety exists from a laser source. In this document, the **"WARNING"** icon will accompany this symbol. |
| | Since laser light is not accessible to the user during normal operation of the system, the overall classification of these lasers is "Class 1", i.e., "lasers which are safe under reasonably foreseeable conditions of operation." |
| | To prevent eye damage from potentially harmful laser light, observe all safety warnings. |

| | PROTECTIVE EARTH OR GROUND TERMINAL |
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| | This symbol identifies the location of the protective earth or ground terminal lug on the equipment. |

| | OFF Position of Principal Power Switch |
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| | This symbol graphically represents the equipment main power switch when it is in the OFF position. |

| | ON Position of Principal Power Switch |
|---|---|
| | This symbol graphically represents the equipment main power switch when it is in the ON position. |

# Informations sur la sécurité

Cette section contient des informations et instructions relatives aux composants et accessoires du système. Elle se compose des sous-sections suivantes :

## Symboles de sécurité

Les symboles illustrés ci-dessous et ceux apposés à l'instrument vous rappellent qu'il est crucial de lire et comprendre toutes les consignes de sécurité avant d'installer, d'utiliser, d'entretenir ou de réparer cet appareil.

Lorsque des symboles apparaissent dans ce mode d'emploi, respectez scrupuleusement les consignes qui les accompagnent.

| ⚠ **AVERTISSEMENT** | Cette icône accompagne le texte et/ou les autres symboles internationaux destinés à protéger le personnel contre les risques de blessures. Lorsque cette icône est présente, votre personnel risque de s'exposer à des dangers en cas de non-respect des consignes du paragraphe **«Avertissement»** ou d'exécution incorrecte des procédures. |
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| ⚠ **ATTENTION** | Cette icône accompagne le texte et/ou autres symboles internationaux associés aux risques de dommages matériels. Lorsque ce symbole est présent, il indique que l'équipement risque d'être endommagé, qu'une défaillance logicielle ou une perte de données risque de se produire en cas de non-respect des consignes figurant dans le paragraphe **«Attention»** ou d'exécution incorrecte des procédures. |
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| **AVERTISSEMENT** | **HAUTE TENSION**<br><br>Les paragraphes marqués de ce symbole indiquent qu'une source de haute tension risque de compromettre la sécurité de votre personnel. Dans ce document, l'icône **«AVERTISSEMENT»** est toujours accompagné de ce symbole.<br><br>Tous les dispositifs sont munis d'un cordon d'alimentation électrique à trois fils qui permet de les mettre à la terre et de diminuer le danger d'électrocution.<br><br>**Assurez-vous que la prise murale correspondante est correctement câblée et mise à la terre.**<br><br>**N'utilisez AUCUN adaptateur permettant de passer de trois à deux fils.**<br><br>**N'utilisez AUCUNE rallonge à deux fils ou une multiprise à deux fils.**<br><br>**Coupez l'arrivée de courant au système avant d'effectuer une maintenance.**<br><br>**N'enlevez AUCUN panneau ; ces derniers ne doivent être enlevés que par des techniciens de service qualifiés.** |

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| **AVERTISSEMENT** | **DANGER BIOLOGIQUE**<br><br>Les paragraphes marqués de ce symbole indiquent que des substances biologiques risquent de compromettre la sécurité de votre personnel. Dans ce document, l'icône **«DANGER BIOLOGIQUE»** est toujours accompagné de ce symbole.<br><br>Des solvants et des réactifs toxiques, inflammables et présentent un danger biologique peuvent être utilisés pendant le fonctionnement normal de l'instrument.<br><br>• **Observez toutes les informations de précaution imprimées sur le récipient d'origine des solutions.**<br>• **Utilisez le système dans un environnement adapté à l'application.**<br>• **Lorsque vous utilisez des substances pathologiques ou toxiques, prenez toutes les précautions nécessaires afin d'éviter la création d'aérosols.**<br>• **Observez toutes les mesures de précaution applicables quand vous utilisez des solvants inflammables sur l'appareil ou à proximité de celui-ci.**<br>• **Portez des vêtements de protection pour laboratoire, tels que des lunettes, des gants, une blouse de laboratoire et un respirateur quand vous travaillez avec des substances dangereuses.**<br>• **La mise au rebut des déchets de solutions doit se faire de manière appropriée.** |

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| **AVERTISSEMENT** | **OBJETS TRANCHANTS/PIÈCES EN MOUVEMENT**<br><br>Les paragraphes marqués de ce symbole indiquent que des angles vifs ou d'autres pièces saillantes à l'extérieur et l'intérieur de l'appareil, ainsi que des pièces en mouvement risquent de compromettre la sécurité de votre personnel. Dans ce document, l'icône «**AVERTISSEMENT**» accompagne toujours ce symbole.<br><br>Pour éviter d'être blessé par les pièces en mouvement, observez les mesures suivantes :<br><br>• **Éloignez les vêtements lâches et les cheveux des pièces en mouvement.**<br>• **N'empêchez jamais le déplacement des pièces en mouvement.** |

| | **SURFACE CHAUDE** |
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| **AVERTISSEMENT** | Les paragraphes marqués de ce symbole indiquent que des surfaces chaudes ou d'autres pièces saillantes à l'extérieur et l'intérieur de l'appareil risquent de compromettre la sécurité de votre personnel. Dans ce document, l'icône «**AVERTISSEMENT**» est toujours accompagné de ce symbole. |

| | **FAISCEAU LASER** |
|---|---|
| **AVERTISSEMENT** | Les paragraphes marqués de ce symbole indiquent qu'une source laser risque de compromettre la sécurité de votre personnel. Dans ce document, l'icône **«AVERTISSEMENT»** est toujours accompagné de ce symbole. |
| | Comme l'utilisateur ne peut pas accéder au laser pendant le fonctionnement normal du système, leur classification globale de ces lasers est «classe 1» ; en d'autres termes, «ces lasers ne présentent pas de danger dans des conditions de fonctionnement normales». |
| | Pour protéger les utilisateurs contre les rayons laser dangereux, tenez compte de tous les avertissements de sécurité. |

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| | **Terre de protection ou borne de mise à Terre**<br><br>Ce symbole désigne l'emplacement de la terre ou de la borne de mise à terre de l'équipement. |

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| | **Position HORS de l'interrupteur de courant principal**<br><br>Ce symbole représente graphiquement l'interrupteur principal de l'équipement en position HORS. |

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| | **Position EN de l'interrupteur de courant principal**<br><br>Ce symbole représente graphiquement l'interrupteur principal de l'équipement en position EN. |

# Sicherheitsinformationen

Dieser Abschnitt enthält Sicherheitsinformationen sowie Anleitungen für System-Hardware und -Zubehör.

## Sicherheitssymbole

Die unten dargestellten und am Gerät angebrachten Symbole sollen daran erinnern, daß alle Sicherheitsanweisungen zu lesen und zu verinnerlichen sind, bevor die Installation, Bedienung, Wartung oder Reparatur dieses Gerätes in Angriff genommen wird.

Wo im Handbuch Symbole erscheinen, sind die mit dem jeweiligen Symbol verbundenen Sicherheitsinformationen besonders zu beachten.

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| **⚠**<br>**WARNUNG** | Dieses Symbol begleitet Texte und/oder sonstige internationale Symbole, die auf Personengefährdung hinweisen. Das Vorliegen dieses Symbols weist auf mögliche Personengefährdungen hin, die auftreten können, falls die Verfahren in dem mit **"WARNUNG"** betitelten Abschnitt nicht korrekt ausgeführt werden. |

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| **⚠**<br>**VORSICHT** | Dieses Symbol begleitet Texte und/oder sonstige internationale Symbole, die auf potentielle Geräteschäden hinweisen. Das Vorliegen dieses Symbols weist auf mögliche Gefahrenquellen für das Gerät, auf Software-Programmausfälle oder auf Datenverluste hin, die auftreten können, falls die Verfahren in dem mit **"VORSICHT"** betitelten Abschnitt nicht korrekt ausgeführt werden. |

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| ⚠ **WARNUNG** | **HOCHSPANNUNG**<br><br>Mit diesem Symbol versehene Abschnitte weisen auf eine von einer Hochspannungsquelle ausgehende potentielle Personengefährdung hin. In diesem Dokument wird dieses Symbol vom "**WARNUNG**"-Symbol begleitet.<br><br>Um das Risiko von elektrischen Stromschlägen zu reduzieren, sind alle Geräte mit dreiadrigen Kabeln und Steckern ausgestattet und können nur an geerdete Steckdosen angeschlossen werden.<br><br>**Sicherstellen, daß der Wandanschluß korrekt verkabelt und geerdet ist.**<br><br>**AUF KEINEN FALL Steckeradapter für zweiadrige Steckdosen verwenden.**<br><br>**AUF KEINEN FALL ein zweiadriges Verlängerungskabel oder eine zweiadrig verkabelte Mehrfachsteckdose verwenden.**<br><br>**Vor Wartungsarbeiten die Stromversorgung des Systems unterbrechen.**<br><br>**KEINERLEI Verkleidungen entfernen; Verkleidungen dürfen nur von dafür qualifizierten Kundendiensttechnikern entfernt werden.** |

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| <br>**WARNUNG** | **BIOGEFÄHRDUNG**<br><br>Mit diesem Symbol versehene Abschnitte weisen auf eine von einer biologischen Substanz ausgehende potentielle Personengefährdung hin. In diesem Dokument wird dieses Symbol vom "**BIOGEFÄHRDUNG**"-Symbol begleitet.<br><br>Der normale Betrieb des Systems kann den Einsatz von toxischen, brennbaren oder biogefährlichen Lösemitteln und Reagenzien umfassen.<br><br>• **Sämtliche auf den Orginal-Lösungsbehältern aufgedruckten Sicherheitsangaben beachten.**<br>• **Das System in entsprechender Umgebung betreiben.**<br>• **Beim Umgang mit pathologischen oder toxischen Substanzen alle notwendigen Vorsichtsmaßnahmen zur Vermeidung von Aerosolbildung ergreifen.**<br>• **Beim Umgang mit brennbaren Lösemitteln am Gerät bzw. in dessen unmittelbarer Umgebung alle diesbezüglichen Vorsichtsmaßnahmen beachten.**<br>• **Bei Arbeit mit Gefahrstoffen geeignete Laborkleidung tragen, wie bspw. Schutzbrille, Handschuhe, Laborkittel und Atemgerät.**<br>• **Sämtliche Lösungsabfälle sind sachgerecht zu entsorgen.** |

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| <br>**WARNUNG** | **SCHARFKANTIGE OBJEKTE/ BEWEGLICHE TEILE**<br><br>Mit diesem Symbol versehene Abschnitte weisen auf eine von scharfen Kanten oder sonstigen hervorstehenden Objekten außerhalb oder innerhalb des Geräts sowie von beweglichen Teilen ausgehende potentielle Personengefährdung hin. In diesem Dokument wird dieses Symbol vom **"WARNUNG"**-Symbol begleitet.<br><br>Zur Vermeidung von Verletzungen durch bewegliche Teile ist folgendes zu beachten:<br><br>• **Locker sitzende Kleidung und Haare von beweglichen Teilen fernhalten.**<br>• **Niemals versuchen, die Bewegung beweglicher Teile von Hand einzuschränken.** |

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| <br>**WARNUNG** | **HEISSE FLÄCHEN**<br><br>Mit diesem Symbol versehene Abschnitte weisen auf eine von heißen Flächen oder sonstigen hervorstehenden Objekten außerhalb oder innerhalb des Geräts ausgehende potentielle Personengefährdung hin. In diesem Dokument wird dieses Symbol vom **"WARNUNG"**-Symbol begleitet. |

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| <br>**WARNUNG** | **LASERSTRAHLUNG**<br><br>Mit diesem Symbol versehene Abschnitte weisen auf eine von einer Laserlichtquelle ausgehende potentielle Personen-gefährdung hin. In diesem Dokument wird dieses Symbol vom "**WARNUNG**"-Symbol begleitet.<br><br>Da der Anwender bei normalem Systembetrieb keinen Zugang zur Laserstrahlung hat, fallen diese Laser unter die allgemeine Klassifizierung "Klasse 1", d.h., "Laser, die unter weitgehend vorhersehbaren Betriebsbedingungen keine Gefährdung darstellen".<br><br>Um Augenschäden durch die potentiell schädliche Laserstrahlung zu vermeiden, sind sämtliche Sicherheitshin-weise zu beachten. |

| | **SCHUTZERDE ODER MASSEKLEMME** |
|---|---|
| | Dieses Symbol weist die Schutzerde bzw. die Masseklemme am Gerät aus. |

| | **AUS-Position des Hauptnetzschalters** |
|---|---|
| | Durch dieses Symbol wird graphisch dargestellt, wenn der Hauptschalter für die Stromzufuhr auf "AUS" geschaltet ist. |

| | **EIN-Position des Hauptnetzschalters** |
|---|---|
| | Durch dieses Symbol wird graphisch dargestellt, wenn der Hauptschalter für die Stromzufuhr auf "EIN" geschaltet ist. |

# Informazioni sulla sicurezza

Questa sezione contiene informazioni sulla sicurezza e istruzioni attinenti ai componenti meccanici e agli accessori del sistema.

## Simboli di sicurezza

I simboli riportati sotto e apposti sullo strumento segnalano che prima di installare, usare, effettuare la manutenzione o riparare questo strumento occorre leggere attentamente tutte le istruzioni sulla sicurezza.

Ogniqualvolta si incontrano questi simboli nel manuale, leggere attentamente le informazioni sulla sicurezza da essi segnalate.

| ⚠ AVVERTENZA | Questo simbolo compare insieme al testo o ad altri simboli internazionali relativi ai rischi per il personale. Indica che se non si osserva scrupolosamente quanto segnalato o se si svolgono erroneamente procedure, si corre il pericolo di infortunio. |
|---|---|

| ⚠ ATTENZIONE | Questo simbolo compare insieme al testo o ad altri simboli internazionali relativi al rischio di danni all'apparecchiatura. Indica che se non si osserva scrupolosamente quanto segnalato o se si svolgono erroneamente procedure, si possono causare danni all'apparecchiatura, cessazione del funzionamento del programma software o perdita di dati. |
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| <br>**AVVERTENZA** | **ALTA TENSIONE**<br><br>I paragrafi contrassegnati con questo simbolo indicano che esiste il pericolo di folgorazione da una sorgente di alta tensione. Questo simbolo è accompagnato dal simbolo di **"AVVERTENZA"**.<br><br>Per ridurre il rischio di scosse elettriche, tutti i dispositivi sono dotati di spina e cavo a tre conduttori per il collegamento dell'apparecchio con l'impianto di messa a terra.<br><br>**Accertarsi che la presa di corrente sia cablata adeguatamente e collegata all'impianto di messa a terra.**<br><br>**NON utilizzare un adattatore per collegare una spina a tre conduttori con una a due conduttori.**<br><br>**NON utilizzare un cavo di prolunga a due conduttori o una presa multipla a due conduttori.**<br><br>**Prima di eseguire la manutenzione del sistema, scollegarlo dall'alimentazione.**<br><br>**NON rimuovere i pannelli; devono essere rimossi esclusivamente dal personale di assistenza tecnica.** |

| | **PERICOLO BIOLOGICO** |
|---|---|
| **AVVERTENZA** | I paragrafi contrassegnati con questo simbolo indicano che esiste un pericolo per la propria incolumità a causa di una sorgente biologica. Questo simbolo è accompagnato dal simbolo di **"AVVERTENZA"**.<br><br>Il funzionamento normale del sistema può comportare l'uso di solventi e reagenti tossici, infiammabili o biologicamente pericolosi.<br><br>• **Prendere tutte le precauzioni indicate sui contenitori originali della soluzione.**<br>• **Fare funzionare il sistema in un ambiente adeguato.**<br>• **Quando si usano materiali tossici o che possano causare condizioni patologiche, prendere tutte le precauzioni necessarie per prevenire la formazione di aerosol.**<br>• **Quando si usano solventi infiammabili all'interno o in prossimità dello strumento, seguire tutte le procedure pertinenti per la sicurezza.**<br>• **Quando si opera con materiali pericolosi, indossare un camice da laboratorio e usare occhiali e guanti di sicurezza e un respiratore.**<br>• **Eliminare tutte le soluzioni di scarto in modo adeguato.** |

| | **OGGETTI TAGLIENTI/PARTI MOBILI** |
|---|---|
| **AVVERTENZA** | I paragrafi contrassegnati con questo simbolo indicano che esiste un pericolo per la propria incolumità a causa di spigoli vivi o altre parti accessorie all'esterno o all'interno dell'apparecchio. Questo simbolo è accompagnato dal simbolo di **"AVVERTENZA"**.<br><br>Per prevenire infortuni che possono essere causati dalle parti mobili, prendere queste precauzioni:<br><br>• **Tenere i capelli e indumenti larghi lontani dall'area delle parti mobili.**<br>• **Non tentare mai di limitare il movimento delle parti mobili.** |

| | **SUPERFICIE AD ALTA TEMPERATURA** |
|---|---|
| **AVVERTENZA** | I paragrafi contrassegnati con questo simbolo indicano che esiste un pericolo per la propria incolumità a causa di superfici o altre parti accessorie all'esterno o all'interno dell'apparecchio, ad alta temperatura. Questo simbolo è accompagnato dal simbolo di "**AVVERTENZA**". |

| | **LUCE LASER** |
|---|---|
| **AVVERTENZA** | I paragrafi contrassegnati con questo simbolo indicano che esiste un pericolo per la propria incolumità a causa di una sorgente laser. Questo simbolo è accompagnato dal simbolo di "**AVVERTENZA**". |
| | Durante il funzionamento normale del sistema, la luce laser non è accessibile né osservabile, pertanto la classificazione laser complessiva di questi laser è "Classe 1", ossia "laser che non mettono a rischio l'incolumità delle persone in condizioni di funzionamento ragionevolmente prevedibili". |
| | Per proteggere gli utenti dai rischi della luce laser, osservare tutte le avvertenze sulla sicurezza. |

| | **Collegamento con la terra o terminale di protezione** |
|---|---|
| | Questo simbolo indica la posizione del collegamento con la terra o dello spinotto di protezione sull'apparecchio. |

| | **Posizione OFF (SPENTO) dell'interruttore principale di alimentazione** |
|---|---|
| | Questo simbolo indica il punto dell'interruttore principale di alimentazione su cui occorre premere per spegnere l'apparecchio. |

| | **Posizione ON (ACCESO) dell'interruttore principale di alimentazione** |
|---|---|
| | Questo simbolo indica il punto dell'interruttore principale di alimentazione su cui occorre premere per accendere l'apparecchio. |

# Información sobre seguridad

En esta sección se proporciona información sobre la seguridad e instrucciones para la utilización del equipo y accesorios del sistema.

## Símbolos de seguridad

Los símbolos ilustrados a continuación y que se encuentran sobre el instrumento recuerdan al usuario que debe leer y comprender plenamente todas las instrucciones relativas a la  seguridad antes de la instalación, operación, mantenimiento o reparación de este instrumento.

Cuando vea esos símbolos en este manual, preste especial atención a la información de seguridad correspondiente a esos símbolos.

| ⚠ **ADVERTENCIA** | Este icono acompaña al texto y los símbolos internacionales que identifican riesgos potenciales para el personal. Su presencia significa que hay un riesgo potencial a la seguridad personal del operador si no se aplica la información incluida en el párrafo de la **"ADVERTENCIA"** o si no se ejecutan correctamente los procedimientos. |
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| ⚠ **PRECAUCIÓN** | Este icono acompaña a texto y los símbolos internacionales que identifican riesgos potenciales de daños para el equipo. Su presencia indica un riesgo potencial de daños al equipo, fallos de programa o pérdida de datos si no se aplica la información incluida en el párrafo de la **"PRECAUCIÓN"** o si no se ejecutan correctamente los procedimientos. |
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| ⚠️<br><br>**ADVERTENCIA** | **VOLTAJE  ALTO VOLTAJE**<br><br>Los párrafos marcados con este símbolo contienen advertencias de riesgos potenciales a la seguridad personal debido a una fuente de alto voltaje. En este documento, junto a este símbolo se imprimirá el icono de **"ADVERTENCIA"**.<br><br>Para reducir el riesgo de descargas eléctricas, todos los dispositivos están dotados de cable eléctrico de tres alambres y del enchufe adecuado para conectar el equipo a tomacorrientes con descarga a tierra.<br><br>**Verifique que el tomacorrientes de pared tenga una conexión y descarga a tierra adecuadas.**<br><br>**NO use un adaptador de tres a dos alambres.**<br><br>**NO use un cable de extensión de dos alambres ni una banda de enchufe múltiple de dos alambres.**<br><br>**Antes de efectuar tareas de mantenimiento interrumpa el paso de corriente al instrumento.**<br><br>**NO quite ninguno de los paneles; éstos sólo deben ser quitados por personal de servicio calificado.** |

| | **RIESGO BIOLÓGICO** |
|---|---|
| **ADVERTENCIA** | Los párrafos marcados con este símbolo indican riesgos potenciales a la seguridad personal debido a una fuente de sustancias biológicas. En este documento, junto a este símbolo se imprimirá el icono de **"ADVERTENCIA"**. <br><br> La operación normal del sistema puede incluir uso de solventes y reactivos tóxicos, inflamables o que presentan un riesgo biológico. <br><br> • **Observe todas las precauciones impresas en los recipientes originales de las soluciones.** <br> • **Haga funcionar el sistema en el entorno adecuado.** <br> • **Al utilizar materiales tóxicos o patológicos, tome todas las precauciones necesarias para impedir la generación de aerosoles.** <br> • **Al utilizar solventes inflamables en el instrumento o cerca del instrumento, observe todas las precauciones aplicables.** <br> • **Al trabajar con materiales peligrosos, use vestimenta de laboratorio adecuada, por ejemplo, gafas de protección, guantes, bata de laboratorio y dispositivo de respiración.** <br> • **Procese todas las soluciones de desecho de la manera adecuada.** |

| | **OBJETOS AGUDOS/PIEZAS MÓVILES** |
|---|---|
| **ADVERTENCIA** | Los párrafos marcados con este símbolo indican riesgos potenciales a la seguridad personal debido a la existencia de esquinas u otras salientes agudas en el exterior o interior de este equipo. En este documento, junto a este símbolo se imprimirá el icono de **"ADVERTENCIA"**. <br><br> Para evitar heridas provocadas por piezas móviles, observe las siguientes medidas: <br><br> • **Mantenga alejados de las piezas móviles la vestimenta y el cabello sueltos.** <br> • **Nunca intente impedir físicamente el movimiento de las piezas móviles.** |

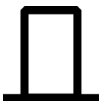| | **SUPERFICIES CALIENTES** |
|---|---|
| **ADVERTENCIA** | Los párrafos marcados con este símbolo indican riesgos potenciales a la seguridad personal debido a superficies o salientes a alta temperatura en el exterior o interior de este equipo. En este documento, junto a este símbolo se imprimirá el icono de **"ADVERTENCIA"**. |

| | **LUZ DE LÁSER** |
|---|---|
| **ADVERTENCIA** | Los párrafos marcados con este símbolo indican riesgos potenciales a la seguridad personal debido a una fuente de luz de láser. En este documento, junto a este símbolo se imprimirá el icono de **"ADVERTENCIA"**.<br><br>Durante el funcionamiento normal del sistema, el usuario no tiene acceso a la luz del láser. Por ello, el láser del sistema tiene la clasificación general de "Clase 1", es decir, "dispositivos láser que son seguros en condiciones de funcionamiento razonablemente predecibles".<br><br>Para proteger a los usuarios de daños a los ojos por la luz potencialmente nociva del láser, observe todas las advertencias de seguridad. |

| | |
|---|---|
|  | **Terminal CON protección DE descarga a tierra**<br><br>Este símbolo identifica la ubicación en el equipo del terminal con protección de descarga a tierra. |

| | |
|---|---|
|  | **Posición de "desconectado' ("OFF") del interruptor principal de corriente**<br><br>Este símbolo representa en forma gráfica el interruptor principal de corriente cuando está en la posición desconectado (OFF). |

| | |
|---|---|
|  | **Posición de "conectado' ("ON") del interruptor principal de corriente**<br><br>Este símbolo representa en forma gráfica el interruptor principal de corriente cuando está en la posición conectado (ON). |

# 安全性に関する情報

本セクションではシステムのハードウェア並びにアクセサリの安全性に関する情報及び指示を記載しています。

## マーク

以下のマークが装置上に貼付されている場合、インストール、操作、メンテナンス、あるいは修理を行う前に安全に関する説明を読み、理解していることを再確認してください。

また、本書中にこれらのマークが使用されている場合は特に安全に関する説明を注意してお読みください。

| ⚠ 要注意 | このマークが文中や他の国際的に使用されているマークと共に使用されている場合、人体に害があることを示しています。「要注意」と記されている内容を守らなかったり誤って実施した場合、使用者に害を及ぼす可能性があることを意味します。 |
|---|---|

| ⚠ 注意 | このマークが文中や国際的に広く使用されている他の国際マークと共に使用されている場合、装置に害があることを示しています。「注意」と記されている内容を守らなかったり誤って実施した場合、装置に損傷を与えたり、ソフトウェアにプログラム エラーが生じたり、またデータが消失する可能性があることを意味します。 |
|---|---|

| 要注意 | 高電圧 |
|---|---|
| | このマークは高電圧の危険性を意味し、使用者に害を及ぼす可能性があることを示しています。本書では「要注意」のアイコンと共に使用されています。 |
| | 感電防止のために、全ての装置は 3 線式の電気コードを用い接地された装置に接続してください。 |
| | 壁面のコンセントは正しく配線され接地されていることを確認してください。 |
| | 3 線から 2 線用のアダプタは使用しないでください。 |
| | 2 線用の延長線または 2 線用のテーブルタップは使用しないでください。 |
| | メンテナンスを行う前にシステムの電源を切ってください。 |
| | いかなるパネルも取り外さないでください。パネルは弊社サービス員が取り外します。 |

| | |
|---|---|
| 要注意 | **生物学上の危険性**<br><br>このマークは生物由来による人体への害の可能性があることを示しています。本書では「要注意」のアイコンと共に使用されています。<br><br>通常の操作でも有毒、可燃性、あるいは生物学上有害な溶媒や試薬を使用することがあります。<br>・ 容器に記載された注意事項をよくお読みください。<br>・ 適切な環境下で装置を操作してください。<br>・ 病理上または有毒物質を使用する際はエアゾルの発生を防ぐための予防措置をとってください。<br>・ 装置のそばで可燃性の溶媒を使用する際は該当する安全手順に従ってください。<br>・ 有害物質を取り扱う際は適切な保護眼鏡、手袋、上着等を着用してください。<br>・ 廃液は適切な方法で廃棄してください。 |

| | |
|---|---|
| 要注意 | **鋭利物 / 稼動部分**<br><br>このマークは鋭利な角や装置内外の付属物、及び稼動部分による人体への害の可能性があることを示しています。本書では「要注意」のアイコンと共に使用されています。<br><br>可動部分による傷害を防ぐために以下の点を確認してください。<br>・ ゆったりした衣服や長髪は稼動部分から離してください。<br>・ 稼動部分の動きを手で止めようとしないでください。 |

| | 高温箇所 |
|---|---|
| 要注意 | このマークは高温箇所や装置内外の付属物による人体への害の可能性があることを示しています。本書では「要注意」のアイコンと共に使用されています。 |

| | レーザ光 |
|---|---|
| 要注意 | このマークはレーザ光線による人体への害の可能性があることを示しています。本書では「要注意」のアイコンと共に使用されています。<br><br>通常の操作ではレーザ光はユーザの目に触れることはありません。そのため、システム全体としてのレーザの分類は「クラス 1」、すなわち「操作上無理なく予測できる状態の下での安全なレーザ」となっています。<br><br>レーザ光の害から目を守るために、すべての注意書きを確認してください。 |

| | |
|---|---|
| ⏚ | 接地用端末<br><br>このマークは装置に接地用端末があることを示しています。 |

| | |
|---|---|
| | 電源スイッチ OFF 状態<br><br>このマークは装置の主要電源スイッチが OFF の状態になっていることを図により示しています。 |

| | |
|---|---|
| | 電源スイッチ ON 状態<br><br>このマークは装置の主要電源スイッチが ON の状態になっていることを図により示しています。 |

# 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.

**Beckman Coulter, Inc.**
**Fullerton, California**
**U.S.A.**

# Copyright, Licenses and Trademarks

## Copyright

## Licenses and Trademarks

# Table of Contents

## Maintenance

## Additional Features

# Section 1 - Introduction

## 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 (sections) can be found following the appropriate tabs as follows:

Tab **Introduction**
Section 1 - Introduction

Tab **Specifications & Site Requirements**
Section 2 - Specifications & Site Requirements

Tab **Hardware/Software Installation**
Section 3 - Hardware and Software Installation

Tab **Maintenance**
Section 4 - Maintenance

Tab **Additional Features**
Section 5 - Additional Features

# Section 2 - Specifications & Site Requirements

## 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.

# Section 3 - Hardware & Software Installation

## 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. Table 3-1 lists these topics in the order they are presented.

Table 3-1    Topics Included in the Hardware/Software Installation

| 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 and installing the GPIB board and driver, installing 32 Karat™ Software and setting up the P/ACE MDQ instrument. Also covered are details on License Repair, Uninstall Software License, Reprocessing License and Software License diskettes. |
| System Configuration | Configuring system components. |
| Installation - Additional Features (See also: Additional Features tabbed section) | Installing and configuring the SS420 boards and SS420X device; installing the Buffer Tray Reservoir and External Detector Adapter. |

# Installation - General

As referred to in Table 3-1, 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 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 NT or Windows 2000 operating system must be installed on the computer prior to installing the GPIB board, its driver and 32 Karat Software.

Additional features provide details on installing and configuring such items as the Buffer Tray Reservoir, External Detector Adapter and the SS420 boards/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



| Inlet | Outlet Carriage | Foam |
| Carriage | Assembly | Inserts (5) |

900002L.CDR
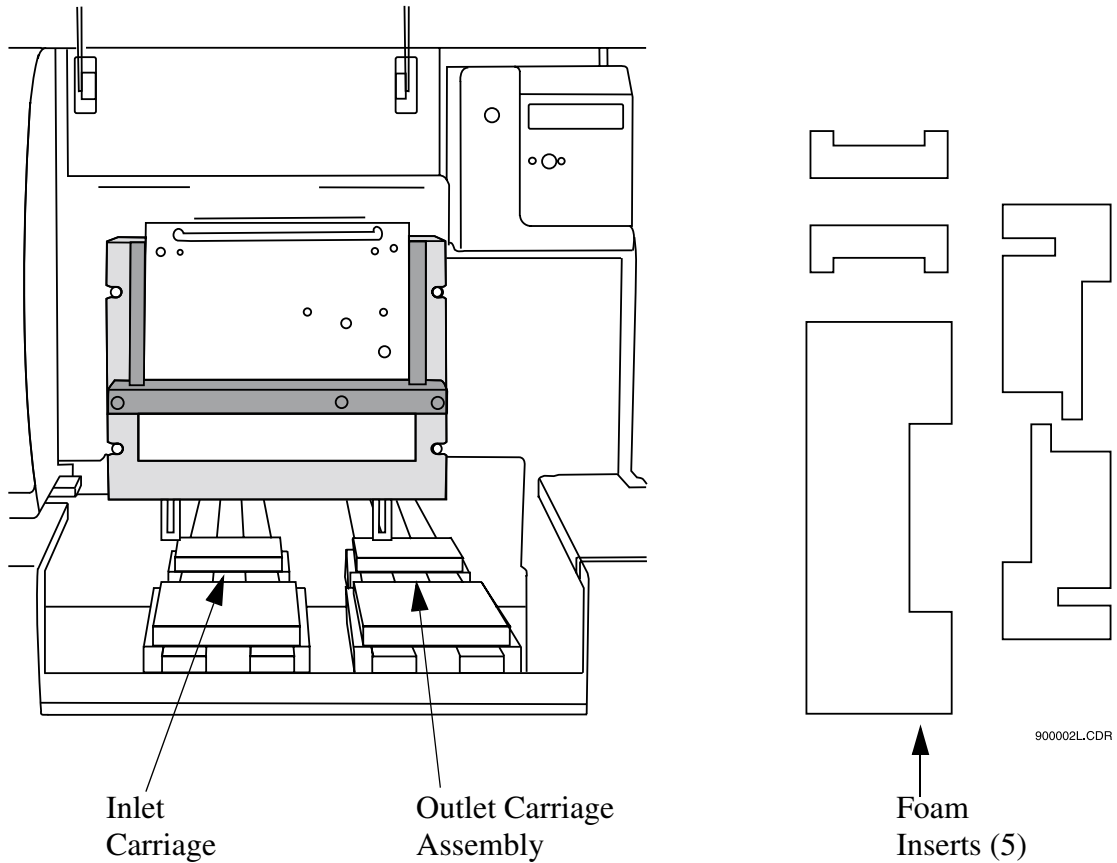
| ⚠️ **CAUTION** | The P/ACE MDQ is heavy (155 lbs/70.5 kg). To avoid personal injury and/or possible damage to the equipment if dropped, use at least two people to lift the instrument. |
|---|---|

3.   Lift the cartridge cover door at the front of the P/ACE MDQ.

4.   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.

5.   Note any damage or missing items and contact the shipping company or your sales representative immediately.

6.    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



901004L.AI
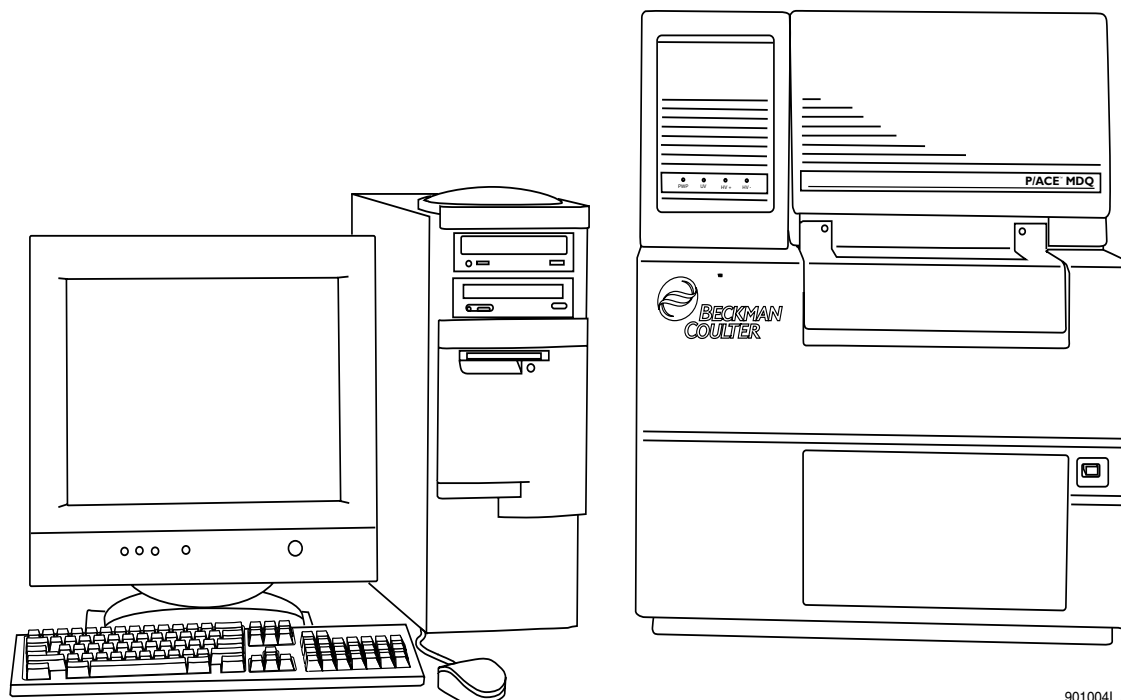
## Repacking

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 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 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.

## 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:

- Installing the GPIB board in the computer
- Configuring the computer. Refer to Table 3-2 for recommended computer hardware configuration
- Installing the GPIB board driver
- Installing 32 Karat Software
- Setting up the P/ACE MDQ Instrument
- Connecting computer and P/ACE MDQ instrument via Communications Cable

Table 3-2    Minimum Recommended Computer Hardware Configuration

| | |
|---|---|
| CPU | Pentium III 500 MHz or greater |
| Memory | 128 Mb (minimum) |
| Floppy Drive | 1.44 Mb |
| Hard Drive | 10 Gb or larger |
| CD-ROM | Required |
| Monitor/Resolution/Colors | 1024 x 768/True Color |
| Keyboard | 101 key |
| Mouse | Microsoft® compatible |
| Interface | PCI-GPIB Communications Interface Board (provided with software) |
| Printer | Any Windows NT™ compatible printer |
| Operating System | Microsoft NT Version 4.0 (Service Pack 6a or higher) or Microsoft Windows 2000 (Service Pack 2 or higher) |
| 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:

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. Replace cover. Before the GPIB board's driver can be installed, the computer must be configured. Refer to **Configuring the Computer,** then install the GPIB board's driver as covered in **Installing the GPIB Communication Interface Board Driver.**

## Configuring the Computer

| | The following configuration settings assume that Windows NT4.0 or Windows 2000 Operating System is installed on the computer. If not, Windows NT4.0 or Windows 2000 must be installed before configuring the computer. |
|---|---|
| ⚠ NOTE | |

### Power/Peripherals

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

### CMOS

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

2. All power management features are disabled.

3. Num Lock is set to ON.

4. Enable COM1 and COM2.

### Display

Referring to the NT / 2000 Operating System manual on how to change the video card settings via the Display icon (icon located in the Control Panel), ensure the following:

5. Screen saver to None.

6. Power saving standby modes disabled.

7. Video resolution set to 1024 x 768, small fonts, true colors.

### Boot Control

Referring to the NT / 2000 Operating System manual on how to set startup parameters via the System icon (icon located in the Control Panel), ensure the following:

8. Select System icon from the Control Panel,

9. Select Startup/Shutdown tab.

10. Select Windows NT Workstation Version 4.00 / Windows 2000.

11. Set Show List to 10 seconds

12. Exit 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 NT / 2000.

2. Insert CD-ROM provided with board into the CD drive.

3.   Select Install NI-488.2 Software for Windows. Skip registering the software when prompted.

4.   Follow the prompts and accept all defaults.

5.   Install only the driver when selecting installation components.

6.   Install NI-VISA when prompted.

7.   Use VISA express installation.

8.   Do not install any Plug and Play options when prompted.

9.   Do not remove the CD from the drive.

10.  Reboot the computer as directed.

11.  When prompted by Wizard, select "Configure your GPIB interface", then follow the steps outlined in Table 3-3. If not prompted, enter the Control Panel, select the GPIB icon and follow the steps outlined below in Table 3-3.

Table 3-3     Steps to Install GPIB Driver

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

Table 3-3    Steps to Install GPIB Driver (Continued)

| | | |
|---|---|---|
| Step 5 | Click Configure | Set Name to DEV1<br>Set Access Board to GBPI0<br>Set Primary to 1<br>Set Secondary to None<br>Check send EOI at end of write<br>Set EOS byte to 0<br>Set I/O Time-out to 10 seconds<br>Set Serial Poll Time-out to 1 second<br>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. | |

12.    After completing installation of the GPIB board's driver, proceed to **Installation - 32 Karat Software** section.

## Installation of 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. When power is applied, the computer will perform a set of built-in diagnostic routines and then complete the start-up process. 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. Click on Install 32 Karat™ Software. If the Master Setup screen does not appear automatically, open CD-ROM (open My Computer and click on CD drive letter, e.g., E:), then find the **Msetup.exe** file. Double click on this file to start the installation process.
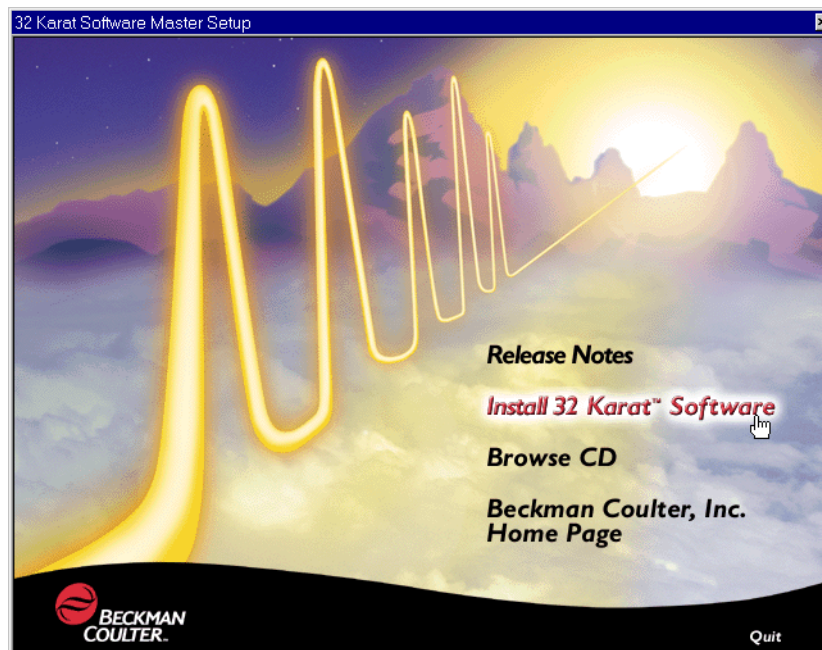


3.  The first screen to appear is the Welcome screen. This screen advises you to close down any current Windows applications before you start the installation and informs you that unauthorized distribution of 32 Karat Software is a crime.
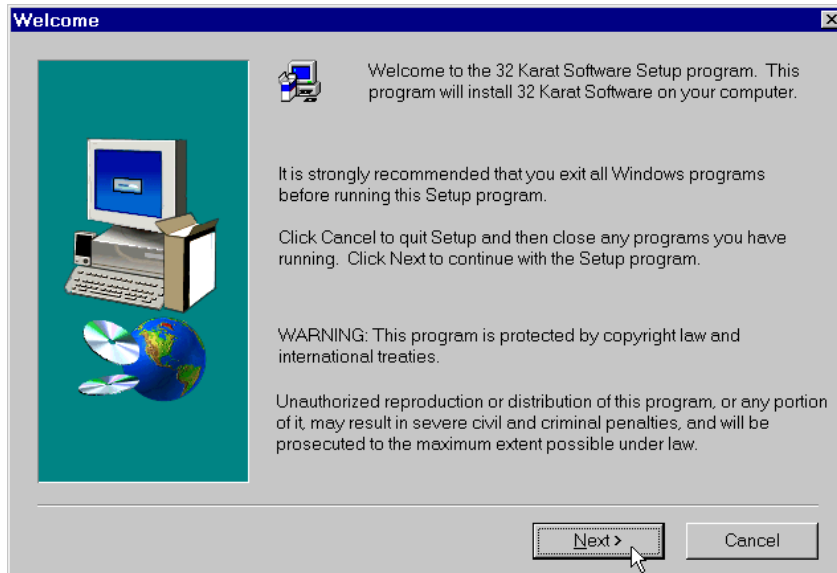
4.   Click Next to continue the installation. Follow the prompts.

5.   When the software installation is complete, the Setup Complete screen will be displayed.
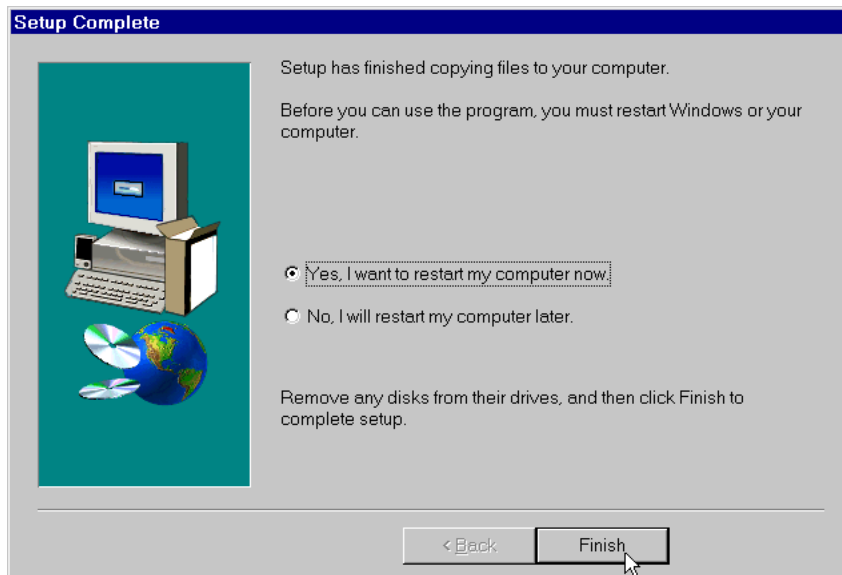


6.   Choose Yes, then click the Finish button. The setup program will automatically restart your computer. If you choose No, the computer will not be restarted. However, you MUST restart before running 32 Karat Software.

# Installation of the Software License

To run 32 Karat Software you must install the "software key" or "license key" that was provided with the software you are running. 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. The license key is installed by running a secure, single-use program provided on a 3 1/4" floppy disk.

Once the program is run and the license is installed, the floppy may not be used to install the license on another computer. You can, however, un-install the license key onto an un-install disk and re-install it on another computer if desired.

**To install the Software License Key:**

When the 32 Karat Software is installed, a "Key" icon will be placed on the desktop along with the 32 Karat icon.

1.  Click on the "Key" icon to open the license manager.
2.  Insert the 32 Karat Software License Diskette into the 3-1/2" diskette drive.
3.  In the Key window, open the Tools menu and select the Install License Options command.
4.  The system will begin installing the software license. This process will take several minutes, after which a message will be displayed indicating that the license was installed successfully.
5.  Once the Software License Diskette has been used, it cannot be used again and may be discarded.
6.  Once you have installed your Software License Key, you may be prompted to create a License Repair Disk. ***This is highly recommended***.

## Creating a License Repair Diskette

You must create the License Repair Disk for your system using the Key program and the blank diskette labeled "License Repair" (included in the 32 Karat Software kit). A License Repair Disk contains your software license information. If you need to restore your software license because of an unexpected error in your system, this disk will recover it for you.

Once you have created the License Repair Disk, label it with the serial number of the computer it was created on. This disk can only be used to repair a software license and re-install it to its original location. It cannot be used to install your license to another machine or location.

If you choose not to create a License Repair Disk when you install your original license, and you later decide you want one, you can create it by running the Key program located in your 32 Karat Software program directory.

**To create the License Repair Disk:**

1.  After the Software License has been installed, insert the blank diskette labeled "License Repair" (included in the 32 Karat Software kit) into your floppy drive.

2.  In the Key window, open the Tools menu and select the Create License Repair Disk command.

3.  Follow the system prompts to complete the process.

| ⚠ NOTE | DO NOT REMOVE THE DISKETTE FROM THE DRIVE UNTIL THE DISK WRITING IS COMPLETE AND THE DRIVE ACTIVITY LIGHT IS OFF!<br><br>Store this diskette in a safe place. |
|---|---|

Should you for some reason lose access to your software license, you can restore it to its original location using your License Repair Disk. Additional repair disks can be created this way using blank floppy disks.

**To repair your Software License:**

1.  Insert the License Repair Disk in your floppy drive and run the Key program in your 32 Karat Software program directory.

2.  In the Key window, open the Tools menu and select the Repair License command.

3.  Follow the system prompts to complete the process.

To remove a software license from your computer (in order to move it to another machine, for example), it must first be uninstalled. This can only be performed with a specially formatted Uninstall Diskette (included in the 32 Karat Software kit).

This Uninstall Diskette is NOT the same floppy disk as the Software License Diskette used to install the original license.

| ⚠ NOTE | The license "uninstall" diskettes that were provided with version 3.0 software will NOT work with version 5.0. If you uninstall your license to a version 3.0 uninstall disk you may lose your license! We recommend that your 3.0 uninstall diskettes be destroyed. |
|---|---|

**To Un-install a Software License:**

1.  Insert the Uninstall Diskette in your floppy drive and run the Key program in your 32 Karat Software program directory.

2. In the Key window, open the Tools menu and select the Uninstall Licenses command.

3. Follow the system prompts to complete the process.

Label the Uninstall Diskette to indicate that it now contains your software license. To install the software license on a new computer, follow the instructions outlined in "Installing a Software License" using the Uninstall Diskette that contains the license.

Once the Uninstall Diskette has been used to install the license on another computer, it cannot be used again and may be discarded.

**When to use the Un-Install Disk:**

• When the computer location is changed on the network (the software will open in "DEMO" mode).
• When the computer name has been changed (the software will open in "DEMO" mode).
• When you want to move the software license from one computer to another.

## Changing the Network Name or Workstation Operating System

If the network name of the computer is changed after the 32 Karat license is installed, the license will be invalidated and the software will not function. In this case, *the License Repair Disk will not restore the license*.

If possible, you should change the network name before the 32 Karat license is installed. If the name must be changed after the license is installed, uninstall the license to an Uninstall Disk before changing the name. You can then re-install the license from the Uninstall Disk after changing the network name.

After re-installing the license, you must create a new Repair Diskette.

The same procedure applies if the Workstation Operating System is changed (for example, from Windows NT to Windows 2000).

## Upgrading from 32 Karat Version 4.0 / 4.01 to Version 5.0

To install version 5.0 on a version 4.0 or 4.01 workstation, you will need a copy of the 5.0 software. You can purchase the 5.0 software CD-ROM or download the upgrade package from http://www.beckmancoulter.com.

1.  Create a repair disk for your 4.0 license.
    *   Select Start/Run… from the Windows desktop.
    *   Type d:\32Karat\key.exe (if your 32 Karat software was not installed in this location, click "Browse" and locate the key.exe file).
    *   Insert a blank floppy diskette into the disk drive of your workstation.
    *   Select Create License Repair Disk from the Tools menu and follow the prompts.

| ⚠️ NOTE | DO NOT REMOVE THE DISKETTE FROM THE DRIVE UNTIL THE DISK WRITING IS COMPLETE AND THE DRIVE ACTIVITY LIGHT IS OFF! <br><br> Store this diskette in a safe place. |
|---|---|

2.  Close all open applications and restart Windows.

3.  If you downloaded the 5.0 software, see the download site for software installation instructions. If you purchased the 5.0 software CD-ROM, The 32 Karat Software CD should auto-run when inserted into the CD-ROM drive of your computer.
    *   Select Install 32 Karat Software from the options listed.
    *   If the CD does not auto-run, click Start, then Run on the Windows desktop.
    *   Type E:\setup.exe and click OK.
    *   Substitute the letter for your CD-ROM drive if other than E:\.

4.  After installation is complete, restart Windows.

5.  Open the 32Karat software.
    *   Click on Help and select About 32 Karat Software to confirm the version is now 5.0.
    *   Click OK to continue.
    *   Look for the word "DEMO" in the title bar.
    *   If DEMO is present, continue with step 6.
    *   Otherwise, go to step 7.

6.  Repair the software license (if required)
    *   Close the 32 Karat software.
    *   Open the key.exe program as described above.
    *   Insert your repair disk into the floppy disk drive.
    *   Select Repair Licenses from the Tools menu and follow the prompts.

7.  Verify your instrument configurations before running the software.

8.    Read the 32 Karat Software Version 5.0 Release Notes that were installed with the software.  These documents contain important information.

9.    If you have problems with the software installation, contact your local Beckman Coulter, Inc. representative for assistance.

## Moving 32 Karat Software to a new workstation or to a new version of Windows

The 4.0 license must be removed from the old system and moved to the new one.

You cannot move the license with a Repair disk.

To move the 4.0 license to a new 5.0 workstation you must use a version 5.0 uninstall disk. This diskette is available from Beckman Coulter, Inc.

| ⚠ <br> NOTE | DO NOT UNINSTALL THE 32 Karat LICENSE TO A 3.0 UNINSTALL DISK! |
|---|---|

Follow the procedure for licensing a new installation, using the 5.0 uninstall disk which contains your 4.0 license in place of the license diskette.

If you downloaded the software, these instructions are available from the download site. If you purchased the software CD-ROM, follow the instructions packaged with the CD-ROM.

The 32 Karat Software Manuals CD should auto-run when inserted into the CD-ROM drive of your computer.  Once it is launched, you may select the desired manual from the menu displayed.

If the CD does not auto-run:

•    Open the Windows Start menu and select the Run command.
•    Type:  E:\autorun.exe and click OK.
•    Substitute the ID of your CD-ROM drive if it has a name other than "E:\"

The manuals are in Portable Document Format (PDF) and require the Adobe Acrobat Reader to open.  Selecting the Install Adobe Acrobat Reader command from the menu will install this program for you.

Read the 32 Karat Software Release Notes that are installed with the software.  These documents contain important information regarding the software.

## P/ACE MDQ Instrument Installation

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, Installing the GPIB Communication Interface Board Driver** and **Configuring the Computer** previously outlined before proceeding |
|---|---|

### UV or PDA Detector/Capillary Cartridge Installations

| ⚠ **NOTE** | The following procedure covers installation of the UV and PDA detectors. The capillary cartridge installation procedure can be found in **Capillary Cartridge Installation (UV/PDA Detector Installations).**<br><br>For details on installing the LIF Detector, please refer to the **LIF Detector Installation** procedure in this section. |
|---|---|

Before you begin, you will need:

•   UV or PDA Detector
•   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 3-3 (UV detector) and Figure 3-4 (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 **Capillary Cartridge Installation for UV/PDA Detectors** to follow.

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

Figure 3-3    UV Detector Installation
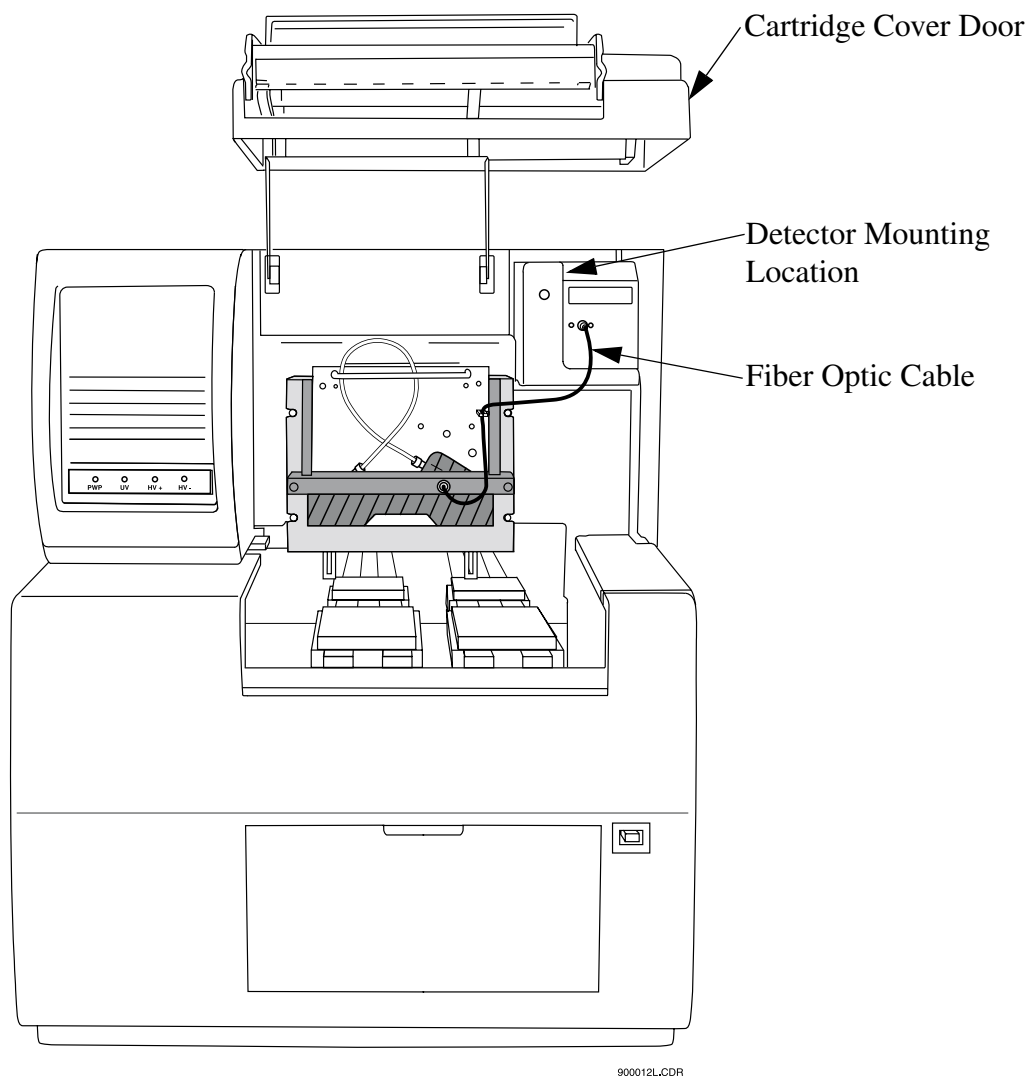
Figure 3-4    PDA Detector Installation
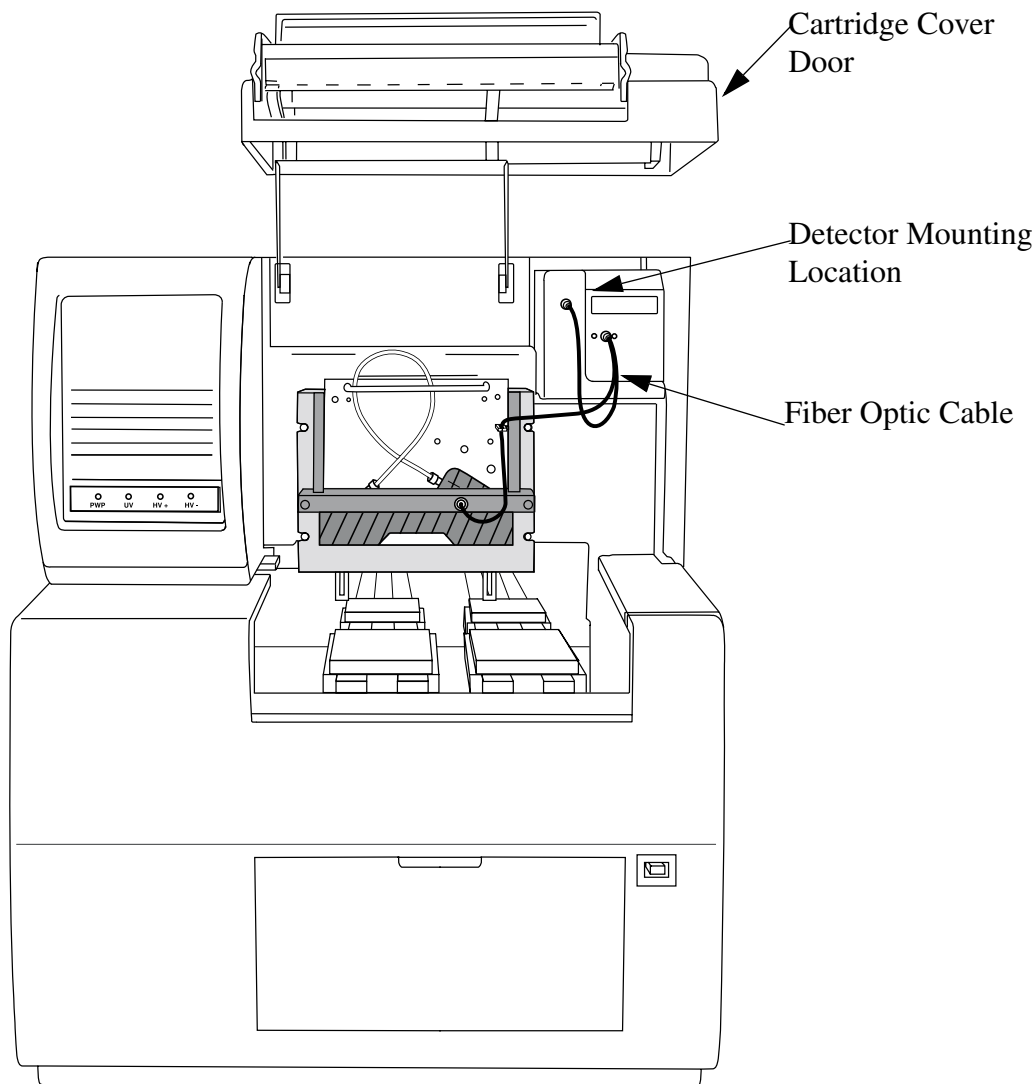


**Capillary Cartridge Installation for UV/PDA Detectors**

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 Section 4 Maintenance.

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

1.    Lift the cartridge cover door at the front of the P/ACE MDQ. Refer to Figure 3-5.

2.    Loosen the captive screws and lift the insertion bar.

3.    Position the capillary cartridge over the cartridge interface block so that the capillary 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 snug.

5. Connect remaining end of fiber optic cable to cartridge as shown in Figure 3-3 (UV) Figure 3-4 (PDA).

6. Lower the cartridge cover door.

Figure 3-5    Cartridge Installation



Cartridge Cover Door

Capillary Cartridge

Insertion Bar

Interface Block
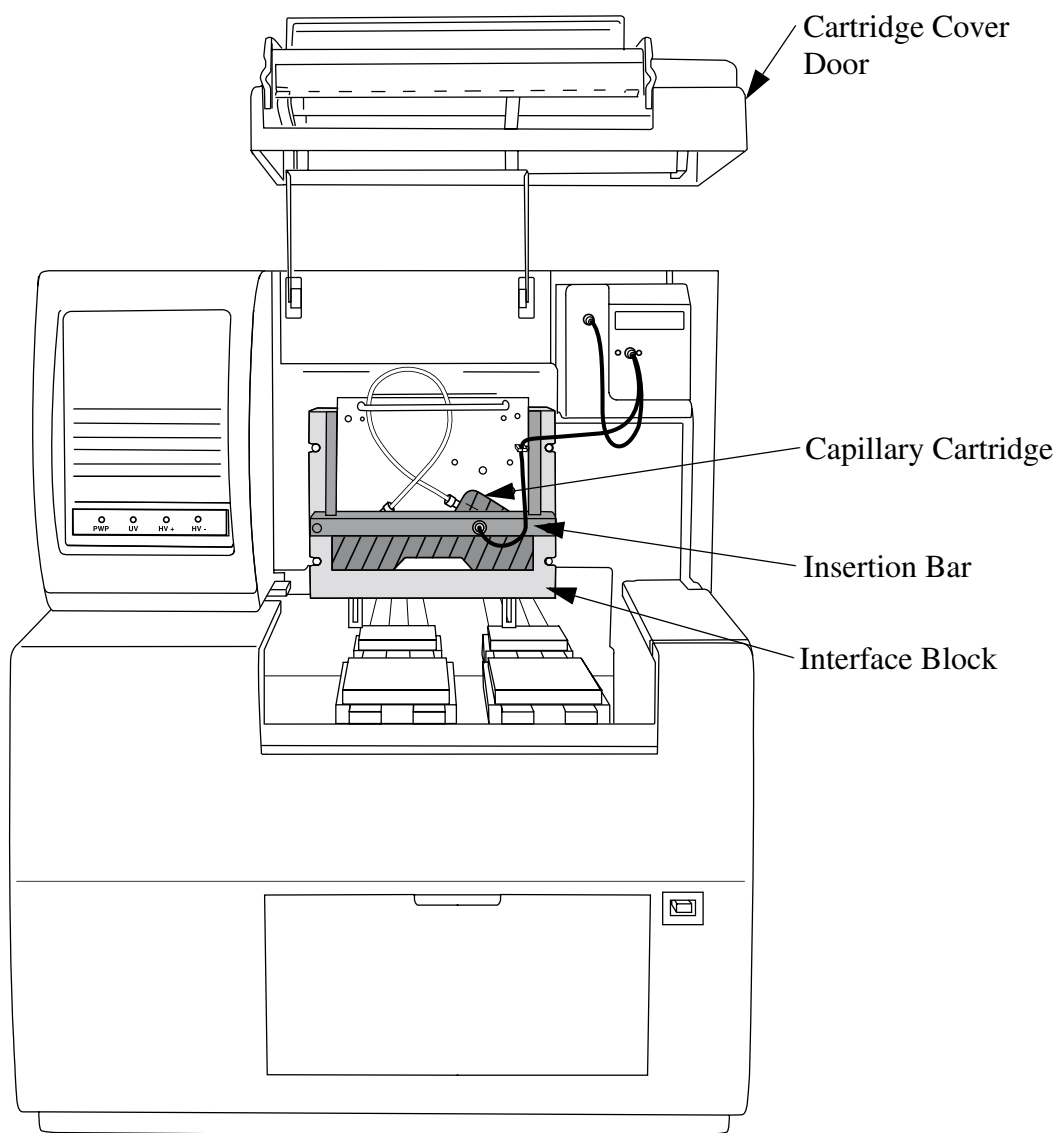
900013L.CDR

| ⚠ NOTE | To ensure proper performance, the capillary-cartridge aperture must be replaced after 3 months of use. See **Capillary Cartridge Rebuild** procedure in the **Maintenance** section of this manual. |
|---|---|

## LIF Detector Installation

The following procedures includes all details on 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 4.0 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 3-6. Hold the cable securely, and screw the fastener into the Interconnect Module. Do not to 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 3-6.

Figure 3-6   Connecting Laser Cables to Interconnect Module
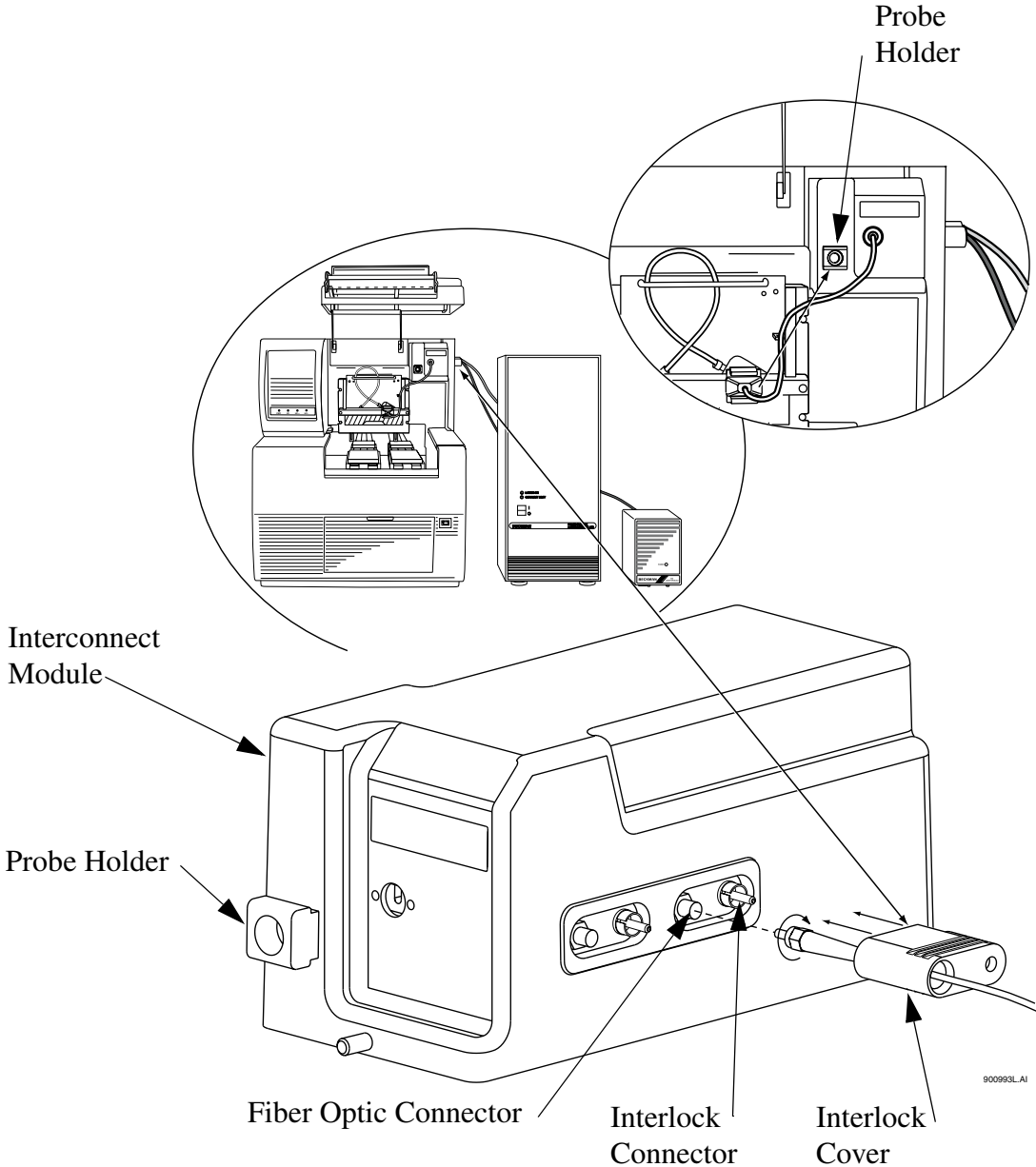
### Installing the LIF Detector Module

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 3-7 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:

- 520 nm, 560 nm and 675 nm emission (band-pass)
- 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 0.350". To install filter(s) into the filter holder (refer to Figure 3-7):

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). *Be sure to handle 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.

| | |
|---|---|
| ⚠️<br>**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. |

Figure 3-7    Installing Filters in the Filter Housing



Notch Filter

Emmisions (Band-Pass) Filter
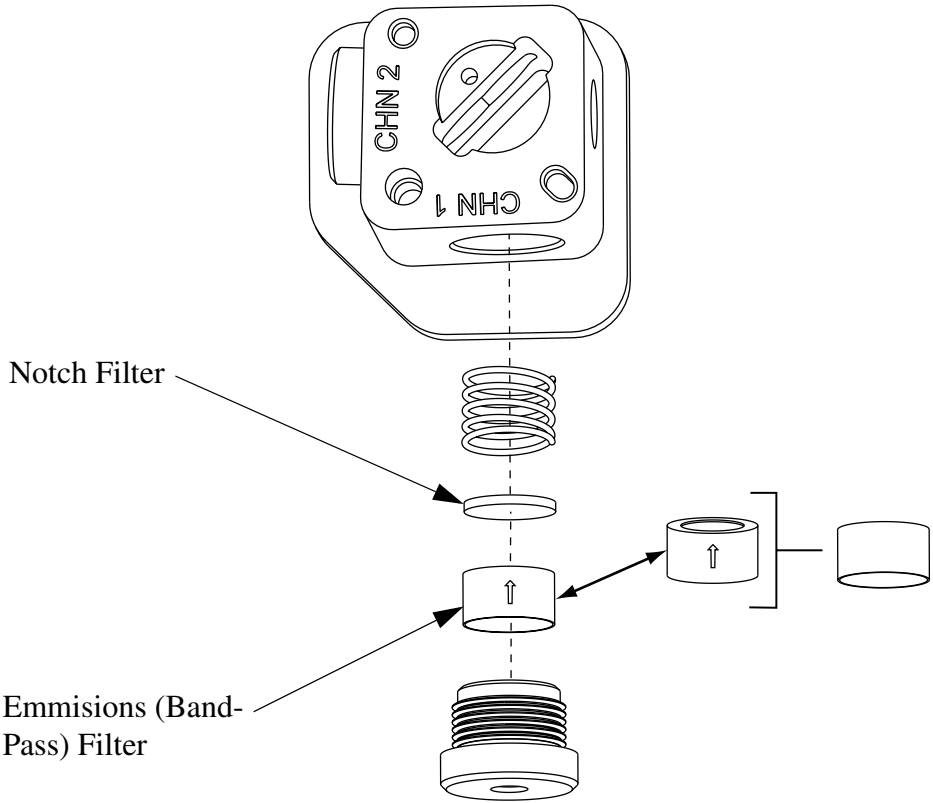
900996L.AI

### Installing the Filter Housing into the Detector

Insert the filter housing into the opening in the right side of the detector. Refer to Figure 3-8 for more information. 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.

Figure 3-8    Installing the Filter Housing into the LIF Detector



900709L.AI
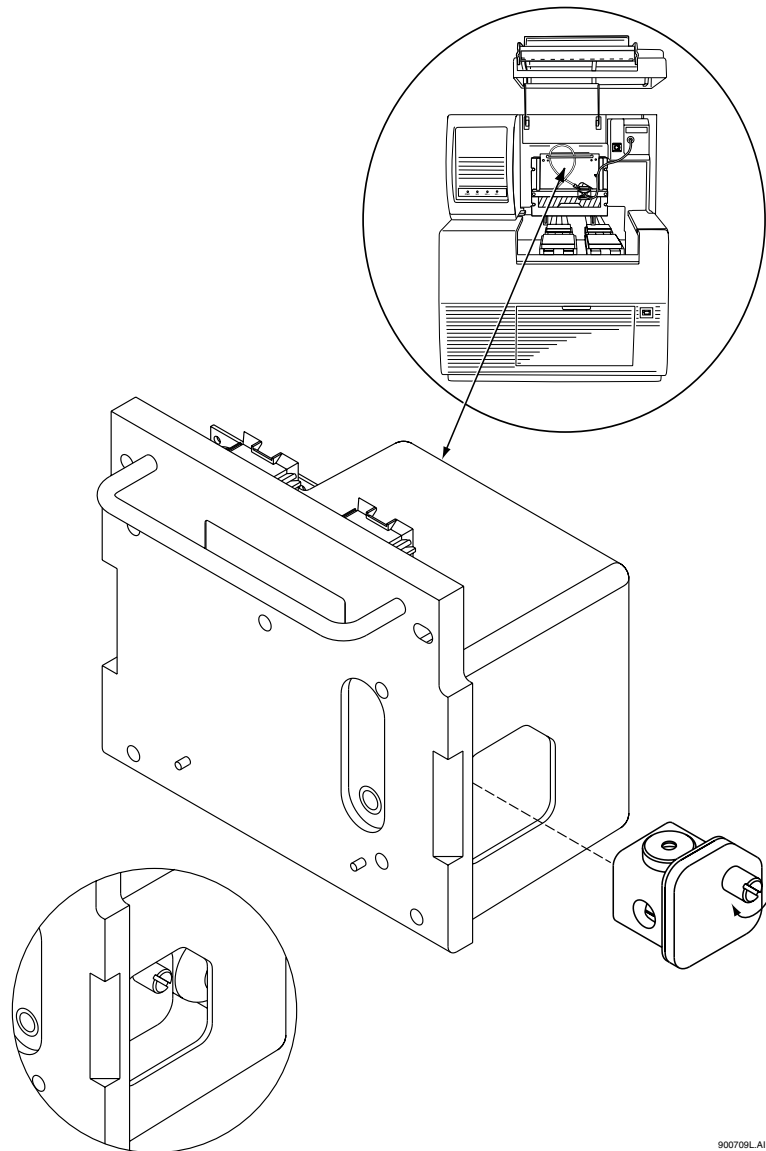
### Installing the LIF Detector into the P/ACE MDQ

| ⚠ <br> WARNING | To avoid a possible shock hazard, power down the P/ACE MDQ instrument before proceeding with component installation. |
|---|---|

Place LIF Detector into the P/ACE MDQ, as shown in Figure 3-8, 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 to 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.

### To install the LIF Plug and Probe Stabilizer

Referring to Figure 3-9, 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 3-9    Installing the LIF Plug and Probe Stabilizer
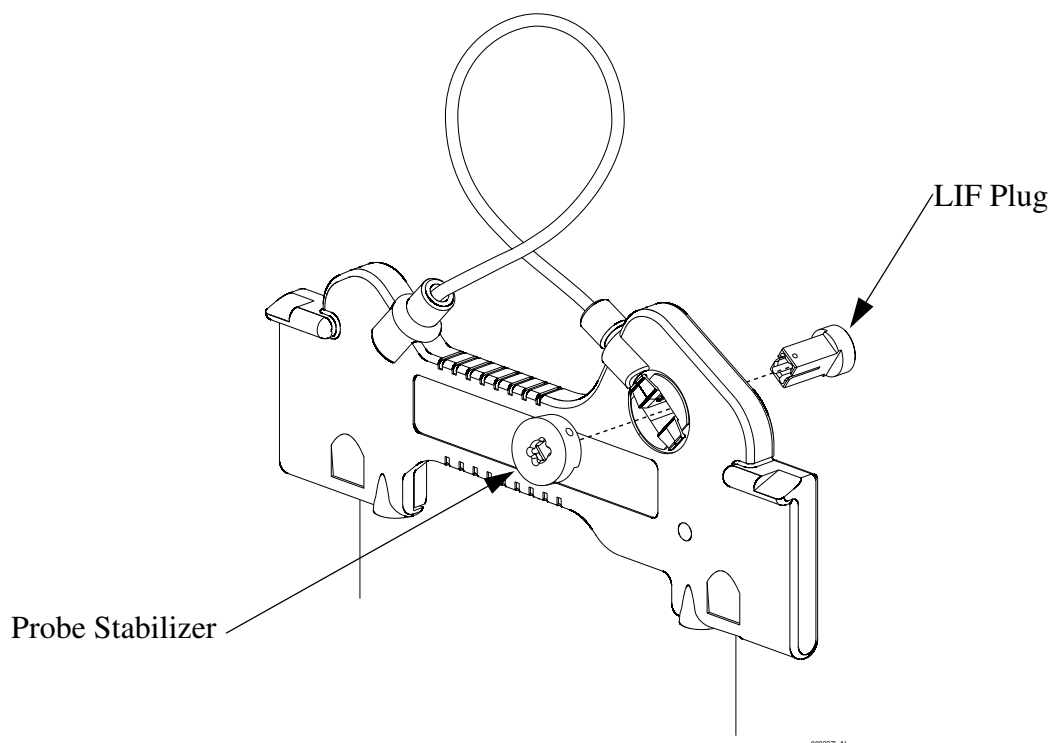


3.    Install the MDQ cartridge with LIF plug into the P/ACE MDQ instrument.

### Connecting the Probe to the Clamping Bar

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

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. Squeeze the probe clamp to open the jaws on the probe, and carefully install the probe onto the clamping bar. Refer to Figure 3-10.

When not in use, install the probe in the Probe Holder (see Figure 3-6) on the Interconnect Module. This provides a mechanical protection for the probe and shields it from dust and other particles.

Figure 3-10  Connecting the Probe to the LIF Cartridge



Alignment Holes in
Clamping Bar

Probe Stabilizer

Probe Clamping
Bar

900999L.AI
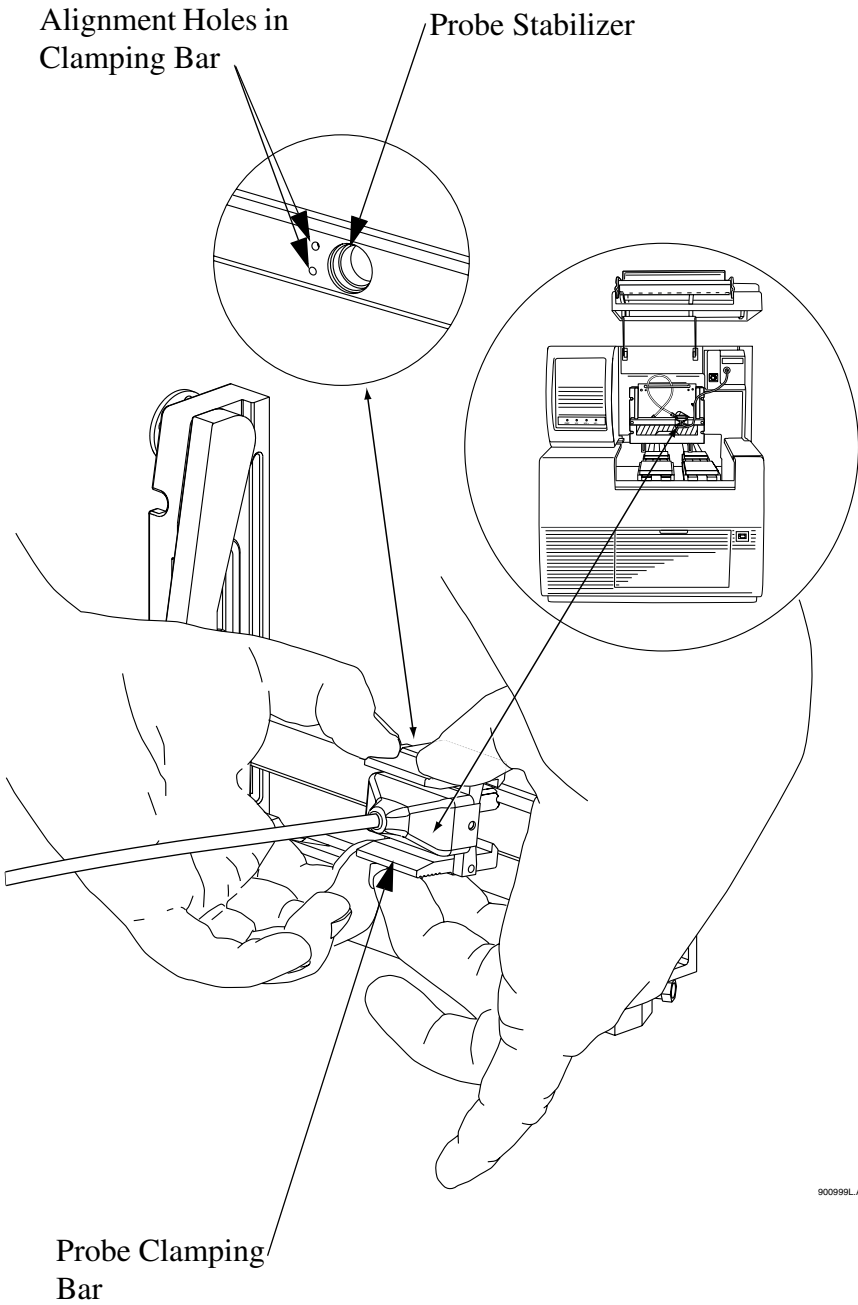
## Connecting the Computer to the P/ACE MDQ Instrument

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

The placement of hardware, i.e., computer and instrument and cable connections will initially be accomplished by the Beckman Coulter Service Engineer. But for reference purposes, refer to Figure 3-11.

Locate the following items in your ship kit:

- Communications Cable
- Power Cable

1. Verify that the P/ACE MDQ power cable is not plugged in 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 3-11.

3. Connect the P/ACE MDQ and computer power cables to the appropriate AC power outlet.

Figure 3-11  Typical Computer/P/ACE MDQ Installation
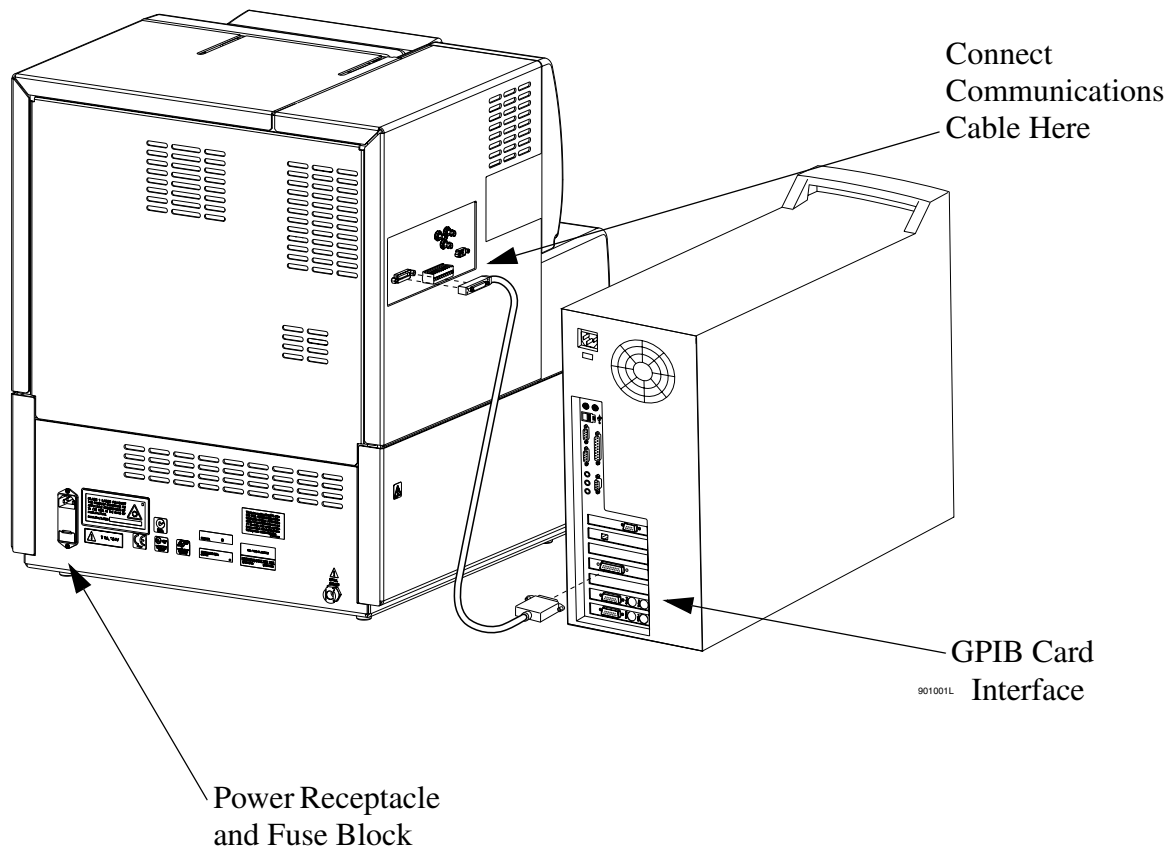
## Analog Outputs

Three analog output connectors (BNC type) are available on the P/ACE MDQ connector panel as shown in Figure 3-12. The outputs of these connectors are determined by the type of detector installed (PDA, LIF or UV).

Figure 3-12  Location of Analog Outputs



900992L.AI
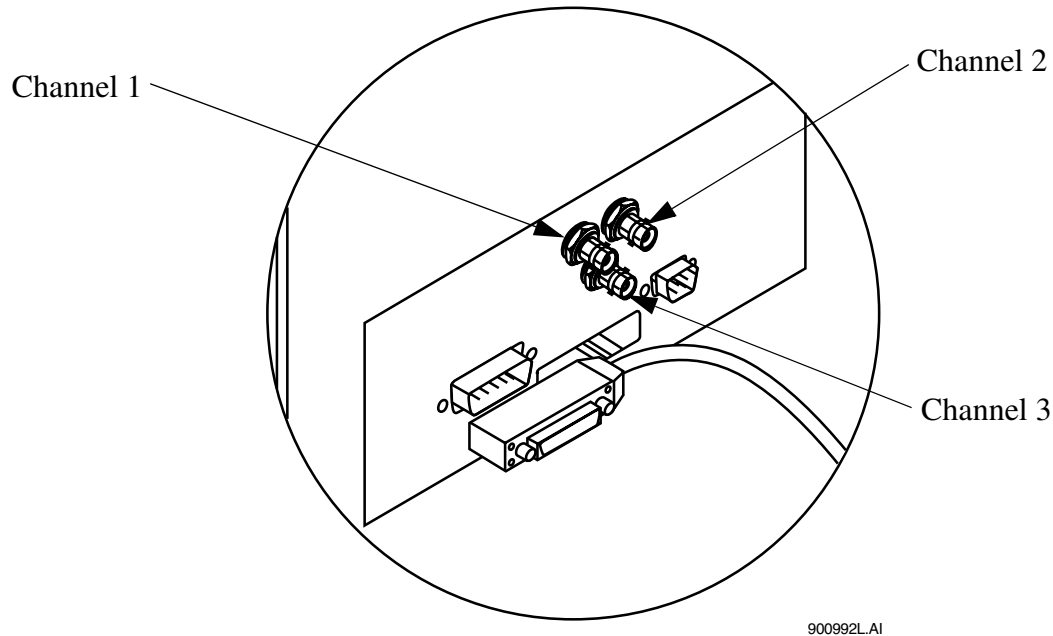
### Outputs for PDA Detector

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.

### Outputs for UV Detector

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.

### Outputs for LIF Detector

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.

## 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.

## Buffer/Sample Tray Installation

During configuration of the system, the type of tray must is 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:

- Buffer trays (36 positions)
- Sample tray (48 positions)
- 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 **Installation - Software** section. |
|---|---|

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 3-13.

| ⚠️ 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 3-13. Refer to NOTE in step 3.

Figure 3-13  Buffer/Sample Tray Installation



Inlet Sample Tray (48) or 96-Well Plate

Outlet Sample Tray (48) or 96-Well Plate

Inlet Buffer Trays (36 Vials)

Outlet Buffer Trays (36 Vials)

900667L.CDR
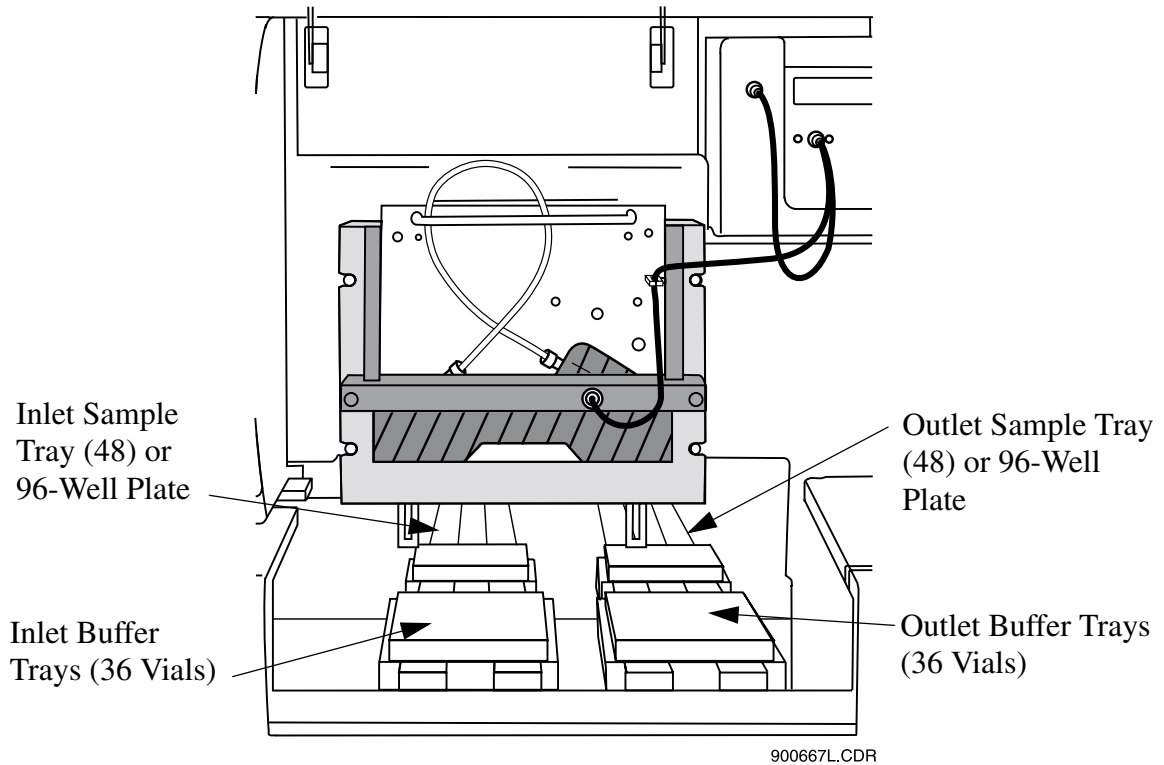
## Installation - Additional Features

### SS420 Board and SS420X Device

Two Analog-to-Digital devices, SS420 and SS420X, are available. Both boards provide high-resolution microprocessor-controlled data acquisition of up to four external analog devices for data acquisition, or operation of analog devices. The SS420 board is installed in an ISA slot in the computer and the SS420X is installed externally and interfaces with the computer via a serial port.

Installation and configuration of the SS420 board and SS420X device are covered in the **Additional Features** tabbed section of this guide.

### 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 4.0 and Firmware 4.0 or higher.

Installation of the Buffer Tray Reservoir is covered in the **Additional Features** tabbed section of this guide.

### 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 the **Additional Features** tabbed section of this guide.

# Section 4 - Maintenance

This section includes customer performable maintenance procedures for both preventive and corrective actions.

## Maintenance Procedures

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

| ⚠ WARNING | Disconnect power before any instrument disassembly. Failure to do so may result in electrical shock or other injury. |
|---|---|
| | Maintenance or repair procedures not specifically described in this manual presents a risk of electrical shock or injury. Refer additional servicing to Beckman Coulter. |
| | Do not attempt to defeat any of the instrument interlocks or safety mechanisms. |

## Capillary Cartridge Rebuild

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 for items required.

Figure 4-1    Capillary Cartridge Rebuild Components



**Safety Glasses**
**Flat-Blade Screwdriver**
**Forceps**

Cartridge Assembly
P/N 144065

Coolant Tubing Kit
P/N 144689

Capillary

**Capillary Rebuild Kit**
**P/N 144645**

Aperture Plug (UV/PDA)
P/N 144711

Aperture O-Ring
P/N 970297

O-Ring Installation Tool
P/N 144540

Cleaving Stone

Capillary Length Template
P/N 144653

**Other Supplies:**

Double Seal Kit (4 pcs.)
P/N 144866

Single Seal Kit (4 pcs.)
P/N 144873

900019L.CDR

## 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. *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



Gently pry the seal-retainer clips away from the cartridge.

Seal-Retainer Clip & Double Seal

900021L.CDR
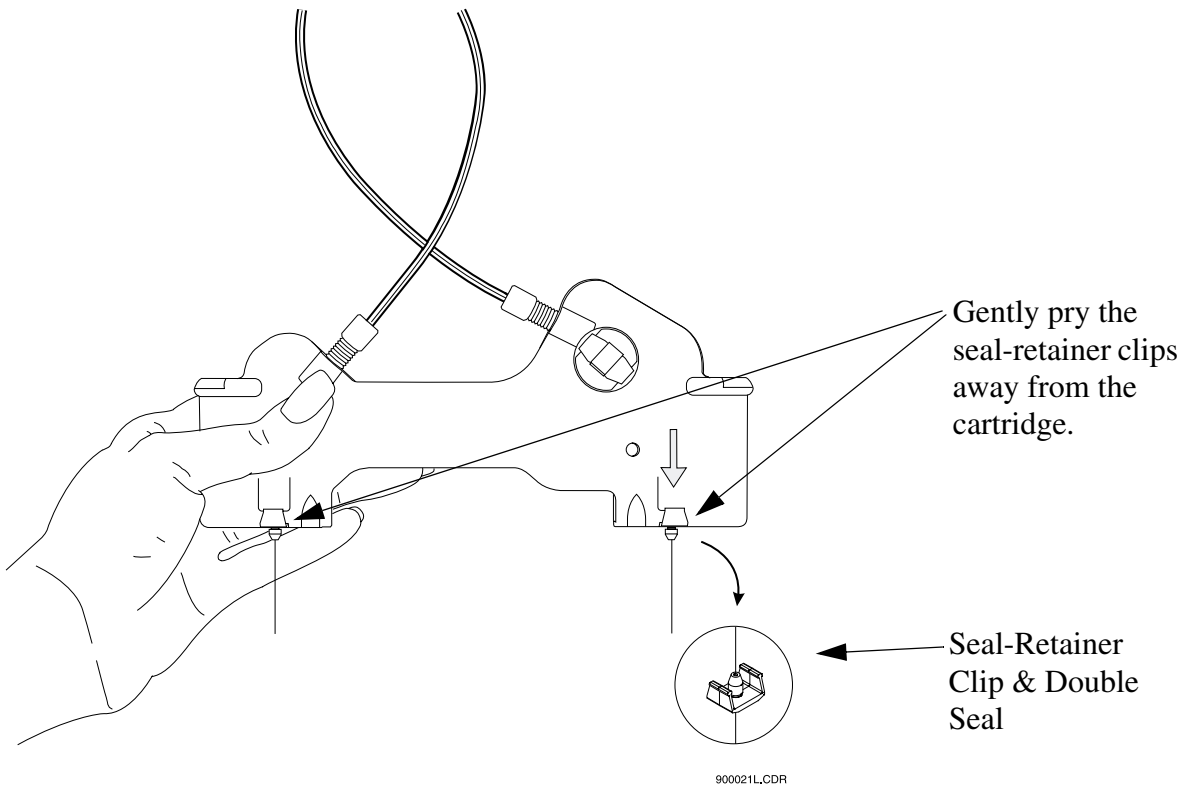
2. Remove the aperture by pushing from the front of the cartridge and pulling out from the back. If the O-ring inside the aperture does not come out, use a pair of forceps to remove it. Refer to Figure 4-3.

Figure 4-3 Removing Aperture from Cartridge



900022L.CDR

Back View
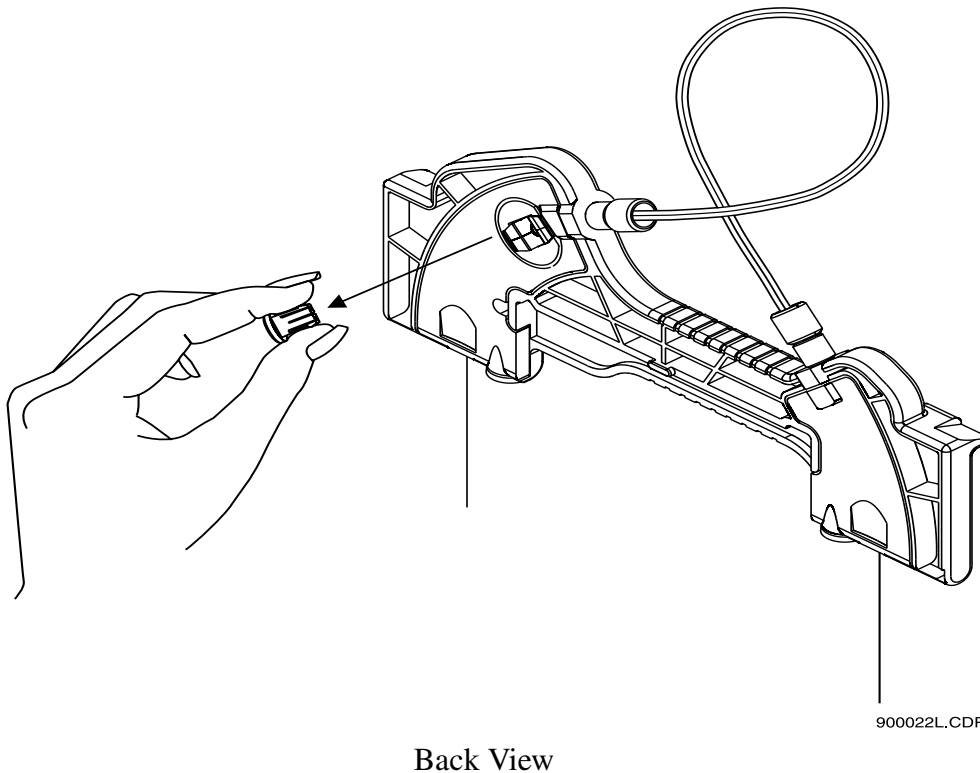
3.    Grasp the capillary at the cartridge inlet and pull firmly to remove the capillary as shown in Figure 4-4.

Figure 4-4    Removing the Capillary



Inlet
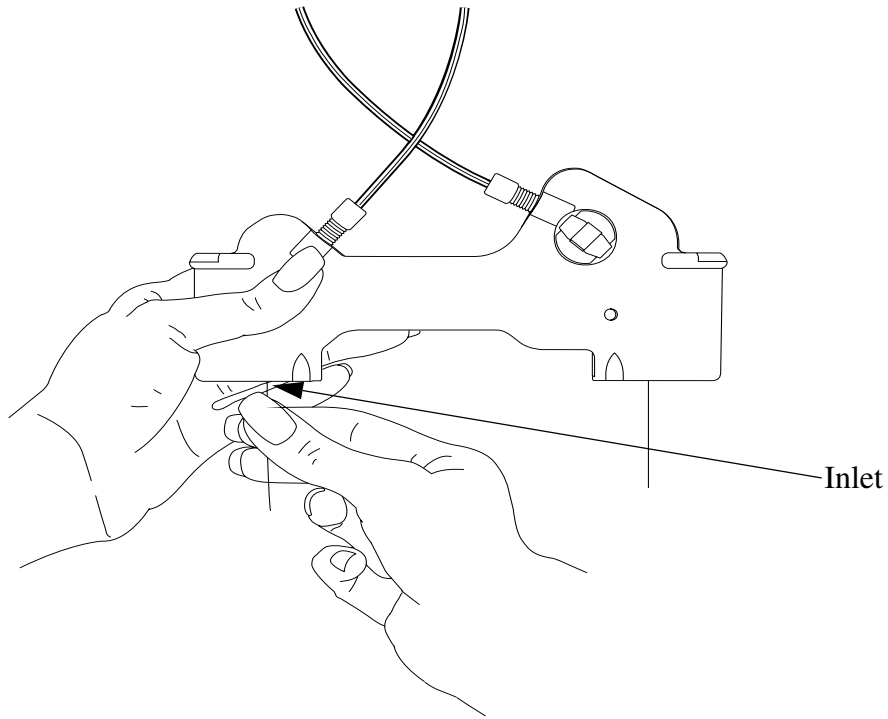
900023L.AI

4. 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.

Figure 4-5    Removing Aperture-Seal Clips

Gently pry the aperture clips away from the cartridge.

Aperture Seal Clip & Single Seal

900024L.CDR
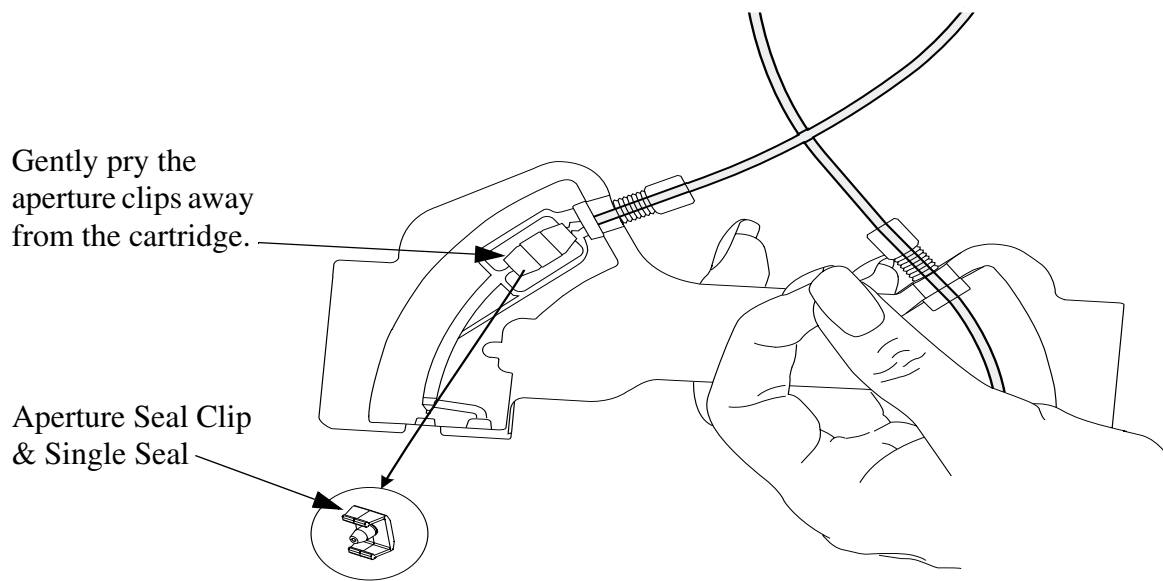
5. If you are using the same capillary length and no leaks are evident at this time, skip to the **Capillary Replacement Procedure**.

## Coolant Tubing and Seal Replacement

| ⚠️ **NOTE** | The following step (6) is necessary only if replacing damaged tubing/O-ring or selecting different length tubing. |
|:---:|:---|

6.  Loosen and remove the tubing nuts, coolant tubing, ferrule and O-ring from the cartridge as shown in Figure 4-6.

Figure 4-6  Removing Tubing Nuts, Coolant Tubing, Ferrule and O-Ring
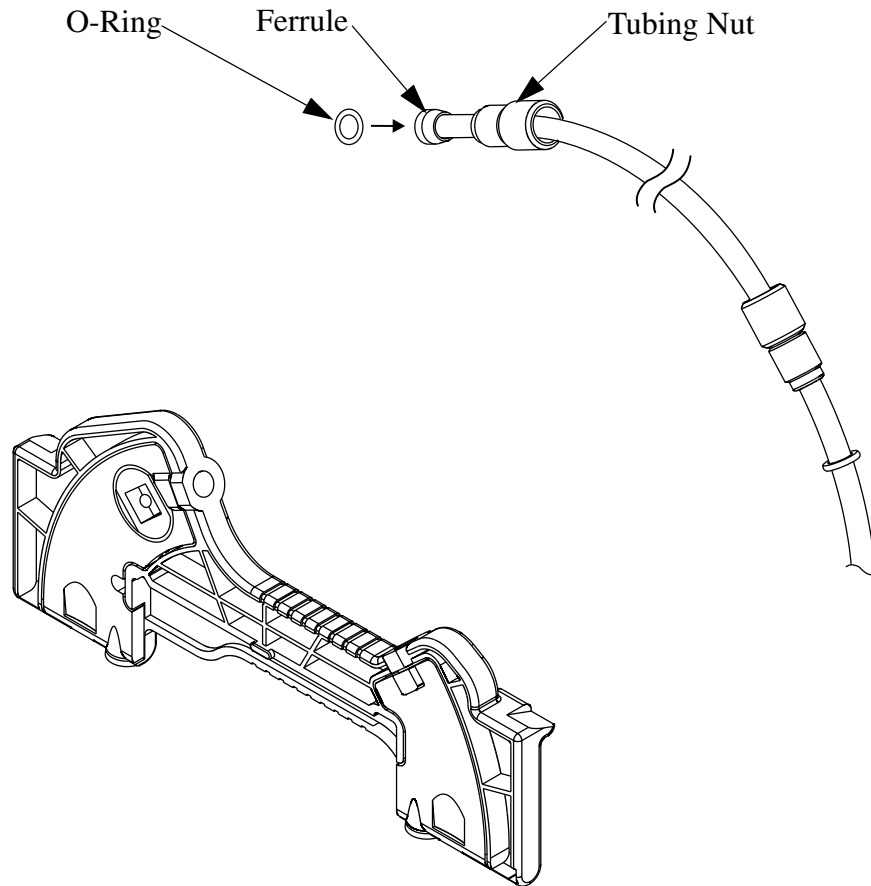


7.  Select the desired capillary length from the Table 4-1, then select corresponding coolant tubing from the Cartridge Tubing Kit or cut coolant tubing to desired length as specified in Table 4-1. Use razor blade or X-ACTO® knife to cut tubing.

Table 4-1    Capillary and Tubing Length

| 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. | | |

8.    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
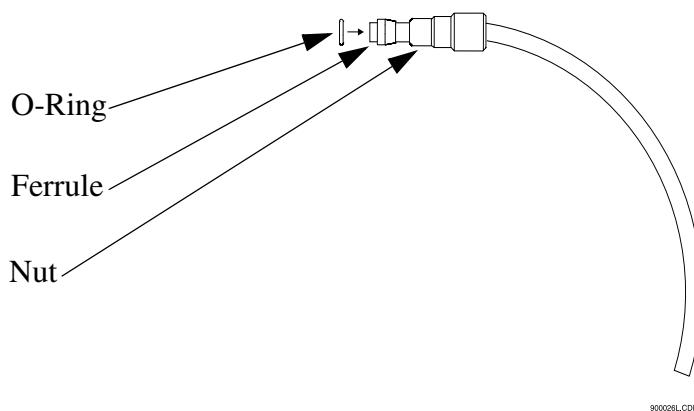
9.   Insert the coolant tubing in the cartridge inlet and press firmly into the cartridge base. Be sure the tubing slides all the way into the cartridge base as shown in Figure 4-8.

Figure 4-8   Inserting the Coolant Tubing in the Cartridge Inlet

Cartridge Outlet Side

Cartridge Inlet Side

Tubing inserted all the way into the base

900027L.CDR

Back View

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. Push the tubing nut, ferrule and O-ring in and tighten the tubing nut finger tight.

### Capillary Replacement

13. Referring to Figure 4-9, measure 11 cm from capillary window to the outlet end. Using a felt tip marker, mark the capillary window position.

| | |
|---|---|
| ⚠<br>**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



Mark          Capillary Window          Mark

900670L.AI

11 cm                    Desired total length plus 5 cm
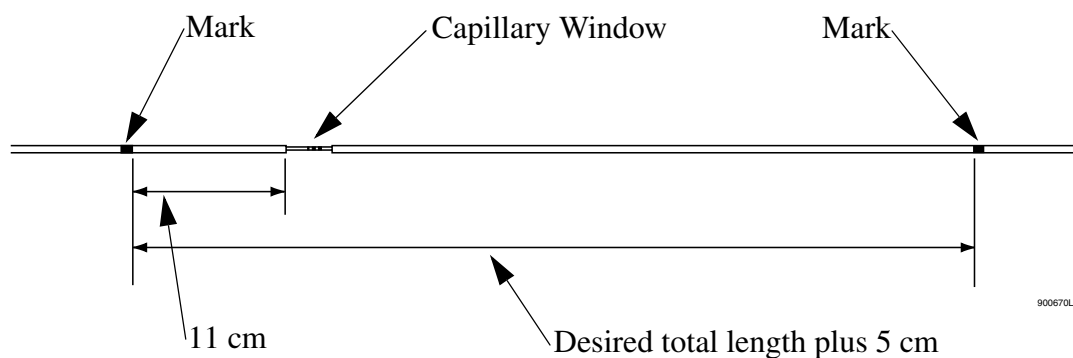
| | |
|---|---|
| ⚠<br>**CAUTION** | Be sure to wear safety glasses when cleaving and breaking the capillary. Remember to handle the capillary safely as the ends are sharp. |

14. Using the capillary cleaving stone, score the capillary as marked and carefully pull capillary straight off without bending. *Do not saw back and forth with the cleaving stone.*

15. Measure the overall length plus 5 cm as shown in Figure 4-9. Using a felt tip marker, mark the capillary.

16. Insert the capillary end farthest from the capillary window into the outlet side of the cartridge as shown in Figure 4-10.

Figure 4-10 Inserting Capillary End into the Outlet Side of Cartridge

Cartridge
Outlet

Capillary
Window

900028L.CDR

Back View
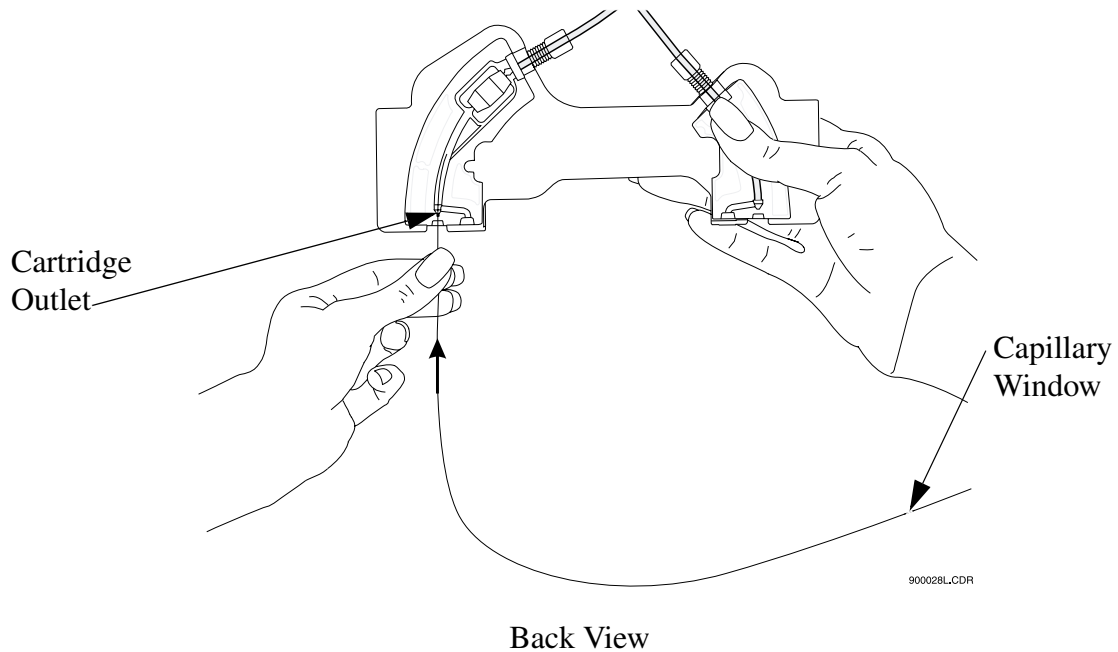
17. Carefully push and twist the capillary through the cartridge until it appears at the cartridge inlet.

18. Continue by pulling the capillary through the cartridge until the capillary window appears centered in the cartridge window as shown in Figure 4-11.

Figure 4-11 Centering Capillary Window in Cartridge Window



Capillary Window

900029L.CDR
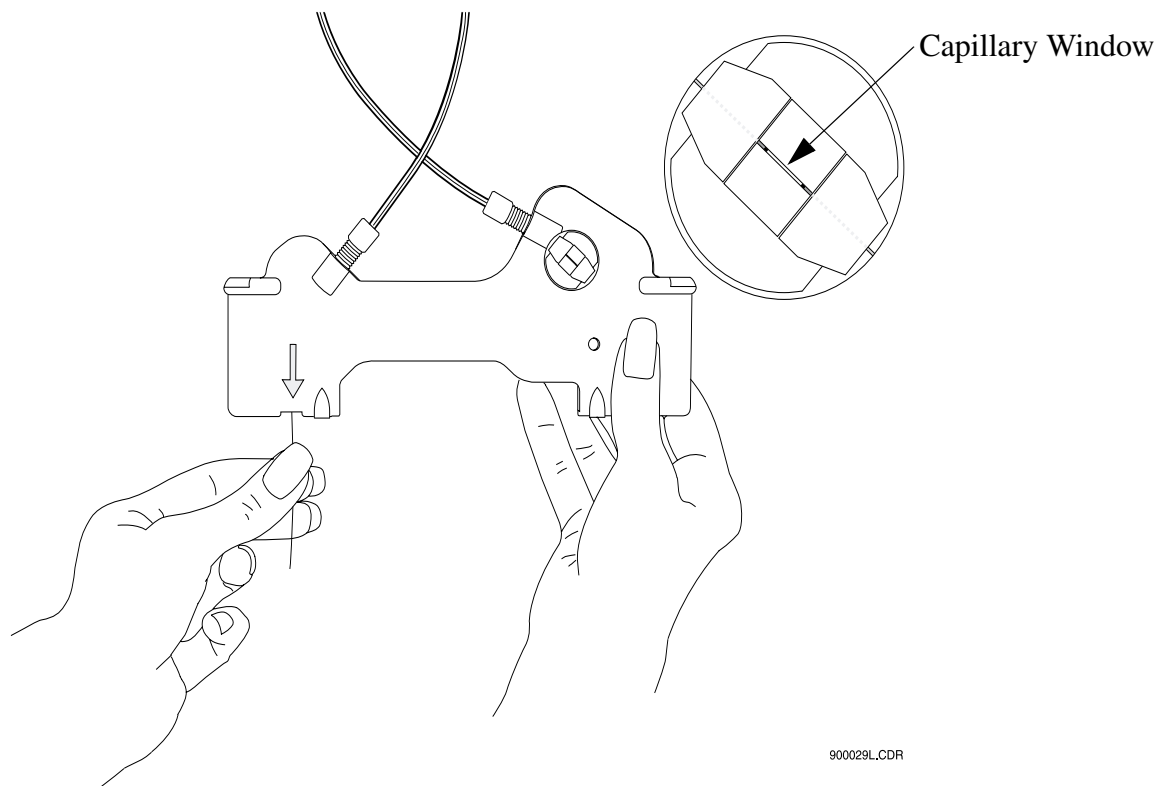
Front View

## Installing the Aperture Clip

19. 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 in place.

| ⚠️ **NOTE** | Make sure the previous o-ring has been removed from the aperture clip before re-installing the clip. |
|---|---|

Figure 4-12  Aligning Groove of Aperture Clip with Capillary Window
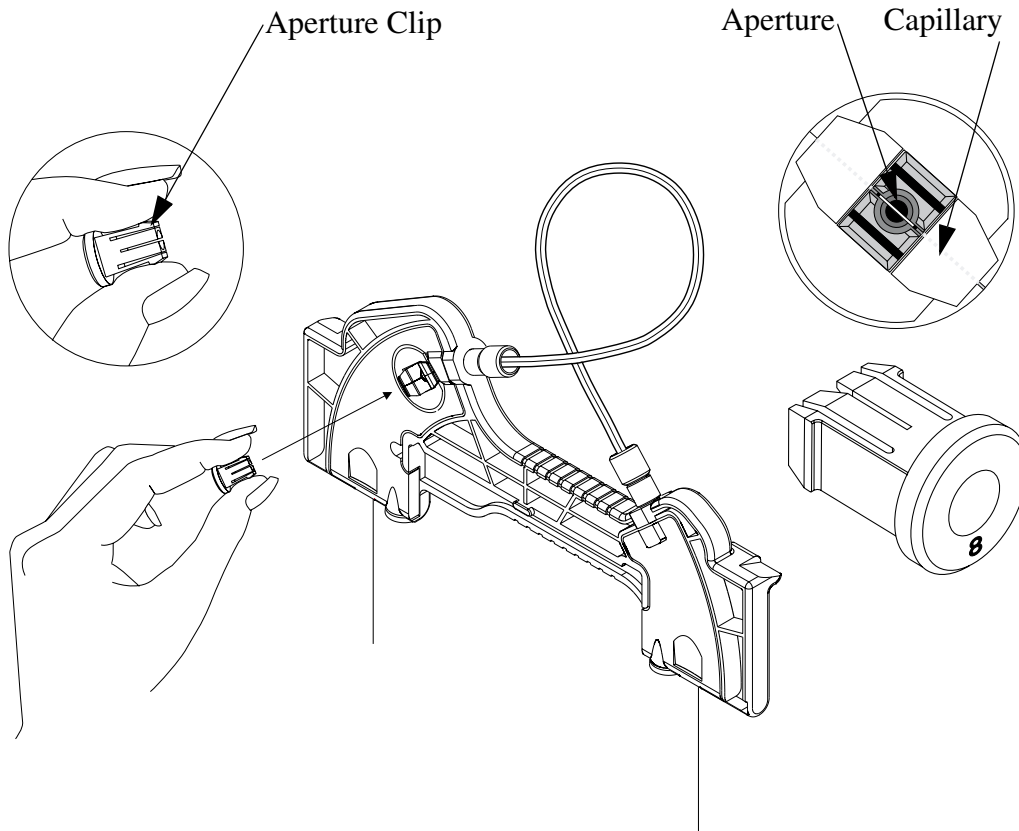
20.    From the front side of the cartridge, place the retainer O-ring in the aperture clip hole; then using the O-ring insertion tool, carefully press the tool until the O-ring is seated in the aperture clip. Refer to Figure 4-13.

Figure 4-13  Seating O-Ring in Aperture-Clip Hole

Insertion Tool

O-Ring

Aperture-Clip
Hole

900032E.CDR

Front View
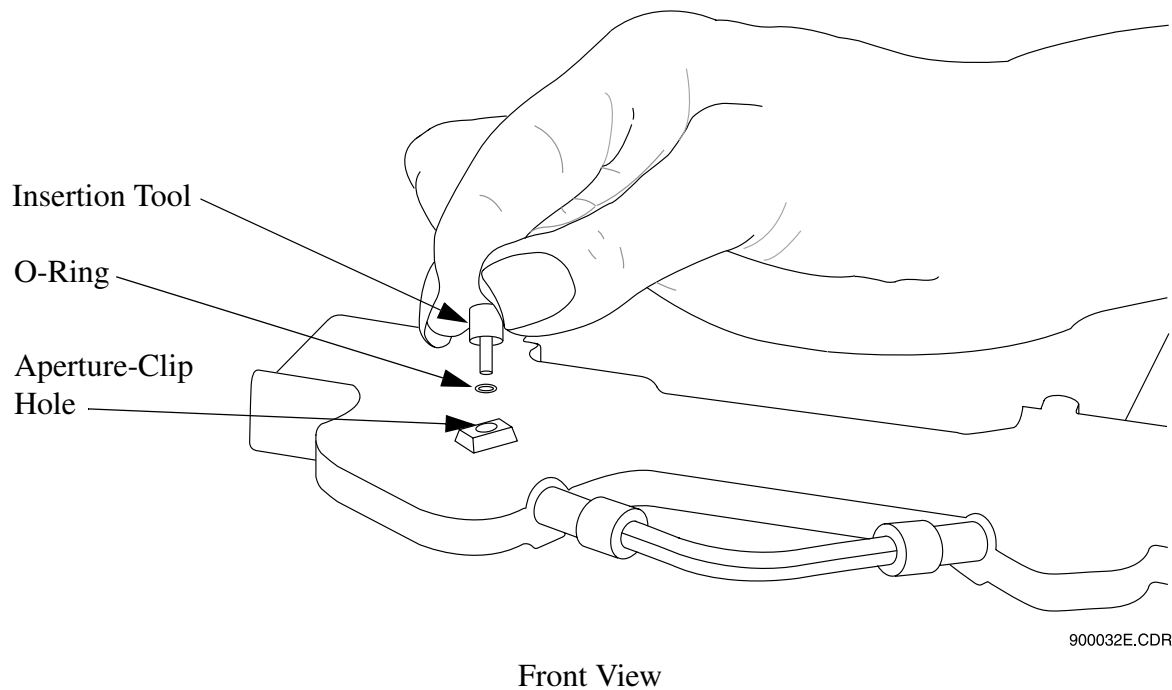
21.     Carefully insert the capillary Seal Retainer Clips over the capillary at each end and press to snap in place. Be sure both the front and back edges clip into place for each clip. Refer to Figure 4-14.

Figure 4-14  Inserting the Capillary-Seal Retainer Clips

Seal-Retainer Clips



900033L.CDR
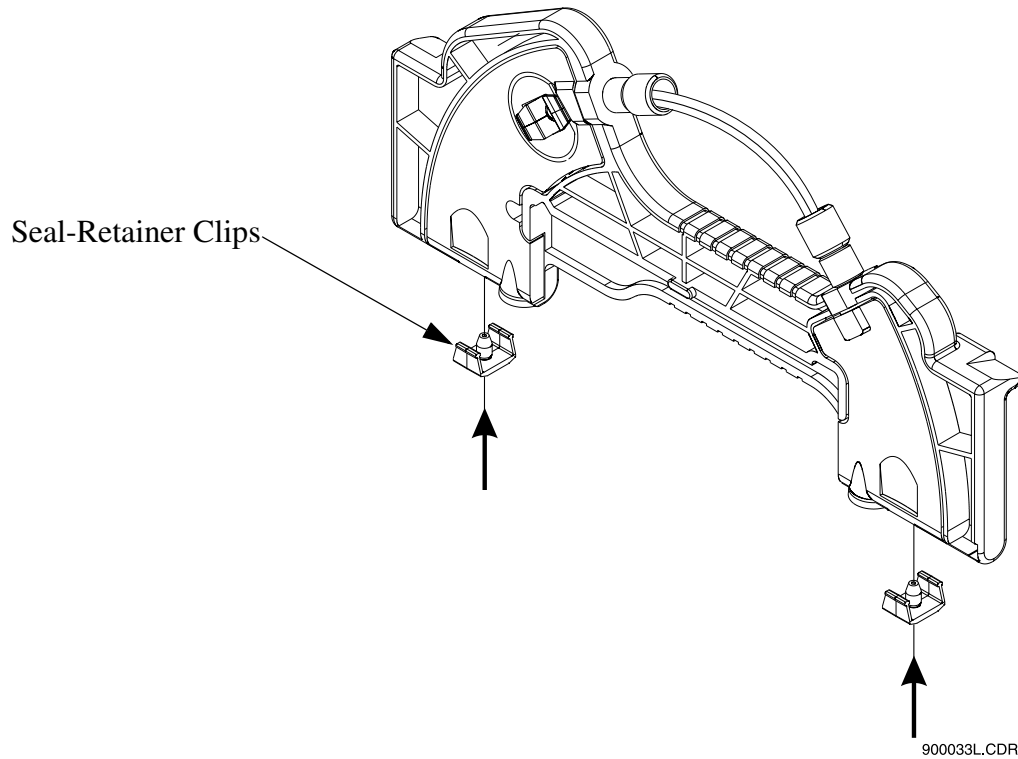
22.     Visually inspect that the capillary ends are straight. If not, remove and reinstall the seal-retainer clips.

### Trimming the Capillary Ends

23. Position the cartridge against the capillary-length template as shown in Figure 4-15.

Figure 4-15  Trimming the Capillary Ends



Cleaving Stone                     Template

901017L.AI
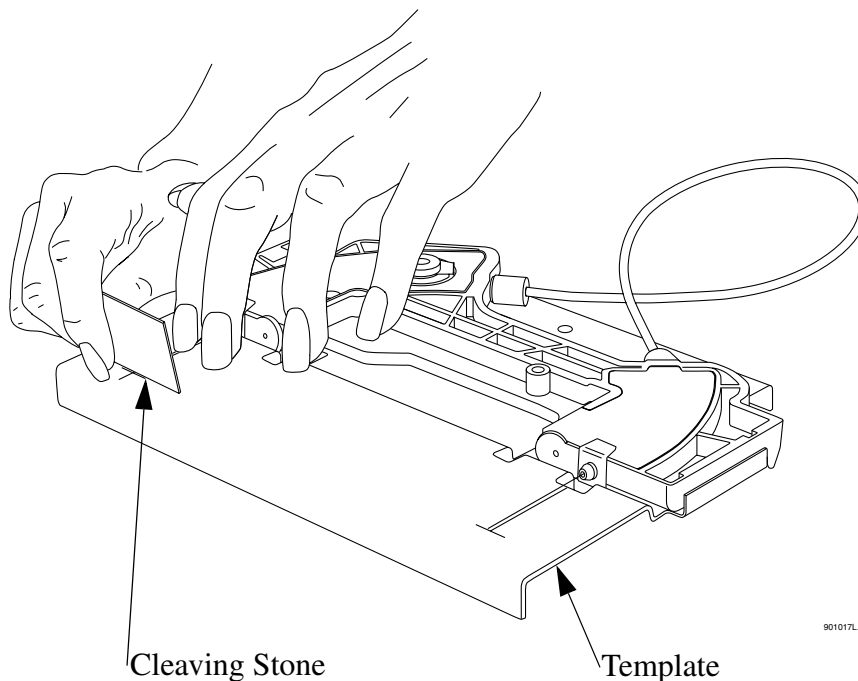
24. At the cartridge inlet, carefully push the capillary into the cartridge until the capillary stops against the wall of the coolant tubing. By doing this, the excess space in the coolant tubing will be eliminated, thus, preventing movement of the capillary during use.

25. Holding the capillary against the template, score each end at the cross mark on the capillary-length template. Do not saw back and forth with the cleaving stone.

26. Carefully pull end of capillary straight off without bending.

The cartridge is now ready for use. Depending on the type of capillary and the application, 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:

- 0.5 mL vials
- 2.0 mL vials
- PCR vials
- 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 level in separation vials can cause poor separation. |
|---|---|

## Filling 0.5 mL Vials

Before you begin, you will need:

- 0.5mLvial
- Blue vial caps

1. Fill the vials with at least 200 μL of degassed liquid. Be sure to dislodge any bubbles that may form at the bottom of the vials.

2. Put the vial cap on the vial as shown in Figure 4-16, then press in place.

Figure 4-16  Filling 0.5 mL Vials
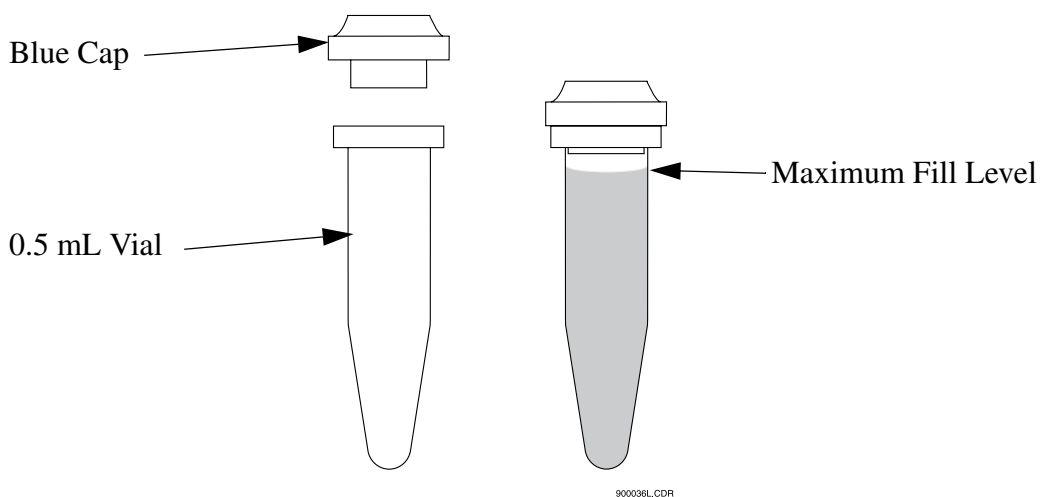
### Filling 2.0 mL Vials

Before you begin, you will need:

- 2.0 mL vial
- 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



Red Cap

2.0 mL Vial

Maximum Fill Level

Viscous Fill Level

900037L.AI
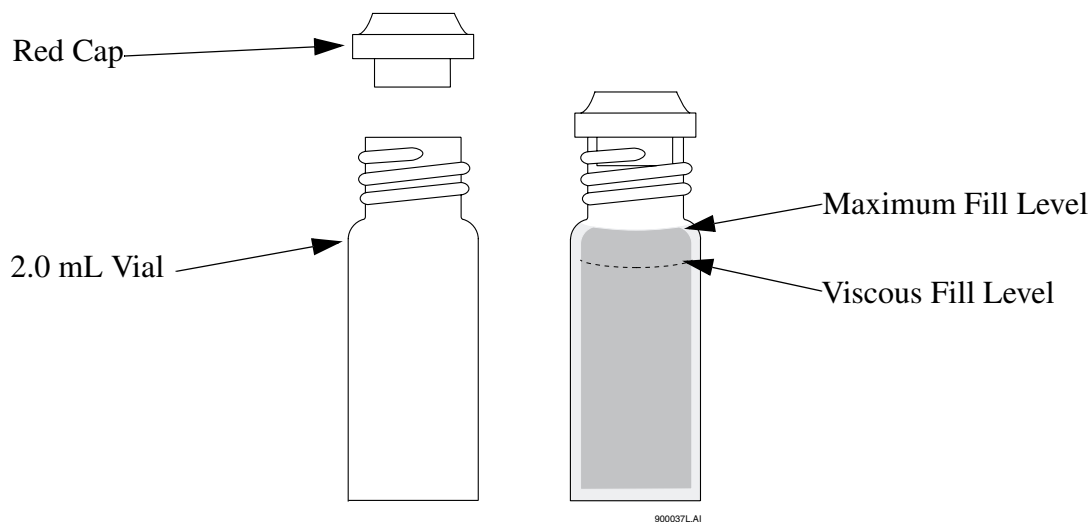
### Filling PCR Vials

Before you begin, you will need:

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

1. Referring to Figure 4-18, fill the vial with at least 5 µL 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 μL 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

Gray Cap

PCR Vial

PCR Spring

PCR Vial Holder                                Maximum Fill Level
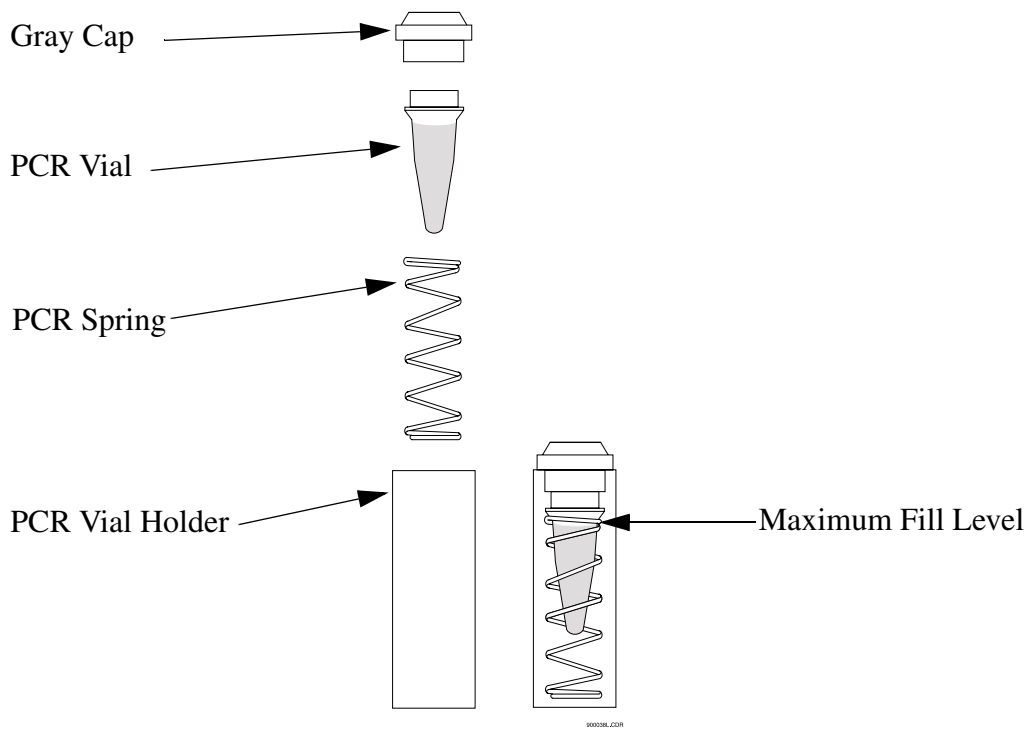
### Filling 96-Well Plates

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 of explosion. Solvent vapors may also damage the instrument. **Do not use volatile solvents in 96-well plates.** |
|---|---|

1. Fill desired well plate positions with 150 μL of sample. Refer to Figure 4-19 for position layout.

Figure 4-19 Filling 96-Well Plates
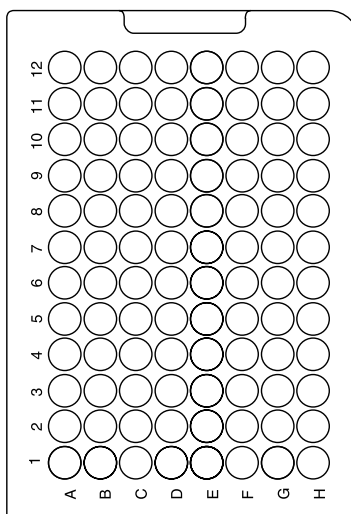


900039L.CDR

## Installing UV Detector Wavelength Filters

Before you begin, you will need:

• Desired filters
• 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.

Figure 4-20  Installing UV Detector Wavelength Filters
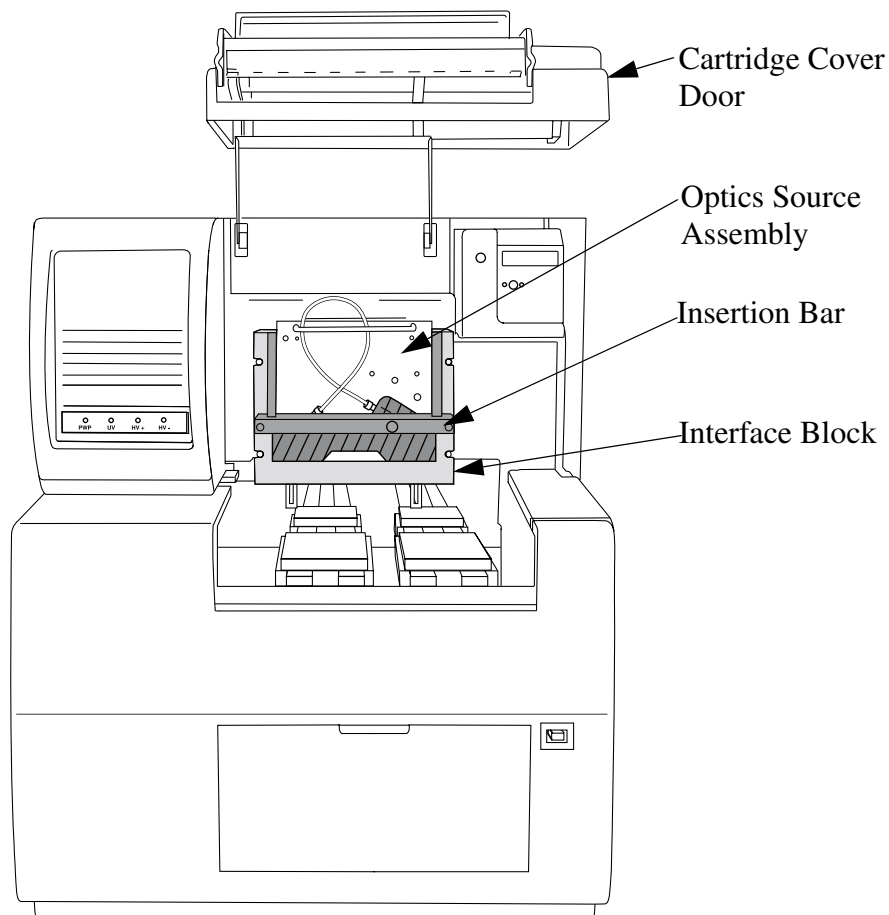


6. Loosen the two thumb screws and remove the optics source assembly. Place the assembly on a clean work surface.

7.      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



Thumb Screws (2)
One on each side.

Open cover at point
indicated

Access Cover

900046L.CDR
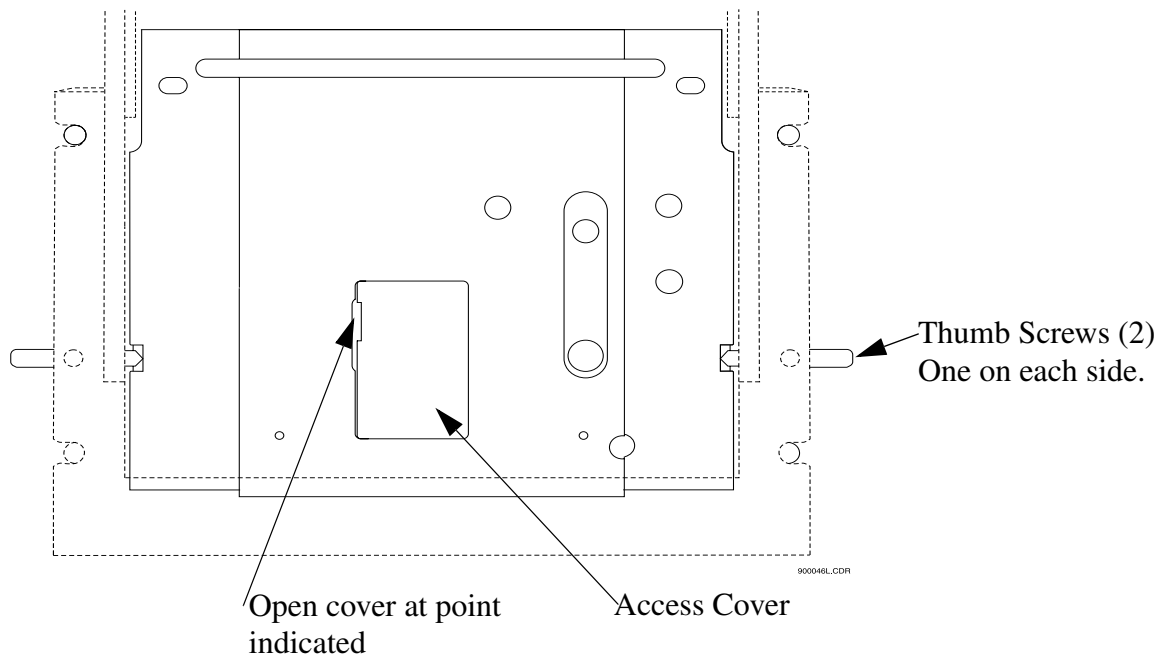
8.      Wearing latex gloves, use small forceps to remove the desired filters from the filter wheel. Touching the optical surfaces of the filters without gloves will leave oils from the skin which can cause improper filter performance.

9.      Examine each wavelength filter for a burned spot. Replace any filters that appear to be damaged.

10. Insert the new filter with the reflective side facing inward. Refer to Figure 4-22.

Figure 4-22  Installing New Filter



900047L.CDR
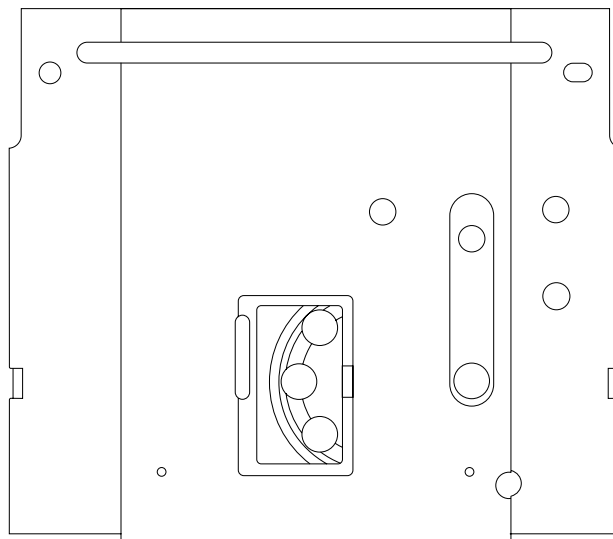
11. When all filters have been inspected or replaced as desired, reinstall the filter wheel access cover.

12. Place the optics source assembly in the mounting location. Align the two upper guide pins and tighten the two thumb screws.

13. Reinstall the capillary cartridge in the interface block.

14. Lower the insertion bar and tighten the two thumb screws.

15. Close the cartridge cover door.

16. Turn the system power on and start 32 Karat Software.

17. From the Instrument screen File menu, select Configuration. The 32 Karat
Software Configuration dialog box appears as shown in Figure 4-23. In the Filter
dialog, enter the position and type for each of the installed filters.

Figure 4-23  Configuration Dialog Box
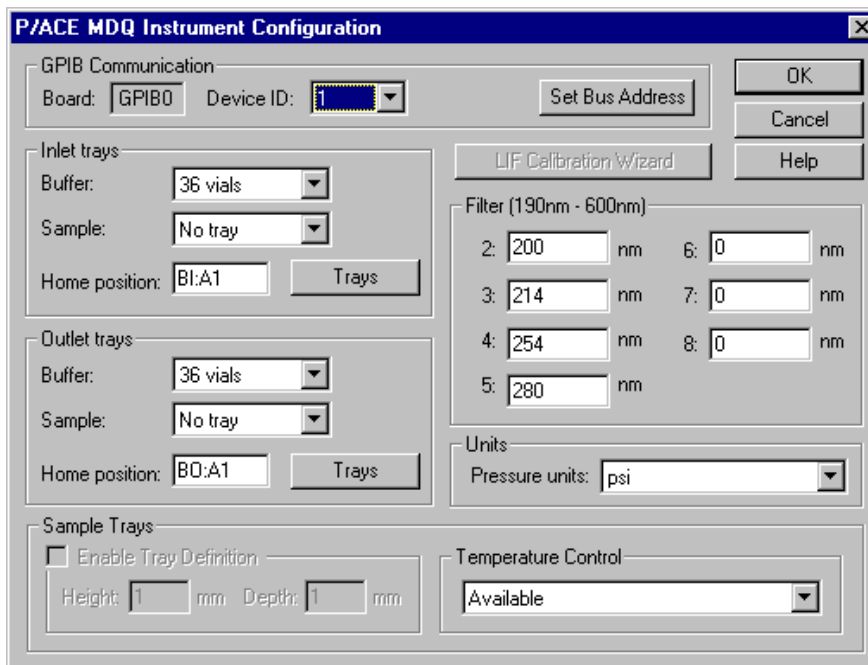
## Calibrating the PDA Detector

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 screen, 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 below.
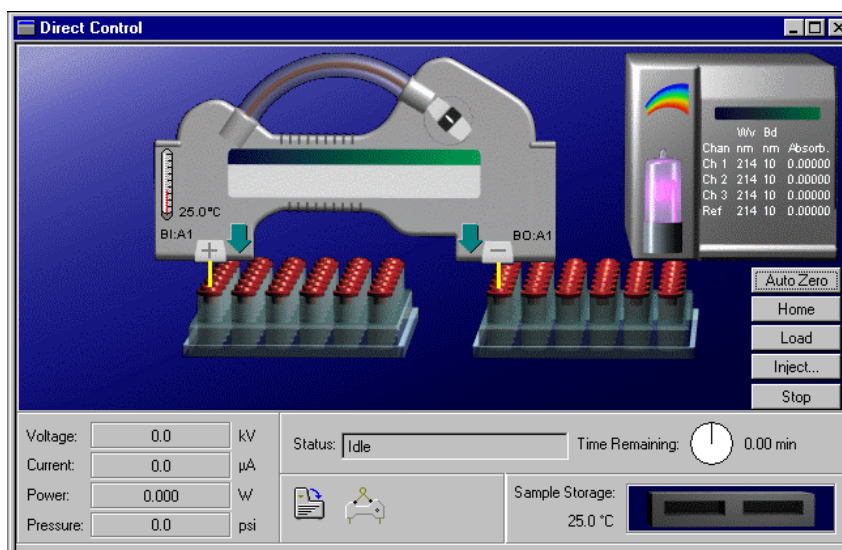


3. Click on the rainbow above the lamp graphic. The PDA Detector Parameters screen appears as shown below.
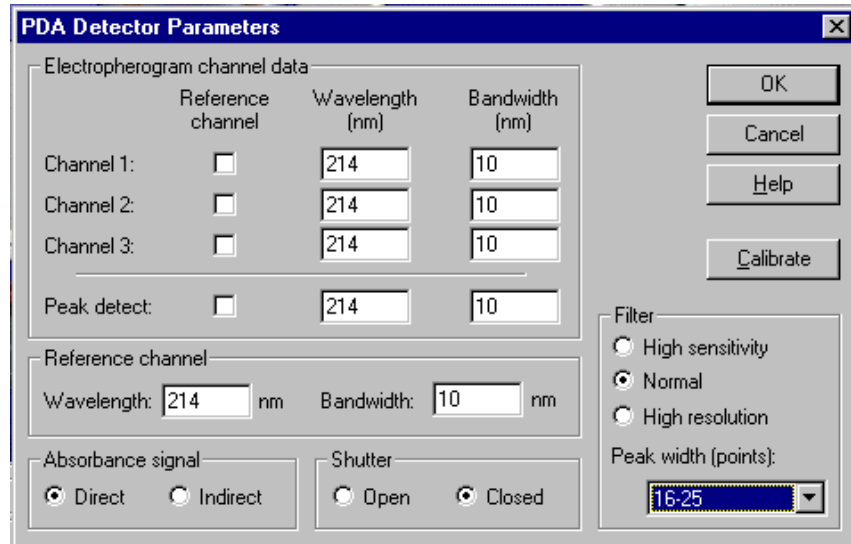
4. Click Calibrate to begin the calibration sequence. Calibration requires approximately 2 minutes. Do not attempt to access the instrument during the calibration process.

## 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:

• Deuterium lamp
• 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. |
|---|---|

Referring to Figure 4-24, proceed as follows:

1. From Direct Control, place trays into 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.

Figure 4-24  Changing the Lamp



Cartridge Cover Door

Optics Source Assembly

Insertion Bar

Interface Block

900040L.CDR
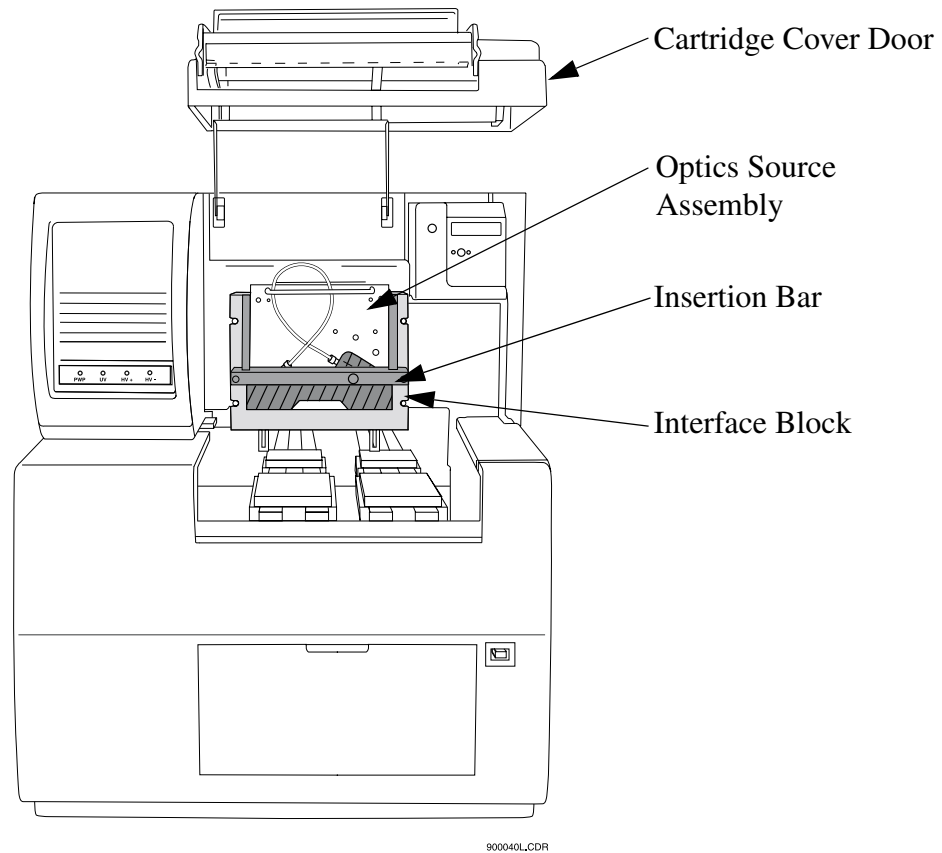
6.     Referring to Figure 4-25, loosen the two thumb screws and remove the optics source assembly. To remove, pull the assembly forward. Place the assembly on a clean work surface.

Figure 4-25  Removing the Optics Assembly

Optics Source Assembly

Thumb Screws (2)

900041L.CDR
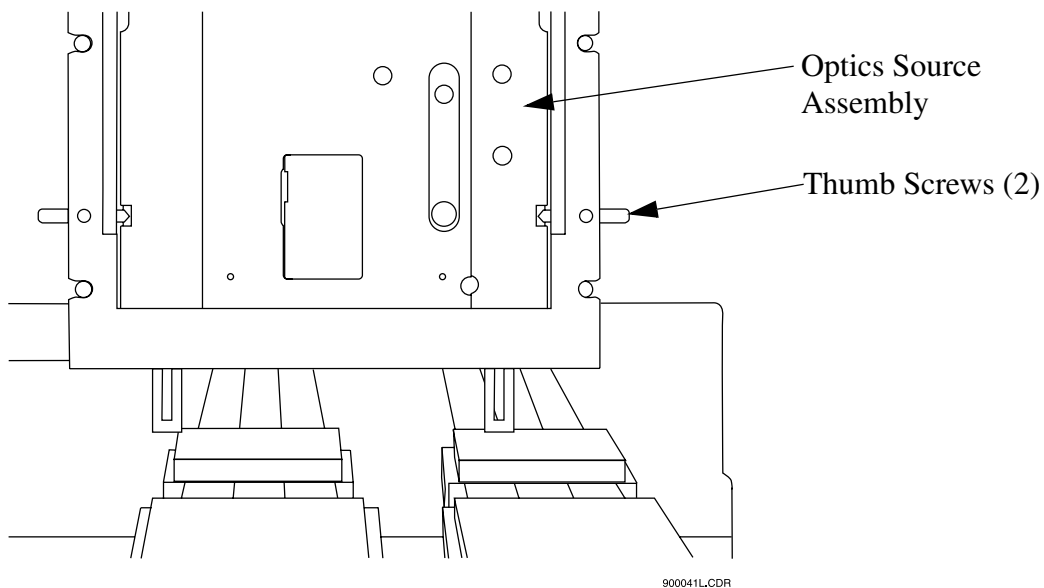
7.  Open the deuterium lamp access cover on the back of the optics source assembly. Disconnect the lamp power plug. Refer to Figure 4-26.

Figure 4-26  Disconnecting the Lamp Power Plug



Power Plug

900042L.CDR
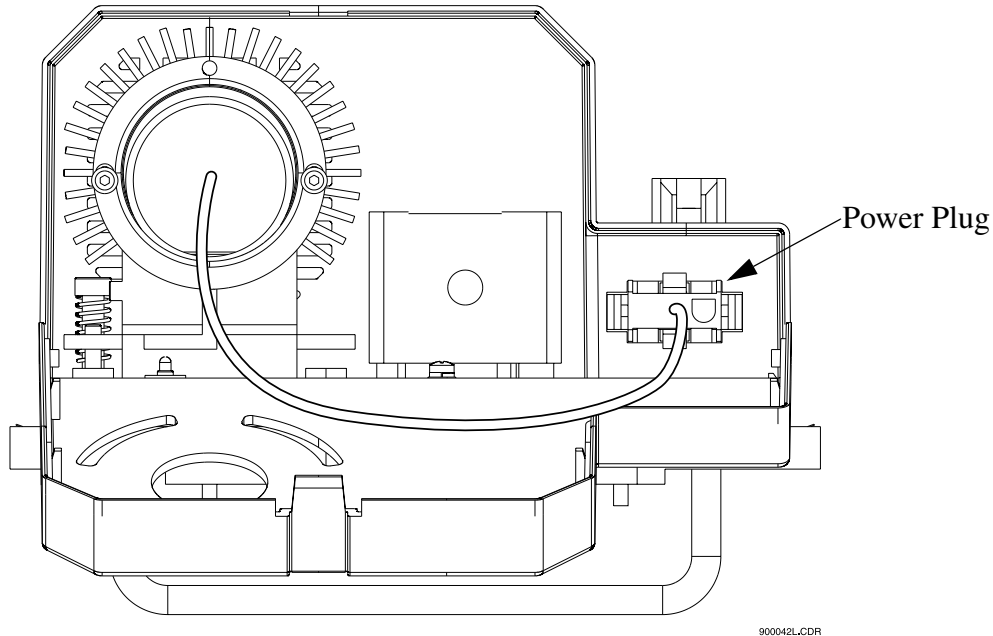
8.  Using a 7/64" hex head wrench, remove the two hex screws securing the deuterium lamp and remove the lamp from the lamp housing.

| ⚠ CAUTION | Do not touch the envelope of the lamp as oils from your skin can damage the lamp. |
|---|---|

| ⚠ NOTE | Ensure an orange O-ring is installed on the lamp flange before installing the lamp. A missing O-ring will decrease lamp performance. |
|---|---|

9.  Install the new deuterium lamp by aligning the flange guide notch in the lamp with the housing guide pin.

10. Install the two hex screws and tighten snug.

11. Reconnect the power plug and close the deuterium lamp access cover.

12. Place the optics source assembly in the mounting location. Align the two upper guide pins and tighten the two thumb screws.

13. Reinstall the capillary cartridge in the interface block.

14. Lower the insertion bar and tighten the two thumb screws.

15. Close the cartridge cover door.

16. Turn on power to system, then start the 32 Karat Software.

17. From the Instrument screen Control menu, select Diagnostics. The PDA (PDA detector installed) or UV (UV detector installed) diagnostic dialog box appears as shown below.
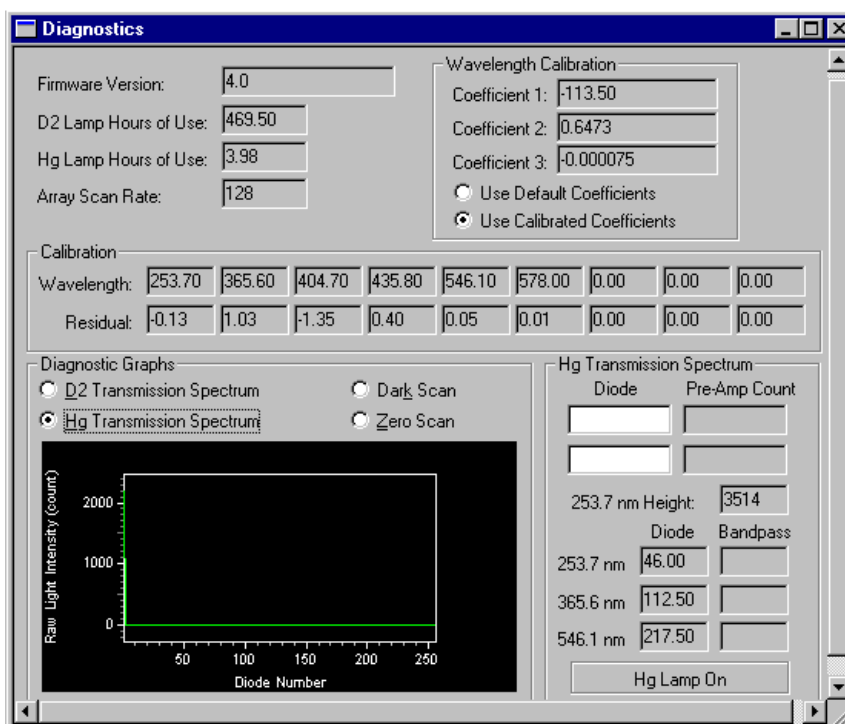


PDA Diagnostics Screen
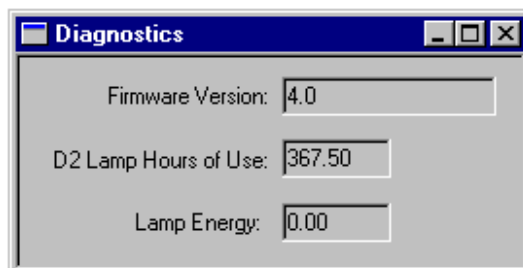


UV Diagnostics Screen

18. Select Control | Diagnostics | Set Lamp Hours. The Lamp Hours of Use dialog box appears as shown below. Enter a value of zero in the dialog box.

**Lamp Hours of Use** ☒

┌─Lamp Hours─────────────┐    ┌──────────┐
│                         │    │    OK    │
│  0                      │    └──────────┘
│                         │    ┌──────────┐
└─────────────────────────┘    │  Cancel  │
                               └──────────┘
                               ┌──────────┐
                               │   Help   │
                               └──────────┘
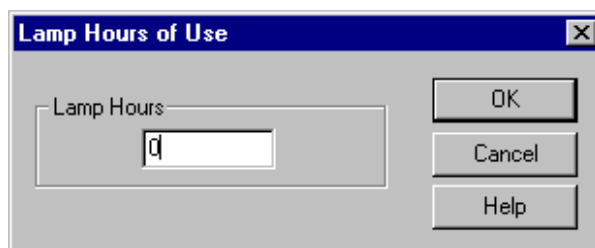
## Cleaning the Fiber Optics (UV and PDA Detectors)

Before you begin, you will need:

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

⚠️
**CAUTION**

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

1. From Direct Control, place trays in LOAD position.

2. Lift the cartridge cover door at the front of the P/ACE MDQ. Refer to Figure 4-27.

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 to dry before reconnecting.

7. Reconnect the fiber optic cable at the clamp arm first, then at the detector.

8.    When all fiber optic cable connectors have been cleaned and reconnected, close the cartridge cover door. Refer to Figure 4-27.

Figure 4-27  Location of Fiber Optic Cable



Cartridge Cover Door

Fiber Optic Cable
(PDA Detector; UV
Detector is similar)

900013L.CDR

# 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.

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

**To access the LIF Calibration Wizard:**

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

2.  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.
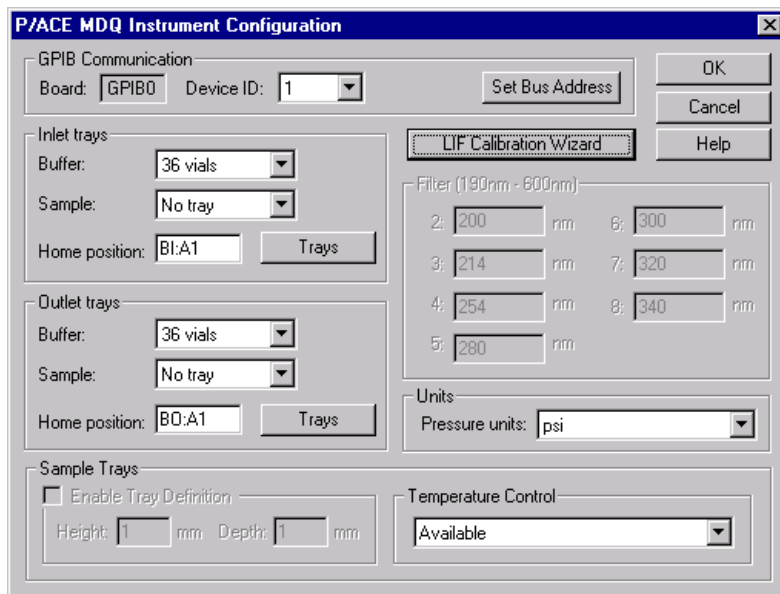


3.  Click on the LIF Calibration Wizard button to begin the calibration.
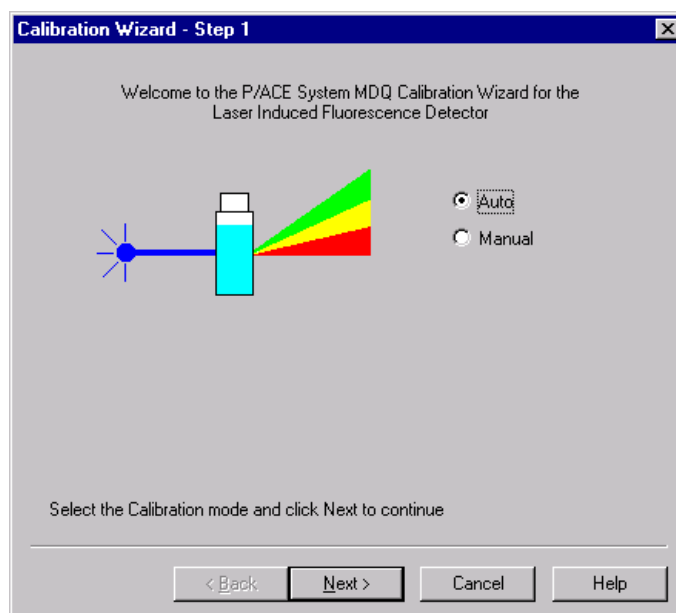
The purpose of the LIF Test Mix Calibration is to normalize the response of the system when some part of the optical path has been changed.

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

**Manual Calibration**

- 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.
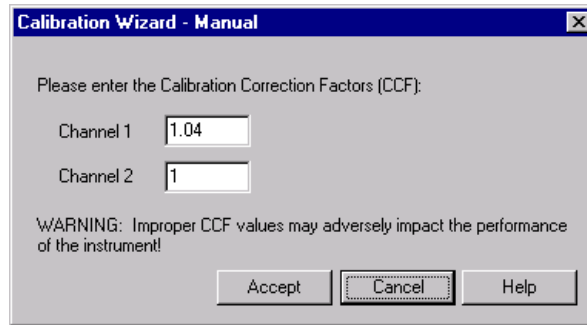


- Input the Calibration Correction Factor for each of the detector channels.

**Auto Calibration**

- Select the Auto option button to begin an auto-calibration process using the calibration test mix.
- Before performing an auto-calibration procedure, use the manual calibration option to set the CCF value to 1.0
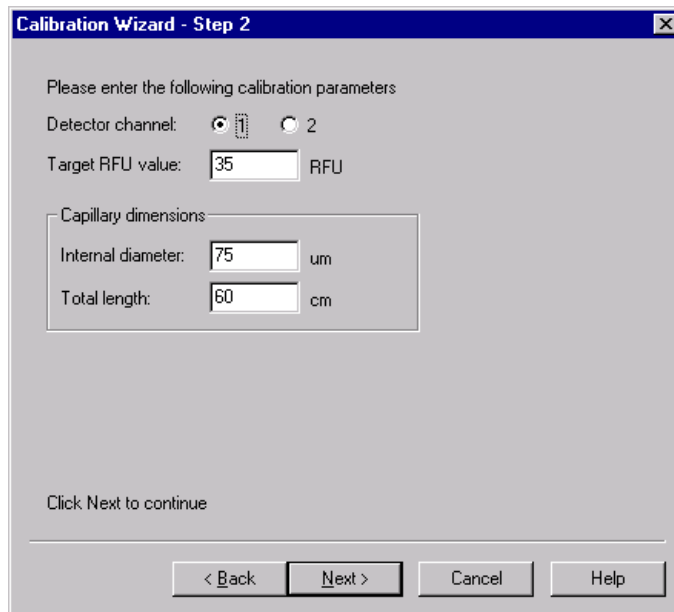
Step 3 of the Calibration Wizard prompts you to install the appropriate calibration vial samples into the instrument before the calibration process can begin.
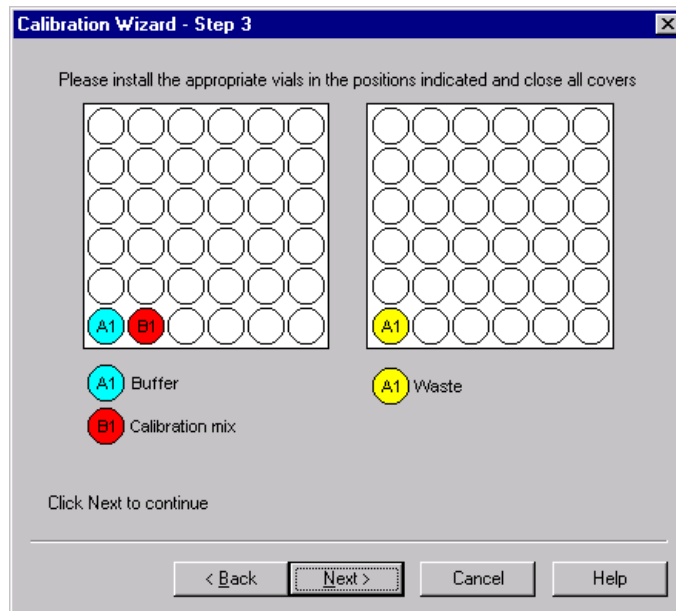


Once the calibration vials are installed in the instrument and their positions configured, click Next to begin the calibration.

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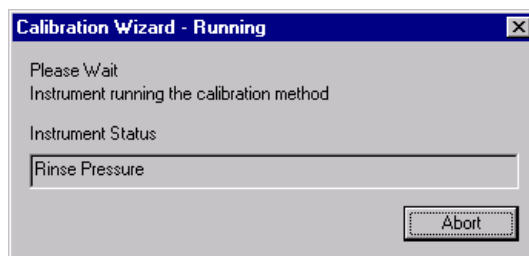


When the calibration is complete, the final step in the calibration wizard prompts you to accept or cancel the correction factor calculated in the calibration.
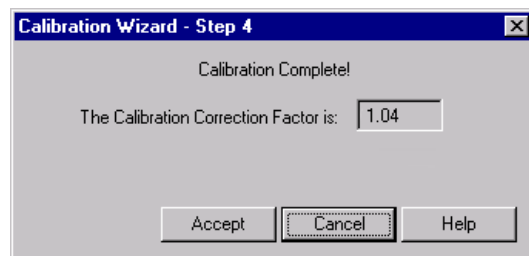


## Calibration Standard:

Changes can be made to the calibration procedure if a different flourescent 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 following method using the new calibration standard and capillary.

**Forward rinse with buffer.**

*   2 minutes @ 20 psi

**Forward pressure separation from test mix to waste.**

*   3 minutes @ 5 psi
*   Autozero @ 0.1 minute
    *   *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. Measure the RFU difference between the first part of the trace and the second part of the trace. Repeat the method several times to ensure the RFU difference is reproducible. 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 capillary. If a different capillary diameter is used, a different target value must be calculated. 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 capillary diameters and their associated target RFU values for various reagent types:

**Cy5**

*   20 mm diameter: RFU = 0.4 (use a different standard - the calibration wizard will not accept a target value below 1.0)
*   50 mm diameter:  RFU = 2.2
*   75 mm diameter:  RFU = 5
*   100 mm diameter:  RFU = 8.9

**Sodium Fluorescein**

*   20 mm diameter: RFU = 2.5
*   50 mm diameter:  RFU = 15.6
*   75 mm diameter:  RFU = 35
*   100 mm diameter:  RFU = 62.2

This concludes the Calibration Wizard - Auto Configuration process. For additional information, refer to the Online Help.

## 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:

- Cleaning solution (90% HPLC grade water, 10% Household Bleach).
- Safety goggles
- 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 4-28, proceed as follows:

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

| ⚠️ **CAUTION** | Be careful not to spill cleaning solution on the parts of the instrument where electrical components are located. |
|---|---|

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

4. Clean all external instrument surface areas thoroughly, at least two times and allow the instrument to dry completely.

Figure 4-28  Instrument Care



Cartridge Cover Door

Insertion Bar

Interface Block

900040L.CDR
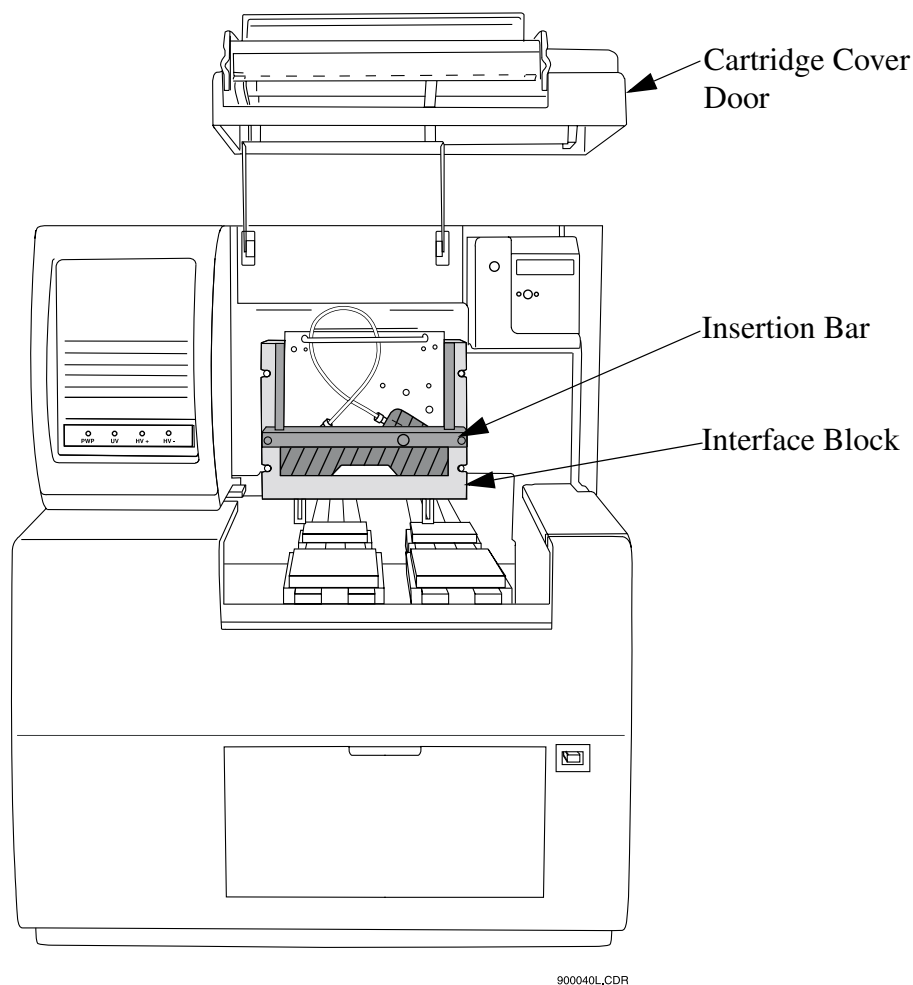
## Cleaning the Interface Block, Ejectors and Electrodes

Before you begin, you will need:

- Cotton swabs
- HPLC grade water

Referring to Figure 4-29, 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.

### Cleaning

4.    Remove the ejector covers and ejectors for cleaning as shown in Figure 4-29.

Figure 4-29  Cleaning Interface Block and Ejectors



Ejector/Electrode
Location

Injector Covers and
Spring Retainers

900045L.CDR
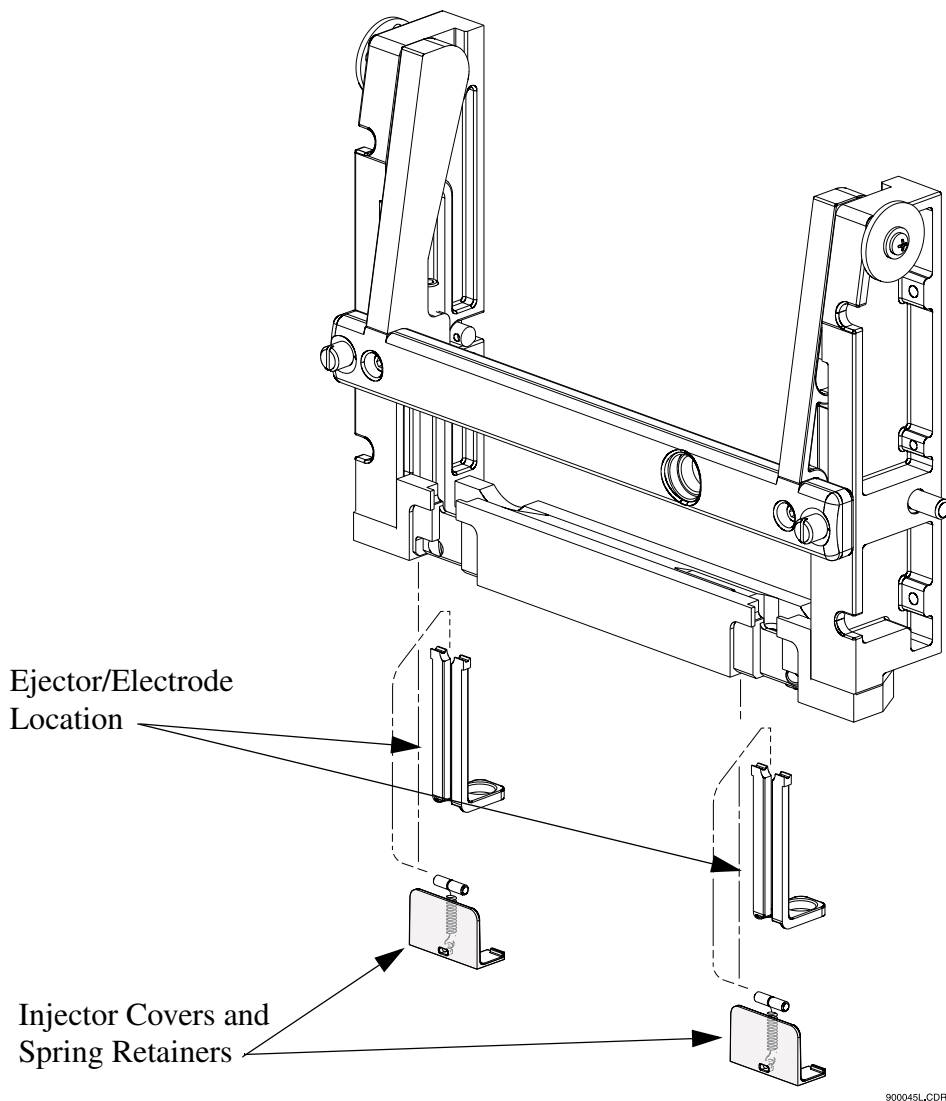
5.    Using cotton swabs, clean interface block, electrodes and ejector surfaces with water followed by methanol, then allow to dry.

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:

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

Referring to Figure 4-30, 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. Draw approximately 120 mL of coolant into the syringe.

4. Fill the coolant supply until the sight tube shows approximately ¾ full.

5. Remove the syringe and close the coolant fill door.

Figure 4-30  Capillary Coolant Installation
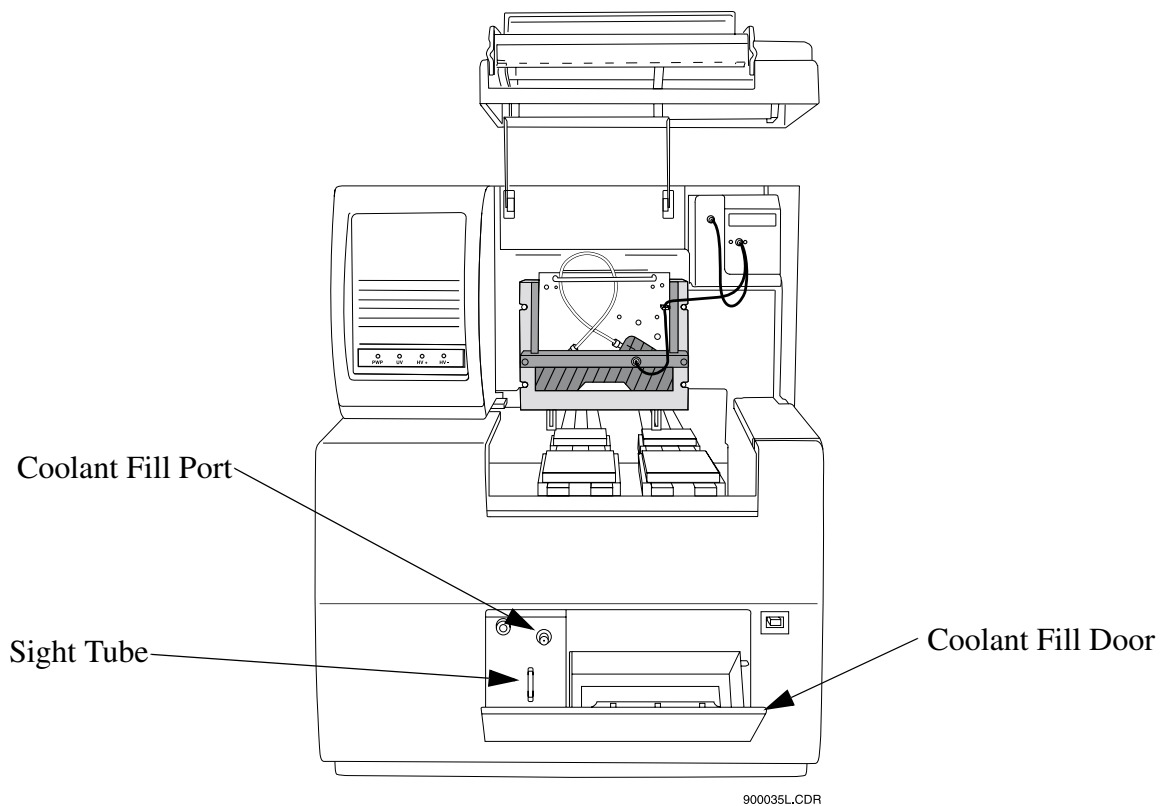
## Replacing the Electrodes

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:

- Electrodes for replacement
- Flat-tip screwdriver, #2

| | |
|---|---|
| ⚠️<br>**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 4-31, 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 4-31  Cleaning and Replacing the Electrodes
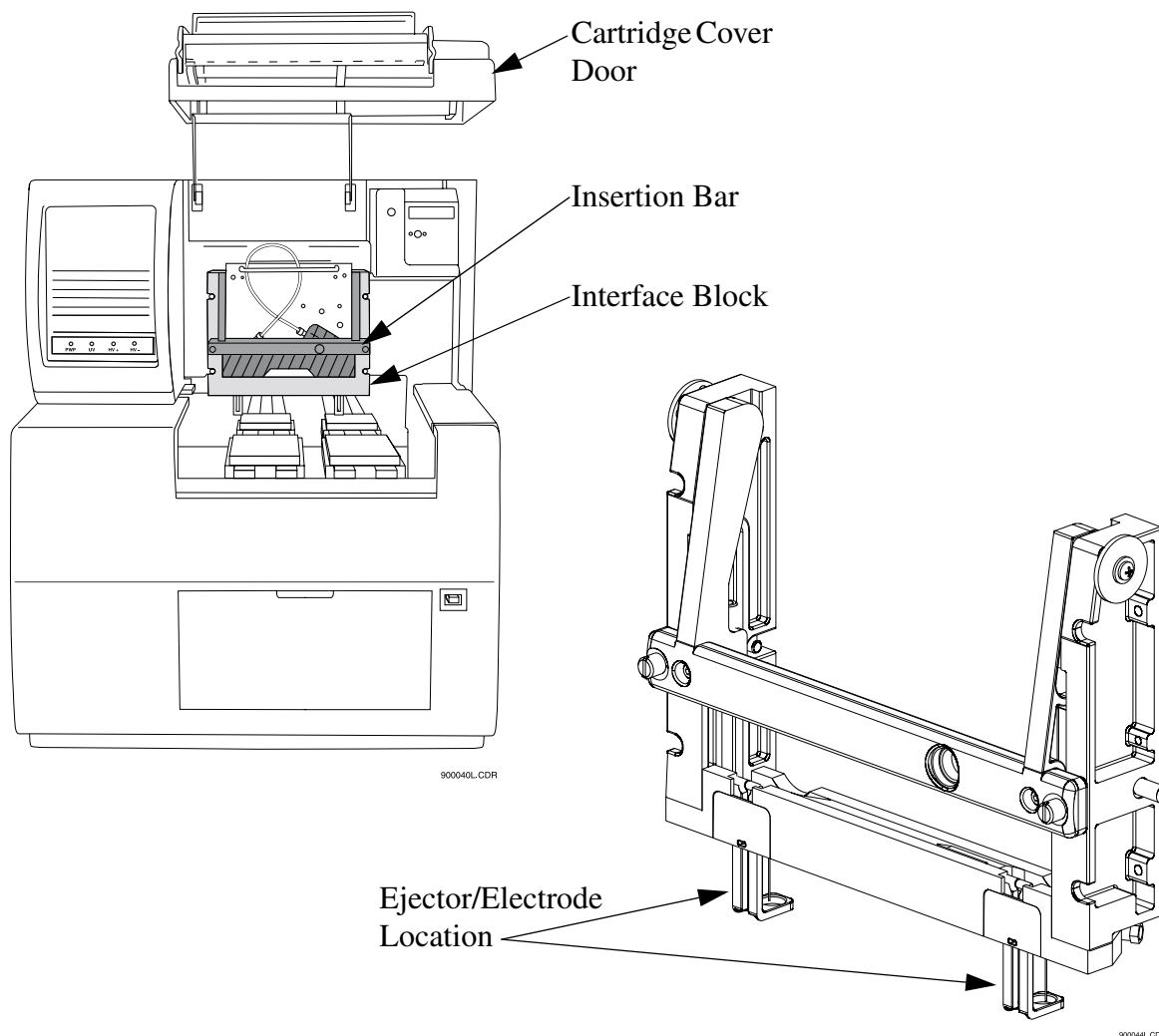


**Cleaning**

4.    The electrodes are attached to the underside of the interface block as shown in Figure 4-31. To access the electrodes for cleaning, remove the ejector cover and ejector in front of the electrode as shown in Figure 4-32.

5.    Using a cotton swab and HPLC grade water, clean the electrode surfaces.

6.    Reinstall the ejector and ejector cover.

## Replacement

| ⚠ **NOTE** | Replacing one electrode at a time provides an example for the opposite side during replacement. |
|:---:|:---|

7. To replace the electrodes, locate the ejector cover and spring retainer as shown in Figure 4-32. To remove the ejector cover and spring retainer, pull out then down to remove.

Figure 4-32  Replacing the Electrode

Injector Covers & Spring Retainers

900045L.CDR
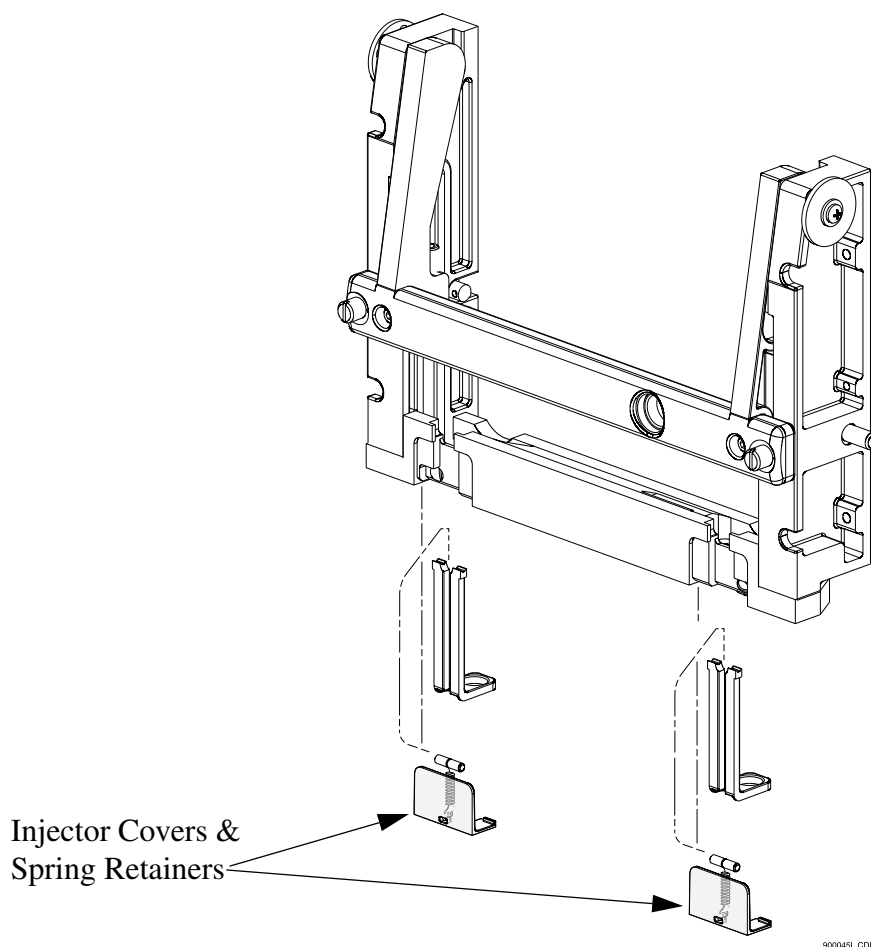
8. Pinch and remove the ejector in front of the electrode.

9. 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.

10. Replace with a new electrode and tighten the nylon screw until snug.

11. Reinstall the ejector in front of the electrode.

12. Reinstall the spring retainer and ejector cover.

13. Reinstall the capillary cartridge in the interface block.

14. Lower the insertion bar and tighten the two thumb screws.

15. Close the cartridge cover door.

## 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:

• Quad-rings for replacement

Referring to Figure 4-33, 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 4-33  Replacing Quad Rings
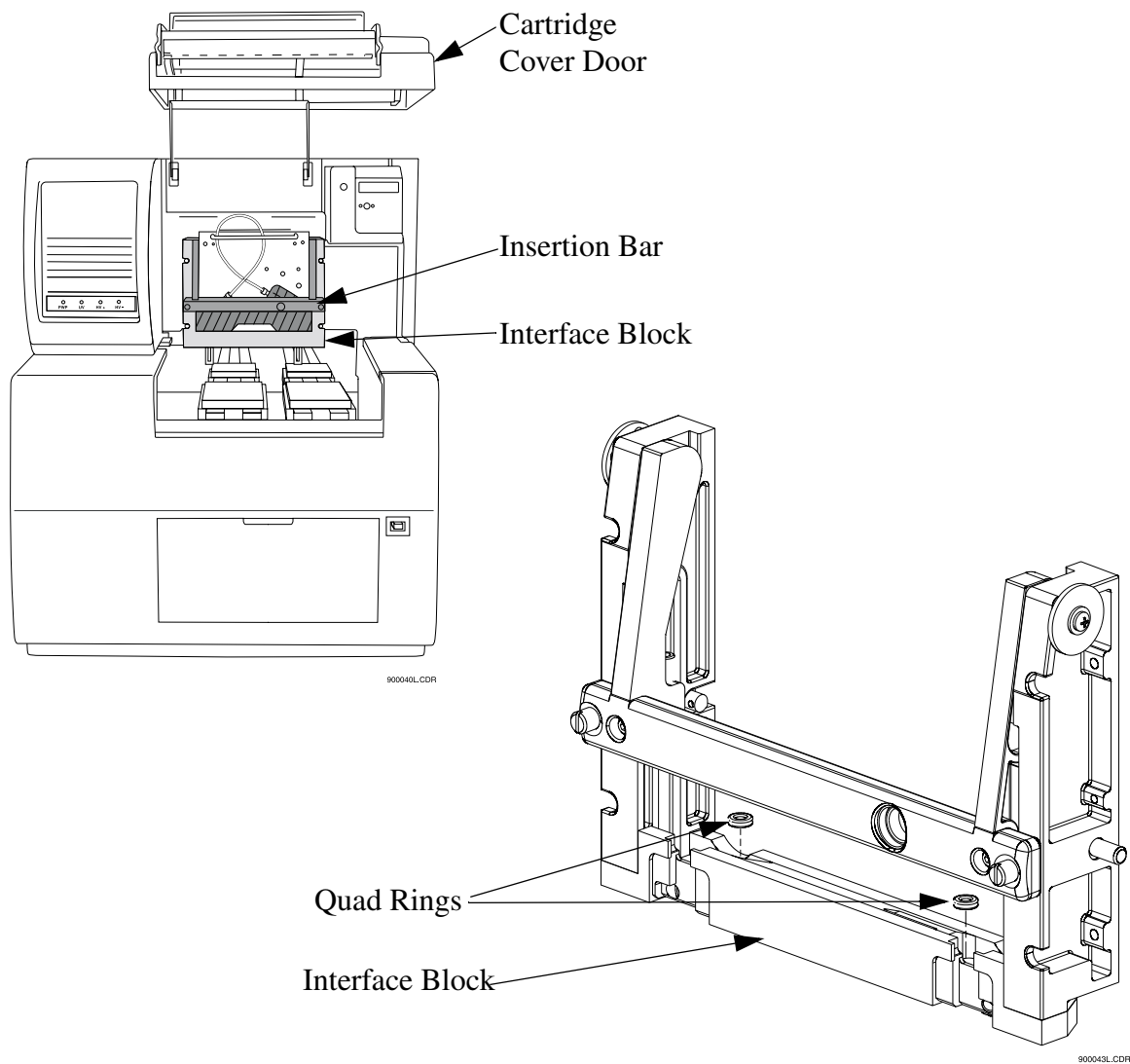


4.    Locate the quad-rings in the interface block, then use thumbnail and forefinger to remove the quad rings.

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.

## Replacing the Fuses

Before you begin, you will need:

- Flat-tip screwdriver, #2
- Replacement fuses (as required)

1. Turn off instrument power and disconnect power plug from the AC power outlet.

2. Using the flat-tip screwdriver, remove the fuse block. Refer to Figure 4-34 for location of fuse block.

Figure 4-34  Replacing Fuses

Fuse Block

900011L.CDR
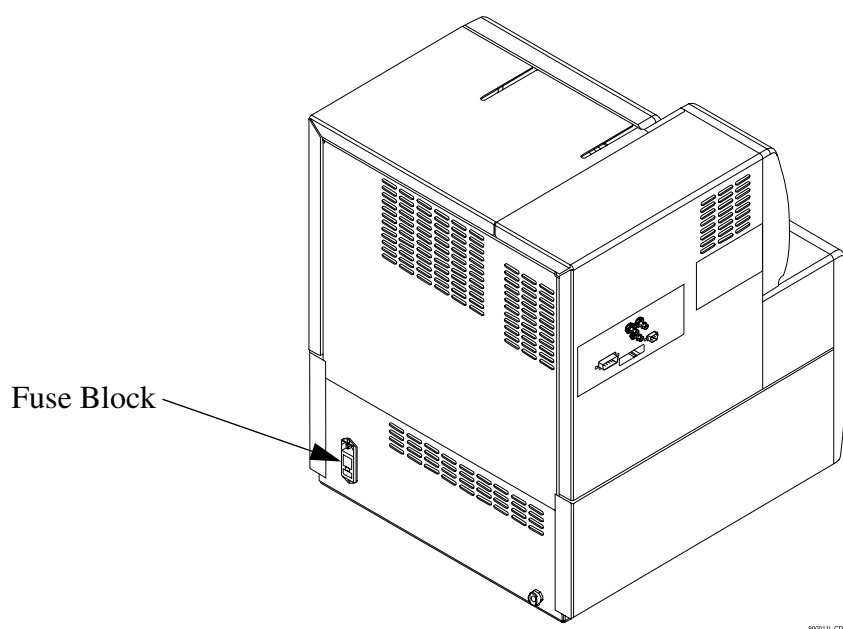
| ⚠ **CAUTION** | It is very important to determine the cause of fuse failure before replacing the fuses. |
|---|---|
| | Be sure to replace the fuses with the correct type and rating for continued protection against risk of fire and/or improper instrument operation. |
| | If the fuses continue to blow after being replaced, contact Beckman Coulter service for additional assistance |

3. Visually inspect or verify fuse continuity with 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.

# Section 5 - Additional Features

## Introduction

This section includes installing and configuring available devices/accessories for P/ACE MDQ.

The devices/accessories included are:

- SS420 (Board)
- SS420X (External Unit)
- Buffer Reservoir Tray
- External Detector Adapter

## SS420 Board

The SS420 board includes:

- SS420 Board
- TP420 Terminal Panel
- AC420 Analog cable
- DC420 Digital cable

## Installing the SS420 Internal Unit

1. Install the SS420 board in an ISA slot in the host computer. If no ISA slot is available, the SS420X board must be installed. Refer to the host computer owners manuals for installation instructions.

Connect the SS420 board to the Terminal Panel as follows:

2. Identify the cable with the 15-pin connectors on each end. Plug one end of the cable into the 15-pin connector on the SS420 board. Connect the other end of the cable to the 15-pin connector (J1) on the Terminal Panel.

3. Identify the cable with the 25-pin connectors on each end. Plug one end of the cable into the 25-pin connector on the SS420 board. Plug the other end of the cable into the 25-pin connector (J2) on the Terminal Panel.

## 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
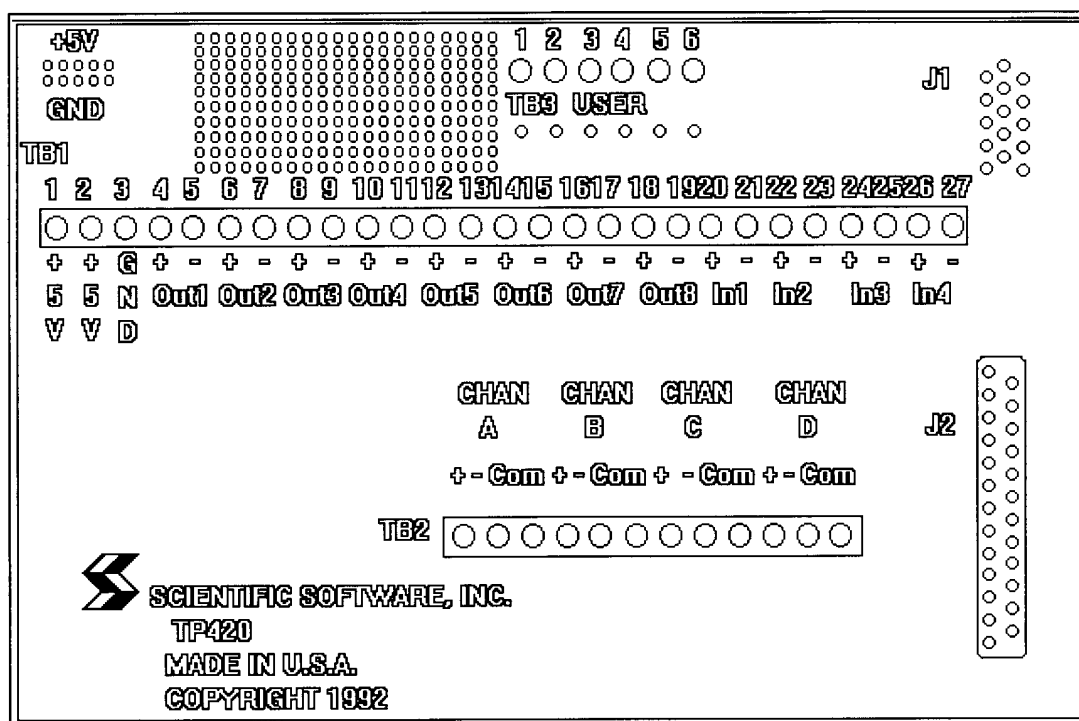


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The Terminal Panel shown in Figure 5-1 contains the following set of connections which will be used in connecting the instrument(s) to the host computer:

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

Locate these connections before you proceed.

1. You will need to 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-). Connect the shield at only one end, preferably to a COM terminal on the SS420 end.

|  | 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. |
| --- | --- |
| ⚠ NOTE | |

## 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 SS420. 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(-).

|  | In order for the trigger and ready relays to operate properly, you must specify the trigger and/or ready connection channel in the system configuration screen. To access this screen, select Configuration from the 32 Karat Software main menu, then Instruments. |
| --- | --- |
| ⚠ NOTE | |

### 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 IN1(-).

### Outputs 1 & 2

Outputs 1 & 2 close on computer power on and open when your 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 SS420 inputs can detect switch closures or can be driven by TTL compatible logic. The output switches are open collectors 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 follows:

1.  Connect one lead from the cable between the device and the SS420 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 SS420 output connector OUT(+) and the input terminal on the device.

## Configuring the SS420 Board

Configure as follows:

1.  From the Tools menu, click on Interface Configuration, then the SS420 icon. Referring to Figure 5-2, set the board configuration as follows:

2.  Click on board number. One is default value.

3.  Enter base address to hardware value set on board. Recommended value is 360 hex.

4.  Accept other defaults.

5.  Click OK to accept values.

Figure 5-2    SS420 Configuration Screen
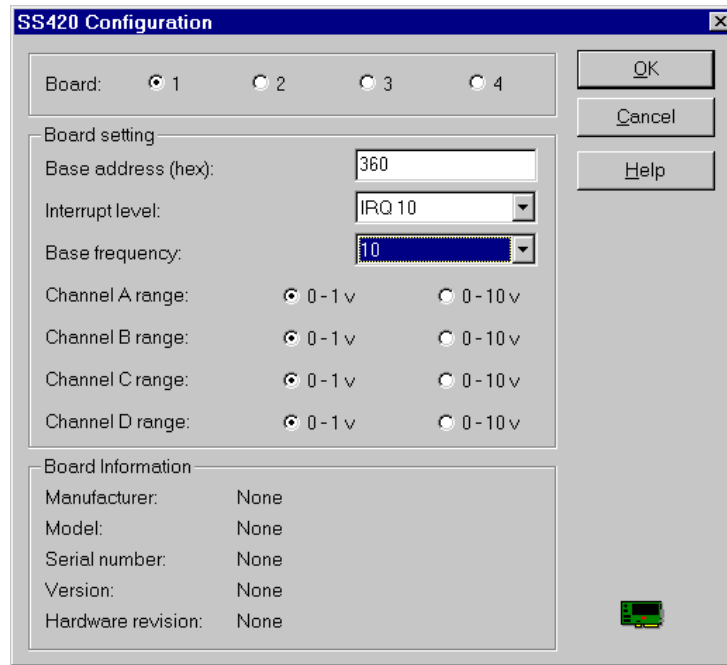
**Interrupt Level (IRQ) Jumper P1**

| | |
|---|---|
| ⚠️ <br> NOTE | No IRQ jumper is required on this board. If a jumper is present, please remove. See Figure 5-3 for location of Jumper P1. |

Figure 5-3    SS420 Analog-To-Digital Board
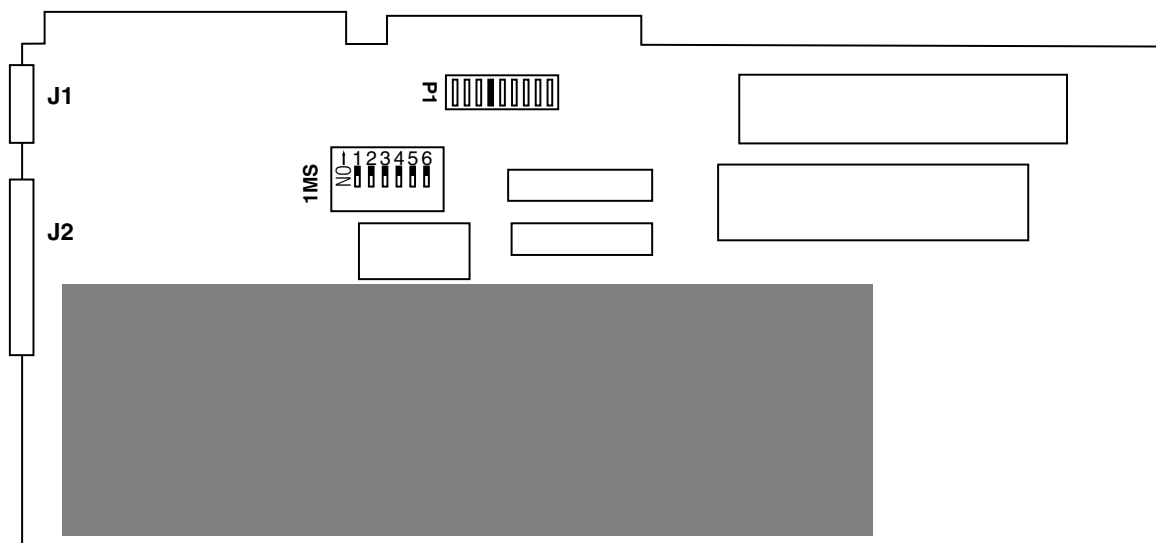


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**Changing Board Address**

The SS420 board is shipped from the factory with an address of 300 or 360 (hex). The address of 360 should be used if other hardware, such as a network card, tape backup, CD ROM, sound card, etc., are installed. If more than one SS420 board is ordered, each board will be set with a unique address. Each board occupies 4 address spaces. Therefore, if you have four SS420 boards installed, set their addresses to:

1st Board = 360

2nd Board = 364

3rd Board = 368

4th Board = 36C

Conflicts in base address often cause random failures. If you are using a network card, or tape backup drive, it is especially important to check for conflicts.

To change the board address, you must change the switches labeled SW1 (see Table 5-1) on your board to reflect the correct address. Each switch is labeled with a number, and SW1 contains a label showing which position is ON. To set a switch ON, slide the switch in the ON direction.

The board address is set to 3XY (hex), where X and Y are variables set by using the switches labeled 1 through 5. Switch 6 is not used. The following diagram illustrates the switch positions used for setting the board address. Switches 1-3 are used for setting X, and switches 4-5 are used for setting Y.

Table 5-1    SS420 Board Switch (SW1) Settings

|       | 1   | 2   | 3   | 4   | 5   |
|-------|-----|-----|-----|-----|-----|
| X=0   | On  | On  | On  |     |     |
| X=1   | On  | On  | Off |     |     |
| X=2   | On  | Off | On  |     |     |
| X=3   | On  | Off | Off |     |     |
| X=4   | Off | On  | ON  |     |     |
| X=5   | Off | On  | Off |     |     |
| X=6   | Off | Off | On  |     |     |
| X=7   | Off | Off | Off |     |     |
| Y=0   |     |     |     | On  | On  |
| Y=4   |     |     |     | On  | Off |
| Y=8   |     |     |     | Off | On  |
| Y=C   |     |     |     | Off | Off |

For example, switches for a board address of 364 would be:

| 1   | 2   | 3   | 4   | 5   |
|-----|-----|-----|-----|-----|
| Off | Off | On  | On  | On  |

## SS420X External Unit

The SS420X External Unit includes:

- SS420X device
- 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 Figure 5-4, install the SS420X external device:

1.  Place SS420X external device next to the computer and external devices. 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. 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 5-4    SS420X External Device Rear Panel
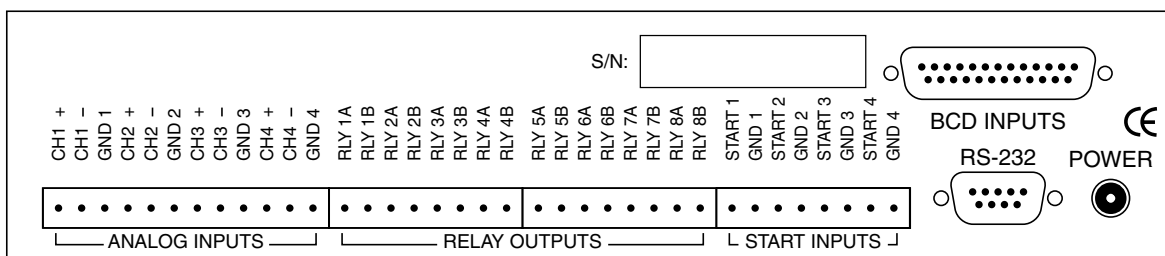


### Connecting Detectors

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 5-4 contains the following set of connections which will be used in connecting the external devices to the host computer:

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

Locate these connections before you proceed.

1.  You will need to 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 -**.

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. **CH 1+** and **CH 1-**). Connect the shield at only one end, preferably to **GND**.

| | |
|---|---|
| ⚠️<br>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 which may require sensitive measurements. |

## Connecting Start Inputs (Trigger Signals)

### Trigger Start of Data Acquisition

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. Simply 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**.

| | |
|---|---|
| ⚠️<br>NOTE | In order for the trigger and ready relays to operate properly, you must specify the trigger and/or ready connection channel in the system configuration screen. To access this screen, select Configuration from the P/ACE 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 devices 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 5-5, configure SS420X device as follows:

1.  From the Tools menu, click on Interface Configuration, then the SS420X icon. Set the board configuration as follows:

2.  Click on board number. One is default value.

3.  Enter base address to hardware value set on board. Recommended value is 360 hex.

4.  Accept other defaults.

5.  Click OK to accept values.

Figure 5-5    SS420X Configuration Screen
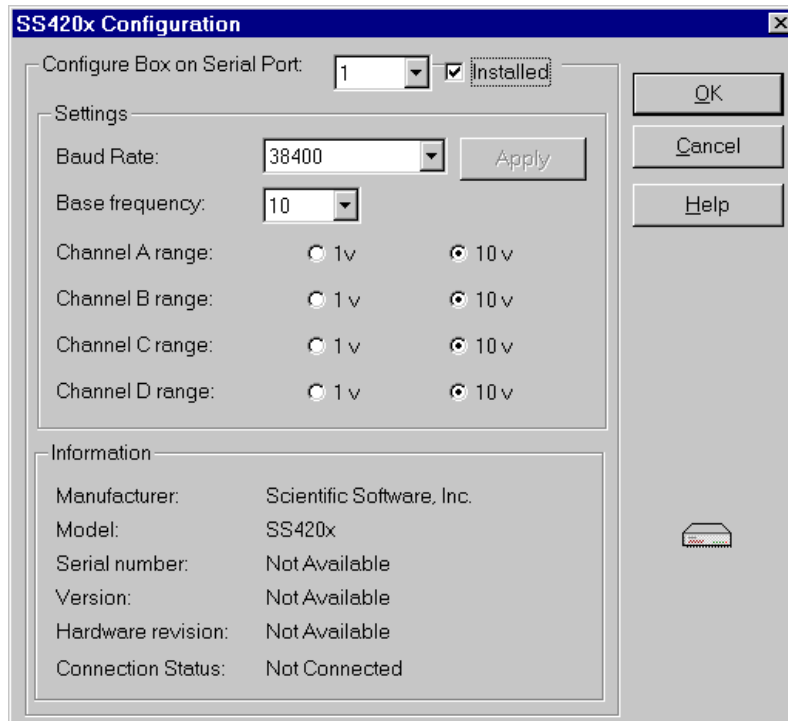
## P/ACE™ MDQ External Detector Adapter

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 4.0 and Firmware Version 4.0 and higher.

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



**High Voltage**

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

WARNING



**Sharp Object**

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

WARNING

## Initial Installation

The EDA modification is not user-installable; 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.

## Installing the capillary

Figure 5-6    Standard Cartridge



900456.AI

### Installing the Capillary in the Standard Cartridge

1.  Referring to Figure 5-6, remove existing capillary, aperture, and end seals. If converting a standard cartridge for ED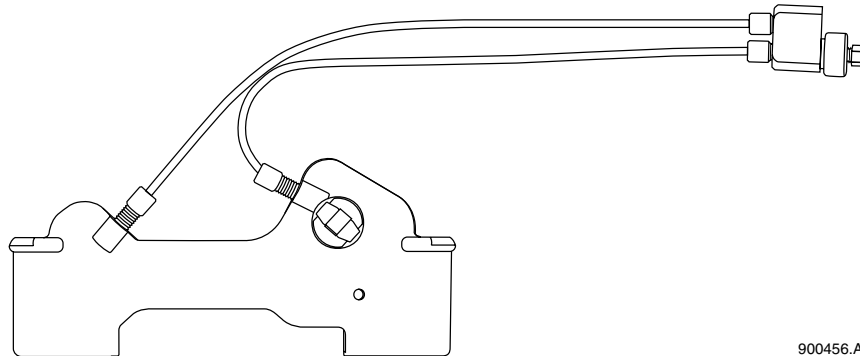A use, remove the coolant tubing. If rebuilding a standard cartridge that has already been converted to EDA mode, skip steps 2 and 3.

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 5-8). 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 8.

5.  Insert the capillary through the OUTLET side of the cartridge, starting with the end of the capillary away from the window. Push the capillary through the window area and the outlet side coolant tube until it emerges from the capillary adapter body.

6.  Grasp the capillary at the capillary adapter body. Pull the capillary until the window area is centered in the aperture.

7.  Install an aperture plug and o-ring as described in the P/ACE MDQ manual.

8.  If a new seal is not to be installed, go to step 9. After removing the nut, install a new seal (P/N 144818) on the capillary emerging from the capillary body. The narrow end of the seal must point toward the capillary adapter body. Push the seal down the length of the capillary and into the capillary adapter body (see Figure 5-8). Re-install the nut (P/N 144817).

9.  Tighten the nut finger-tight only.

10. Place a red seal and clip (P/N 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. **Do not use the older-style blue double seals.**

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

Figure 5-7   EDA-Only Cartridge



900458.AI
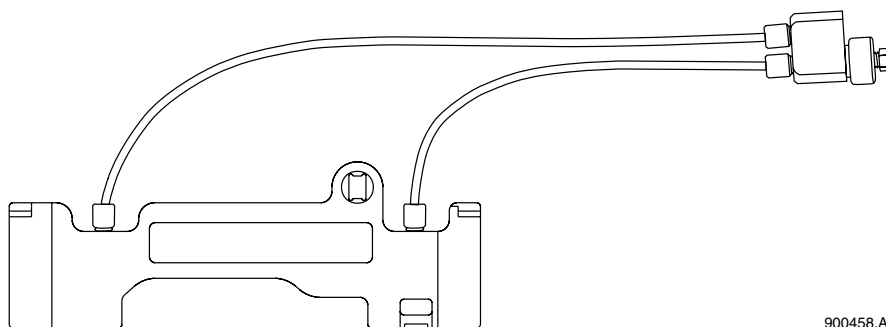
## Installing the Capillary in the EDA-Only Cartridge

1. Referring to Figure 5-7, remove any existing capillary and end seals; if rebuilding an EDA-only cartridge, skip steps 2 and 3 below.

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 5-8). 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.

5. Insert the capillary through the OUTLET side of the cartridge. Push the capillary through the cartridge and the outlet side coolant tube until it emerges from the capillary adapter body.

6. Grasp the capillary at the capillary adapter body. Pull the capillary to install it. Leave sufficient capillary below the cartridge to allow it to be trimmed to length.

7. 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.

8. If a new seal is not to be installed, go to step 9. After removing the nut, install a new seal (P/N 144818) on the capillary emerging from the capillary body. The narrow end of the seal must point toward the capillary body. Push the seal down

the length of the capillary and into the capillary adapter body (see Figure 5-8). Re-install the nut (P/N 144817).

9.  Tighten the nut finger-tight only.

10. Place a red seal and clip (P/N 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. |
|---------|-----------------------------------------------|

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

Figure 5-8   Capillary Adapter Block Assembly



900459.AI

Capillary
Adapter Body

Seal
(P/N 144818)

Nut
(P/N 144817)
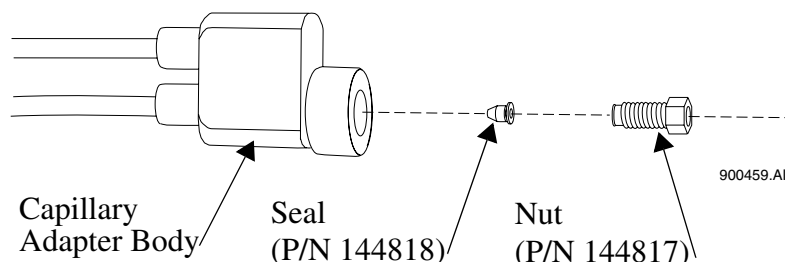
## Installing the Cartridge in the Instrument

Installation of the EDA configured cartridge is similar to installation of a cartridge in the standard mode. Refer to Figure 5-9.

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. Guide the coolant tubes through the slot in the right-side upright.

4.  Lower the bar and tighten the screws.

5.  Insert the capillary adapter body into the slot in the right side of the instrument. Secure it with the locking ring.

6.  Close and latch the doors.

Figure 5-9   Cartridge Installation
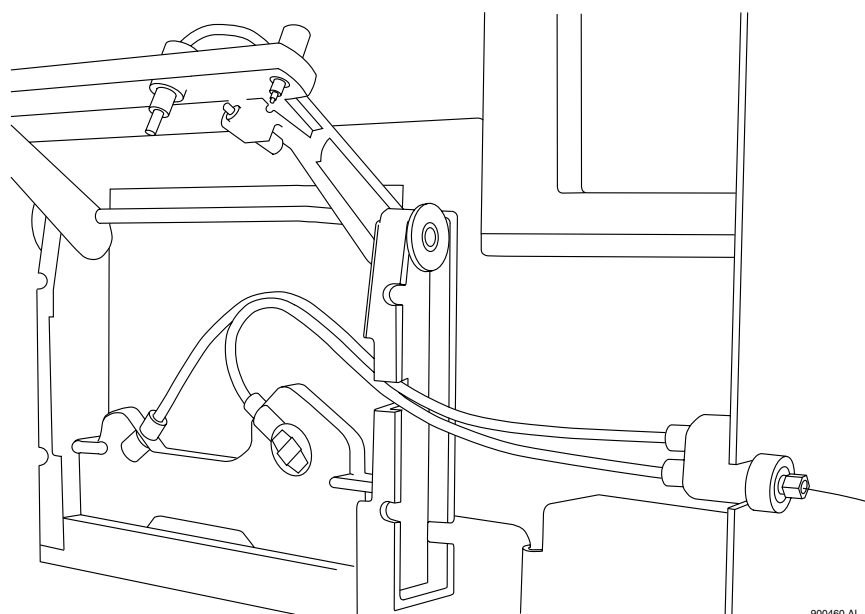


## Programming for EDA Operation

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 Software Reference Guide or on-line 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.

## 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).

## Parts List

| Part Number | Description |
| --- | --- |
| 144821 | **P/ACE MDQ EDA Accessory Kit**<br>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 Sservice Engineer. |
| 144829 | **EDA Cartridge Assembly**<br>cartridge body, cartridge seal, seal retainer clip 100 x 800 slit, capillary adapter assembly and instruction sheet. |
| 144822 | **EDA Tubing Kit**<br>Pre-cut EDA tubing (4 pieces), tubing nuts (4 pieces), o-rings (4 pieces) and ferrules (4 pieces). |
| 144834 | **EDA Capillary Adapter Assembly**<br>EDA capillary adapter body, capillary adapter nut, seal, fittings and tubing kit. |

## P/ACE MDQ™ MDQ Buffer Reservoir Tray

The P/ACE MDQ Buffer Reservoir Tray (P/N 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 4.0 and Firmware 4.0 or higher.
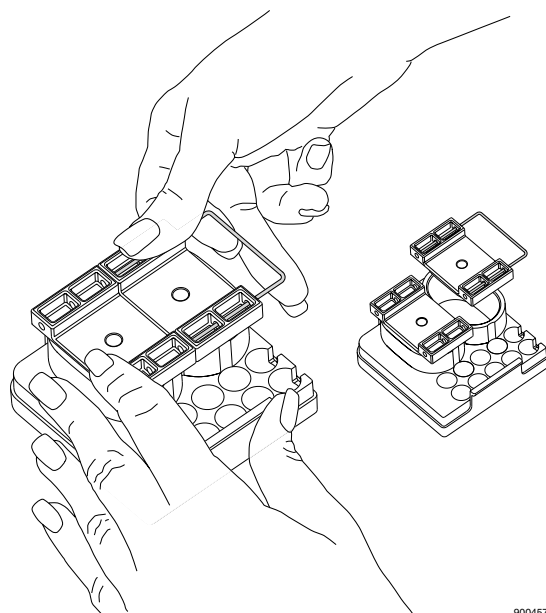
### Filling the Tray

We recommend filling the reservoirs before installing the tray in the instrument. Proceed as follows:

1. Remove the lids by using the tool provided as shown in Figure 5-10. Insert the tool into the holes in the lid; hold the tray down and pull up with the tool. If the reservoirs already contain liquid, take care not to spill the contents during this operation. ***The tight fit of the lid is required to allow the application of up to a maximum 20 psi***.

2. Fill the reservoirs with the desired buffer solution. Note the solvent limitations in Table 1. To prevent liquid emerging from the cap when the lid is inserted, make sure that the liquid level is not above the bottom of the lid.

3. Replace the lids by pushing down firmly; the lids must be completely seated.

4. 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.

Figure 5-10  Lid Removal



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## 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. |
|---|---|

## 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 Table 5-2.

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

Table 5-2    Solvent Compatibility with Polypropylene

| 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 Table 5-3 for part numbers and description of Buffer Reservoir Tray Parts List.

Table 5-3    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) |