Instructions For Use

Automated Labware Positioners (ALPs)

ALPs Instructions For Use

PN 987836AH
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Beckman Coulter, Inc.
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Automated Labware Positioners (ALPs)
ALPs Instructions For Use
PN 987836AH (November 2023)

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Contact Us
If you have any questions, contact our Customer Support Center.

- Worldwide, find us via our website at www.beckman.com/support/technical
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Glossary of Symbols is available at beckman.com/techdocs (PN C24689).

May be covered by one or more pat. - see www.beckman.com/patents

Original Instructions

Revision Status

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released to the Beckman Coulter website. For labeling updates, go to www.beckman.com and download the latest version of the manual or system help for your instrument.

Version AG, 11/2013
Software version 4.1

Changes were made to:

RoHS Notice

Safety Messages

CHAPTER 1, Applying Labels to Labware

CHAPTER 1, Special Framing for the SPE ALP

CHAPTER 1, Controlling the Vacuum Valve Unit Inside a Method

CHAPTER 1, Controlling the Vacuum Valve Unit Outside a Method

CHAPTER 1, Troubleshooting

Chapters added:

CHAPTER 1, Automated Tube Bar Code Reader (ATBCR)

CHAPTER 1, Bar Code Reader-Handheld

CHAPTER 1, Fly-By Bar Code Reader

CHAPTER 1, Labware Stacking ALP

Version AH, 11/2023
Software version 4.2

Changes were made to:

- CHAPTER 6, Drainable/Refillable Reservoir ALP

Safety Notice

Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to operate instrument. Do not attempt to perform any procedure before carefully reading all instructions. Always follow product labeling and manufacturer's recommendations. If in doubt as to how to proceed in any situation, contact your Beckman Coulter Representative.

Alerts for Danger, Warning, Caution, Important, and Note

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT IMPORTANT is used for comments that add value to the step or procedure being performed. Following the advice in the Important adds benefit to the performance of a piece of equipment or to a process.

NOTE NOTE is used to call attention to notable information that should be followed during installation, use, or servicing of this equipment.

Electrical Safety

To prevent electrically related injuries and property damage, properly inspect all electrical equipment prior to use and immediately report any electrical deficiencies. Contact a Beckman Coulter Service Engineer for any servicing of equipment requiring the removal of covers or panels.

High Voltage

This symbol indicates the potential of an electrical shock hazard existing from a high voltage source and that all safety instructions should be read and understood before proceeding with the installation, maintenance, and servicing of all modules.

Do not remove system covers. To avoid electrical shock, use supplied power cords only and connect to properly grounded (three-holed) wall outlets. Do not use multiplug power strips.

Disposal of Electronic Equipment

It is important to understand and follow all laws regarding the safe and proper disposal of electrical instrumentation.

The symbol of a crossed-out wheeled bin on the product is required in accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Union. The presence of this marking on the product indicates that:

- the device was put on the European Market after August 13, 2005.
- the device is not to be disposed via the municipal waste collection system of any member state of the European Union.

For products under the requirement of WEEE directive, please contact your dealer or local Beckman Coulter office for the proper decontamination information and take back program, which will facilitate the proper collection, treatment, recovery, recycling, and safe disposal of the device.

RoHS Notice

These labels and materials declaration table (the Table of Hazardous Substance’s Name and Concentration) are to meet People’s Republic of China Electronic Industry Standard SJ/T11364-2006 “Marking for Control of Pollution Caused by Electronic Information Products” requirements.

China RoHS Caution Label — This label indicates that the electronic information product contains certain toxic or hazardous substances. The center number is the Environmentally Friendly Use Period (EFUP) date, and indicates the number of calendar years the product can be in operation. Upon the expiration of the EFUP, the product must be immediately recycled. The circling arrows indicate the product is recyclable. The date code on the label or product indicates the date of manufacture.

China RoHS Environmental Label — This label indicates that the electronic information product does not contain any toxic or hazardous substances. The center "e" indicates the product is environmentally safe and does not have an Environmentally Friendly Use Period (EFUP) date. Therefore, it can safely be used indefinitely. The circling arrows indicate the product is recyclable. The date code on the label or product indicates the date of manufacture.

Laser Light

This symbol indicates that a potential hazard to personal safety exists from a laser source. When this symbol is displayed in this manual, pay special attention to the specific safety information associated with the symbol.

Laser Specifications

Laser Type:	Class II Laser Diode
Maximum Output:	1mW
Wavelength:	670 nm

Chemical and Biological Safety

Normal operation of the Biomek workstations may involve the use of materials that are toxic, flammable, or otherwise biologically harmful. When using such materials, observe the following precautions:

- Handle infectious samples according to good laboratory procedures and methods to prevent the spread of disease.
- Observe all cautionary information printed on the original solution’s containers prior to their use.
- Dispose of all waste solutions according to your facility’s waste disposal procedures.
- Operate the Automated Labware Positioners (ALPs) in accordance with the instructions outlined in this manual, and take all the necessary precautions when using pathological, toxic, or radioactive materials.
- Splashing of liquids may occur; therefore, take appropriate safety precautions, such as using safety glasses and wearing protective clothing, when working with potentially hazardous liquids.
- Use an appropriately contained environment when using hazardous materials.
- Observe the appropriate cautionary procedures as defined by your safety officer when using flammable solvents in or near a powered-up instrument.
- Observe the appropriate cautionary procedures as defined by your safety officer when using toxic, pathological, or radioactive materials.

NOTE Observe all warnings and cautions listed for any external devices attached or used during operation of the instrument. Refer to applicable external device user’s manuals for operating procedures of that device.

Moving Parts

To avoid injury due to moving parts, observe the following:

- Never attempt to exchange labware, reagents, or tools while the instrument is operating.
- Never attempt to physically restrict any of the moving components of the Automated Labware Positioners (ALPs).

Cleaning

Observe the cleaning procedures outlined in this manual for each specific Automated Labware Positioner (ALP). Prior to cleaning equipment that has been exposed to hazardous material:

- Appropriate Chemical and Biological Safety personnel should be contacted.
- The Chemical and Biological Safety information contained in this manual should be reviewed.

Maintenance

Perform only the maintenance described in this manual. Maintenance other than that specified in this manual should be performed only by service engineers.

IMPORTANT It is your responsibility to decontaminate Automated Labware Positioners (ALPs) before requesting service by a Beckman Coulter Service Engineer or returning parts to Beckman Coulter for repair. Beckman Coulter will NOT accept any items which have not been decontaminated where it is appropriate to do so. If any parts are returned, they must be enclosed in a sealed plastic bag stating that the contents are safe to handle and are not contaminated.

Safety Messages

CAUTION

Always operate the Automated Tube Bar Code Reader (ATBCR) with the lid closed and all covers in place.

WARNING

Only use the recommended containers in the Automated Tube Bar Code Reader. Sample containers not listed may damage the ATBCR or cause pipetting errors.

CAUTION

Do not use sample container and tip combinations labeled NO. Tips could become wedged inside sample containers.

WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

WARNING

Use only the container type specified by the container type label on the sample rack. A rack is configured to accept only one type of sample container. Placing an incorrect container type in a rack may damage the instrument or cause pipetting errors.

CAUTION

A sample rack is configured to accept only one type of sample container. Do not mix container types within a rack.

⚠ CAUTION

Exceeding the maximum tilt speed for the labware type can cause the containers to fall out of the rack. Do not exceed the values given above. Do not use any tilt for the containers noted as "No tilt at any speed." in the table above. See *Setting Tilting Parameters* for more information.

⚠ CAUTION

Loading tube racks backwards in the input tray when the rack bar code error handling option "Use the configured rack default type" is selected may report improper results.

⚠ WARNING

Do not place hands inside of the sample presentation point when the instrument is operating.

⚠ WARNING

Make sure the sample containers placed in the sample rack match the type indicated by the sample rack bar code label. Mismatches may result in damage to equipment or pipetting errors.

⚠ WARNING

The tubes contained in a rack should always match the expected tube type specified by the rack bar code.

⚠ CAUTION

A mismatch between the Default Tube Rack type and the physical rack present when ignoring missed rack bar codes may result in damage to equipment, damage to labware, improper pipetting, and/or spilled samples.

⚠ CAUTION

Tilting should only be used with sealed or capped tubes. Tilting unsealed or uncapped tubes may result in samples spilled inside the ATBCR.

⚠ CAUTION

Using sealed or capped tubes requires proper tips to be used for peircing the seals or septa. Using tips that are not equipped for piercing may result in damage to equipment, damage to labware, improper pipetting, and/or spilled samples.

⚠ CAUTION

Loading tube racks backwards in the input tray when the tube bar code error handling option "Ignore, use default bar code, and continue the method" is selected may report improper results.

⚠ CAUTION

The default tilt positions are 45° and 135°. Depending on labware and tilt speed, changing the tilt positions may cause the sample rack to be dislodged from its carrier. Do not use a non-default tilt angle without prior verification.

⚠ CAUTION

Not all tube types can be tilted at 100% speed. The default tilt speed for the instrument is 30%. Tilting larger tubes at 100% speed may result in the tube falling out of the carriage. The tilting speed must be limited to the largest tube type to be used in a method. See Table 3.3 for recommended maximum tilt speeds.

⚠ CAUTION

Make sure the probes of the Span-8 Pod are not positioned inside the sample rack at the presentation point prior to homing.

⚠ CAUTION

The Labware Stacking ALP is for use with the Biomek NX^{P} Span-8 (with gripper) Laboratory Automation Workstation only.

⚠ CAUTION

Do not attempt to install or remove the Labware Stacking ALP; it must be installed or removed by a Beckman Coulter Service Engineer.

⚠ WARNING

Use only supported labware with the Labware Stacking ALP materials.

⚠ CAUTION

Framing the Labware Stacking ALP sets the correct position for the current deck; it does not change framing information for other decks. If a different deck is used, this ALP must be reframed for that deck before it is used in a method.

CAUTION

To move labware to and from the Labware Stacking ALP, use the Stack/Unstack Labware step. Using the Move Labware step from the Basic Step Palette will result in a validation error.

CAUTION

Do not attempt to install or remove the Fly-By Bar Code Reader; it must be installed or removed by a Beckman Coulter Service Engineer.

WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING

If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads may occur.

WARNING

If a label is applied by any means other than a Print & Apply device, an increase in bad reads or no reads may occur.

CAUTION

Framing a Fly-By Bar Code Reader sets the correct position for the current deck only; it does not change framing information for other decks. If a different deck is used, the Fly-By Bar Code Reader must be reframed for that deck before it is used in a method.

WARNING

When using Home All Axes with a Fly-By Bar Code Reader on the deck, make sure the pod is not near the front, back, or side of the instrument.

WARNING

Always have the laser module access cover, located on the Fly-By Bar Code Reader, in place when operating or troubleshooting the laser module.

Contents

Illustrations

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CHAPTER 1

Introduction to ALPs

About This Manual

NOTE Unless otherwise noted, all information in this manual referring to the Biomek® FX refers to both the FX and FX^P instruments and all information referring to the Biomek NX instruments refers to both the NX and NX^P instruments.

This ALPs *(Automated Labware Positioners)* Information For Use (IFU) provides information on using and configuring ALPs on a Biomek Laboratory Automation Workstation. This chapter contains information general on all ALPs, while the individual ALP chapters contain specific hardware and software information applicable to the specific ALP. Generally the individual chapters provide the following information:

- Overview of the ALP
- Installing the ALP to the deck
- Any special hardware information on using the ALP in a method
- Framing instructions
- Specific information on using the ALP in a method
- Specific information on using the ALP outside a method
- Removing the ALP from the deck
- Storage
- Preventive maintenance

Since several ALPs and devices, such as a wash pump or fan, associated with ALPs require a Device Controller to operate, an appendix on the Device Controller is included.

Related Manuals

The following related manuals provide more in-depth information on the Biomek Software and Biomek Laboratory Automation Workstations as a supplement to this *ALPs (Automated Labware Positioners) Information For Use*:

- Biomek Software
- Biomek® FX and FX^P Laboratory Automation Workstations
- Biomek® NX and NX^P Laboratory Automation Workstations Multichannel Pod
- Biomek® NX and NX^P Laboratory Automation Workstations Span-8 Pod

ALPs Overview

Automated Labware Positioners (ALPs) are removable and interchangeable platform structures that are installed on the Biomek deck to allow automated assays to be performed.

ALPs are either:

- Passive ALPs — some hold labware in place on the deck while others act as receptacles for by-products from methods, such as system fluid and disposed tips, tip boxes, and labware.

  OR

- Active ALPs — contain mechanisms that may connect to power and/or air sources for mechanical operation, such as tip loading, tip washing, mixing/stirring, shaking, and precisely positioning labware.

  NOTE Addresses are manually set on some active ALPs to allow the instrument to identify the specific ALP being used. Address switches for ALPs use hexidecimal numbering, (refer to APPENDIX A, *Setting Address Switches*).

The sections in this chapter include:

- *Installing and Configuring ALPs*
- *About This Manual*

Installing and Configuring ALPs

Each ALP requires a specific procedure for installation and configuration. This procedure includes:

- Physically mounting the ALP to the deck or ALP base — Instructions for mounting each type of ALP on a deck position and for completing the appropriate electrical, air, waste, communications, and liquid connections are provided in the individual ALP chapters in this manual.

  NOTE The **Deck Editor** indicates through dashed, blue lines on which deck positions a specific ALP may be placed (refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck).

- Setting up the ALP in the Biomek Software for operation — After physically installing an ALP on the deck, some ALPs are detected on the Biomek instrument and must be properly installed and configured in **Hardware Setup** (refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck).

  NOTE Only Tip Loader, Stirring, Shaking, Positive Position, Orbital Shaker, and Magnetic Bead ALPs are detected on the Biomek instrument and must be installed in **Hardware Setup**. For some ALPs, devices such as pumps or fans are also installed in **Hardware Setup**. Any necessary specific configuration for these ALPs or devices is provided in the individual ALP chapters in this manual.

- Associating the ALP with a position — After configuring **Hardware Setup** for the new ALP, the software must be told where the ALP is located on the deck using the **Deck Editor** (refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck).

- Framing the ALP — Using the **Deck Editor**, the exact coordinates of the position of the ALP on the deck are set. Instructions for framing each type of ALP are provided in the individual ALP chapters in this manual.

  NOTE Refer to the manual of the specific Biomek instrument for general information on framing.

- Configuring an ALP within a method — Using the Biomek Software, ALPs are configured to complete required operations at specified times within a method. Any special instructions to configure ALPs within a method are provided in the individual ALP chapters in this manual.
- Controlling an ALP outside a method — Instructions for using **Manual Control** to control a specific ALP outside a method are provided in the individual ALP chapters in this manual.

NOTE Initial installation and configuration of ALPs is completed by a Beckman Coulter Service Engineer when the Biomek instrument is installed.

Installing an ALP in Hardware Setup

Hardware Setup tells the Biomek Software what ALPs, devices, pods, and heads are configured on the instrument by providing a connection between the software and the instrument. This information is established by installing, configuring and removing devices in **Hardware Setup**.

After physically installing an ALP on the deck, the ALP is detected on the Biomek instrument and must be properly installed and configured in **Hardware Setup**.

NOTE Only Tip Loader, Stirring, Shaking, Positive Position, Orbital Shaker, and Magnetic Bead ALPs and some devices, such as pumps and fans, must be installed in **Hardware Setup**.

Most ALPs require only installation in **Hardware Setup**; however, some ALPs, such as the Magnetic Bead ALP, require some configuration. The configurations required for specific ALPs are provided in the individual ALP chapters in this manual.

Installing an ALP in Hardware Setup may be accomplished in the following two ways:

1. In **Hardware Setup**, right-click **Devices** or any device under **Devices** and choose **Add Device**.

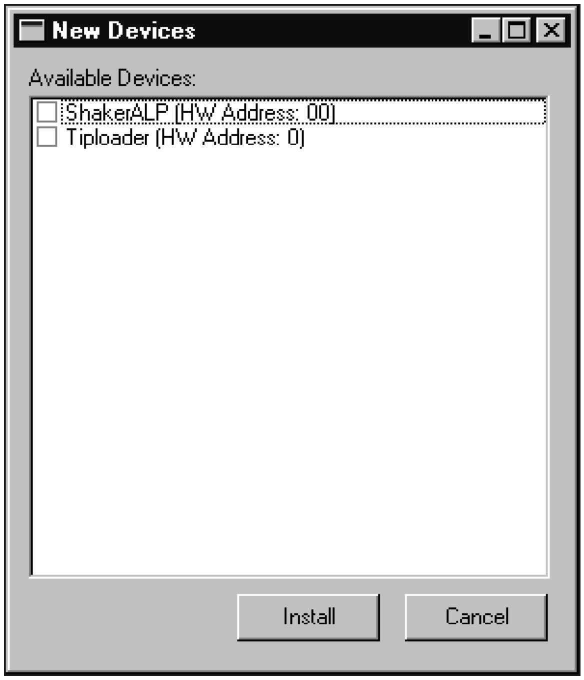
   NOTE The devices detected, but not already installed, are available to add.

2. Select the desired ALP. The **ALP** is added to the installed devices under **Devices** in the left pane.

OR

1. Choose **Add Device** from the top of **Hardware Setup. New Devices** appears (Figure 1.1).

Figure 1.1 New Devices Displaying all Detected Devices



NOTE All the devices detected, but not already installed, are available to add in **New Devices**. Right-click on an available device and choose **Select All** to select all of the available devices or **Clear Selection** to disregard the selection.

2 Select the desired detected device or devices and choose **Install**. The device is added to the installed devices under **Devices** in the left pane.

NOTE An asterisk next to a device indicates the device has been modified since the workspace was loaded.

A blue question mark before the installed device indicates the device has not been fully configured.

A red X before the installed device indicates the device is not detected. Make sure the device is properly connected to a CAN port.

NOTE For more information about **Hardware Setup**, refer to the specific user's manual for the instrument.

CHAPTER 2

8-Channel Active Wash ALP

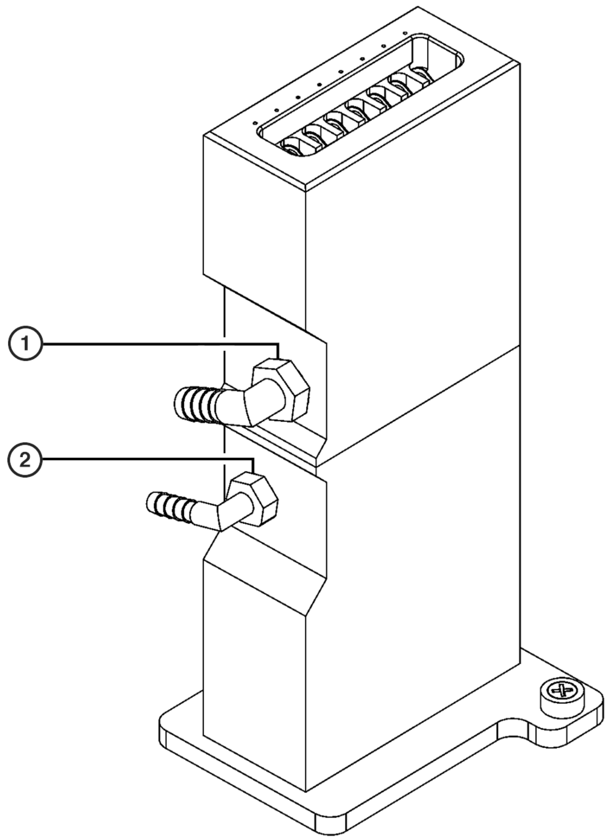
Overview

The 8-Channel Active Wash ALP is an active ALP that washes fixed or disposable tips on the probes of a Span-8 Pod. The ALP provides a flow of wash fluid from a source reservoir for tip washing. A peristaltic pump circulates the fluid through the 8-Channel Active Wash ALP from a source reservoir to a waste reservoir.

Information in this chapter includes the following:

- *Mounting the 8-Channel Active Wash ALP*
- *Framing Instructions*
- *Using an 8-Channel Active Wash ALP in a Method*
- *Removing the 8-Channel Active Wash ALP*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 2.1 8-Channel Active Wash ALP



1. **Waste Port**
2. **Source Port**

Mounting the 8-Channel Active Wash ALP

When mounted on the Biomek deck, the 8-Channel Active Wash ALP occupies 1/2 of a standard deck position. The 8-Channel Active Wash ALP can also occupy the remaining 1/2 ALP position that occurs when a Test Tube Rack ALP (refer to CHAPTER 26, *Test Tube Rack ALPs*) or Half-Position Disposal ALP (refer to CHAPTER 8, *Half-Position Disposal ALP (NX-S8 only)*) is installed on the Biomek deck.

Installing the 8-Channel Active Wash ALP and configuring it in Biomek Software includes:

- *Installing the 8-Channel Active Wash ALP on the Deck*
- *Routing Tubing for the 8-Channel Active Wash ALP*
- *Adding a WashPump in Hardware Setup*
- *Adding and Configuring the 8-Channel Active Wash ALP in the Deck Editor*

Installing the 8-Channel Active Wash ALP on the Deck

To mount an 8-Channel Active Wash ALP to the deck:

1. Position the 8-Channel Active Wash ALP so the locating pin on the bottom of the ALP slips into a locating hole on the deck. Make sure the Source and Waste ports are pointing towards the back of the instrument for easier tube routing.

2. Fasten the ALP to the deck using the Phillips mounting screw located on the base of the ALP (Figure 2.1).

Routing Tubing for the 8-Channel Active Wash ALP

CAUTION

Do not kink the drainage or supply hose.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION

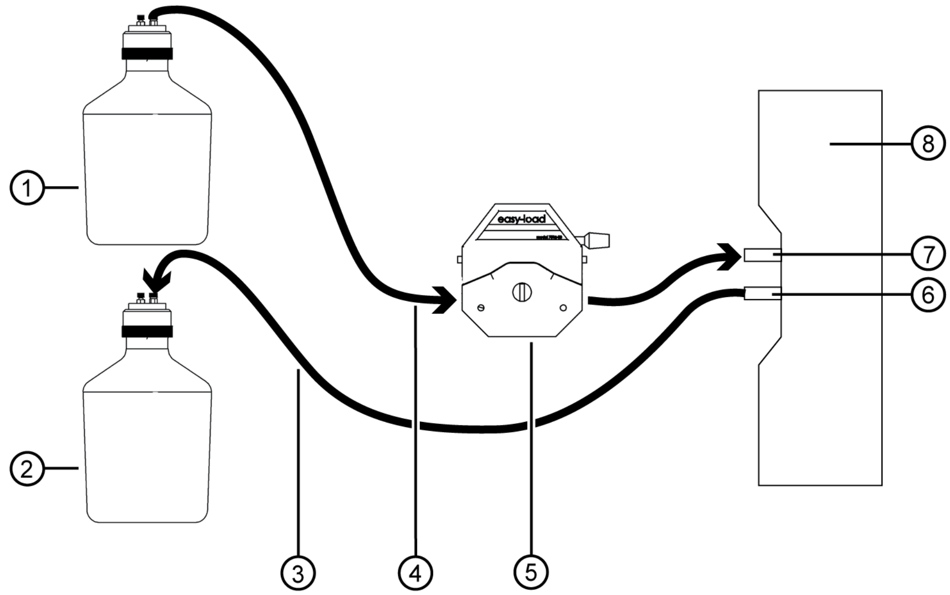
SPILL HAZARD.

CAUTION

Make sure the end of the tubing going into the waste container is no more than 6 inches from the top of the container. If the end of tubing is near the bottom, excessive pressure may cause liquid to overflow onto the deck.

Tubing must be routed properly to circulate system fluid from the source container through the syringes, tubing, and probes on the Span-8 Pod into the 8-Channel Active Wash ALP and to the waste container. The system fluid container for the Span-8 Pod or a separate container may be used as the source container.

Figure 2.2 Tube Routing for 8-Channel Active Wash ALP



1. Source Container
2. Waste Container
3. Waste Tubing
4. Source Tubing
5. Pump Head
6. Waste Port
7. Source Port
8. 8-Channel Active Wash ALP

Opaque PharMed® tubing is routed from the source container through the pump to the ALP. A clear Tygon® tubing is routed from the ALP to the waste container.

To route the tubing to the peristaltic pump and 8-Channel Active Wash ALP:

---

1 Position the peristaltic pump at an off-deck location near the ALP.

NOTE The peristaltic pump must be connected to a Device Controller (refer to APPENDIX A, *Device Controller*).

---

2 Unlock the pump head by rotating the locking lever counterclockwise (from the front of the pump).

---

3 Ensure that the supply container contains the desired system (cleaning) fluid.

---

4 Attach the source tubing to the source port on the ALP.

5 Route the source tubing off the deck by passing it through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the Biomek instrument.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

6 Route the source tubing through the pump head from right to left (facing the front of the pump).

7 Cut the source tubing to the desired length.

8 Route the source tubing from the pump head to the system fluid or source container.

9 Lock the pump head by rotating the locking lever clockwise (from the front of the pump).

10 Place the waste container under the lab bench or in an accessible space lower than the instrument deck height.

11 Attach the drainage tube to the waste port on the ALP (Figure 2.1).

12 Run the opposite end of the drainage tube to the waste container by passing the tube through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the instrument.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

13 Cut the drainage tube to the appropriate length to ensure there is no excess that could cause a 'rise' or 'bump' in the drainage tubes route from the ALP to the waste container and place it in the waste container ensuring the end of the tubing is no more than 6 inches from the top of the container.

NOTE Since the ALP is gravity drained, it is crucial that the drainage tube run down-hill without any rises between the ALP and the waste container.

Adding a WashPump in Hardware Setup

The 8-Channel Active Wash ALP uses a peristaltic pump to wash tips. This pump must be added in **Hardware Setup** as a digital device and configured with the appropriate Device Controller.

To add a **WashPump** in **Hardware Setup**:

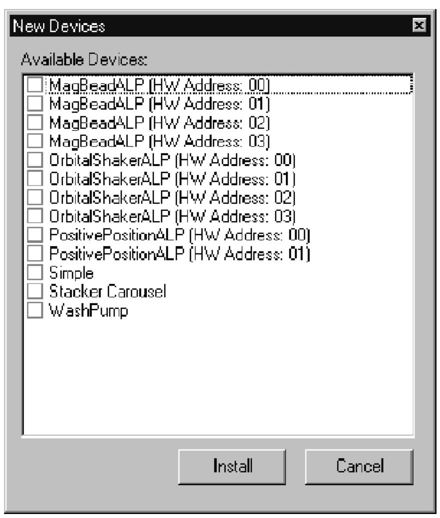
1. From Biomek Software, choose **Instrument >** Hardware Setup. **Hardware Setup** appears.

2. In **Hardware Setup**, right-click **Digital Devices** or any device under **Digital Devices** and choose **Add Device**, then select WashPump.

   OR

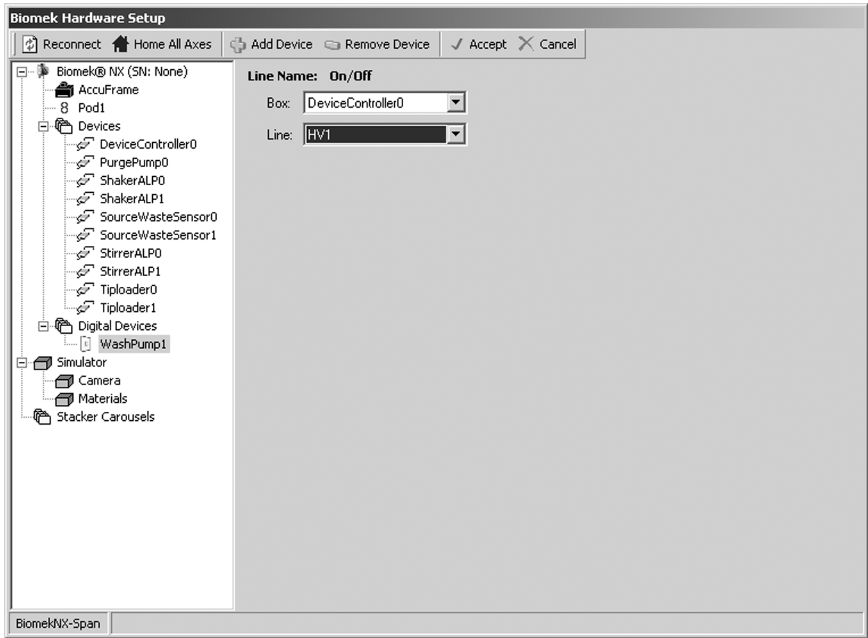
   Choose **Add Device** from the top of **Hardware Setup**. **New Devices** appears (Figure 2.3). Select **WashPump** and choose **Install.** The **WashPump** is added to the installed digital devices under **Digital Devices** in the left pane.

   Figure 2.3 New Devices Displaying All Detected Devices

3. Select the **WashPump** under **Digital Devices** to configure it. The configuration screen for the **WashPump** appears to the right in **Hardware Setup** (Figure 2.4).

Figure 2.4 WashPump Configuration in Hardware Setup



4 In **Box**, select the Device Controller to which the **WashPump** is connected.

5 In **Line**, select to which high voltage (**HV**) port on the selected Device Controller the **WashPump** is connected.

6 Choose **Accept** to save the changes and close **Hardware Setup**.

Adding and Configuring the 8-Channel Active Wash ALP in the Deck Editor

After adding and configuring the **WashPump** in **Hardware Setup**, the 8-Channel Active Wash ALP must be added to the deck in the **Deck Editor** and the **WashPump** associated as a device with the position.

To add and configure the 8-Channel Active Wash ALP in the **Deck Editor**:

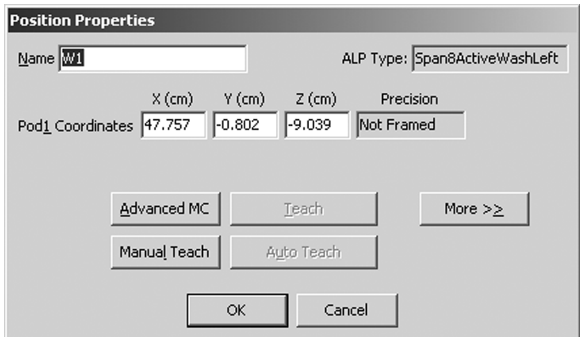
1 In Biomek Software, choose **Instrument >** Deck Editor. **Deck Editor** appears.

2 From the ALPs Type List, select either the **Span8ActiveWashRight** or **Span8ActiveWashLeft**.

3 Drag the selected ALP to the desired available deck position to add the ALP to the deck.

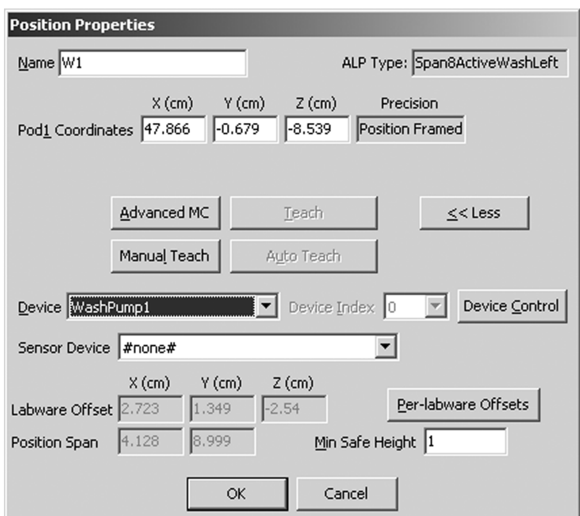
4 Double-click the ALP to open **Position Properties** (Figure 2.5).

Figure 2.5 Position Properties for 8-Channel Active Wash ALP



5 Choose **More** to display additional configuration options for the ALP (Figure 2.6).

Figure 2.6 Expanded Position Properties for the 8-Channel Active Wash ALP



6 In **Device**, select the **WashPump** that is connected to the ALP.

7 If a Source/Waste Sensor is configured for the source and/or waste containers, select the **Sensor Device.**

NOTE Refer to APPENDIX B, *Source/Waste Sensor*, for more information on the Source/Waste Sensor.

8 Choose **OK** to save changes and close **Position Properties**.

9 Choose **Save** to save changes and close **Deck Editor**.

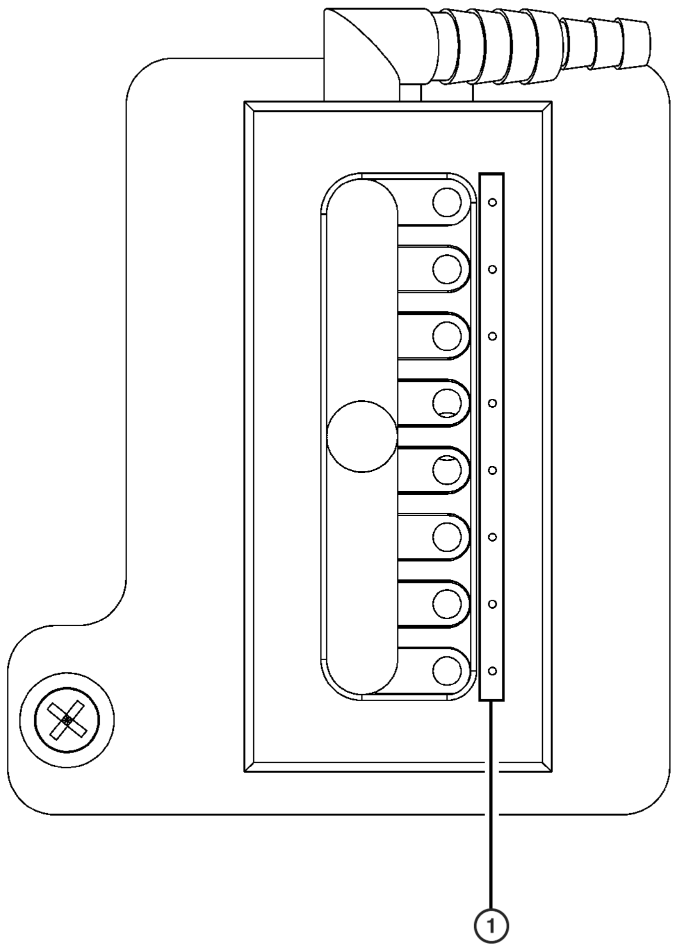
Framing Instructions

The 8-Channel Active Wash ALP must be manually framed to ensure that the tips and probes on the Span-8 Pod access the cleaning wells of the ALP without causing any damage to the tips, probes, pod, or ALP. Since the cleaning wells of the ALP are relatively small, it is crucial that the tips on the probes be framed as accurately as possible.

The 8-Channel Active Wash ALP is framed using **Biomek® NX Manual Framing Wizard**, which is accessed through **Position Properties** in the **Deck Editor**. This process involves:

- **FX** — The 8-Channel Active Wash ALP on a Biomek FX instrument is framed using the **Biomek® FX Manual Framing Wizard.** The instructions are the same.
- loading disposable tips to the probes, if necessary.
- aligning disposable or fixed tips with the framing targets on the 8-Channel Active Wash ALP (Figure 2.7).

Figure 2.7 Framing Targets on 8-Channel Active Wash ALP (Top View)



1. **Framing Targets** — align the tips to these small white dots on the ALP.

To frame using **Biomek® NX Manual Framing Wizard**:

- **FX** — The 8-Channel Active Wash ALP on a Biomek FX instrument is framed using the **Biomek® FX Manual Framing Wizard**. The instructions are the same.

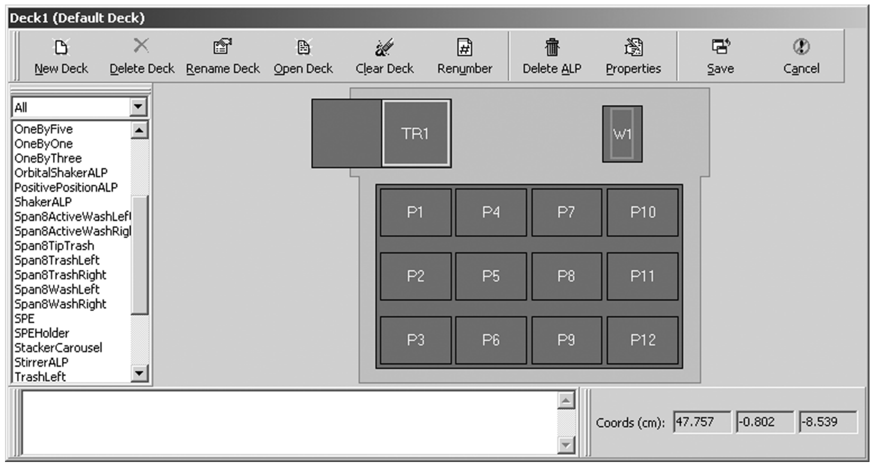
---

1 Choose **Start** > **Programs** > **Beckman Coulter** > **Biomek Software** to open Biomek Software.

---

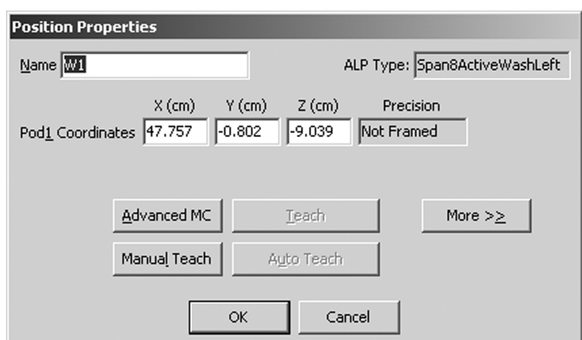
2 From the **Instrument** menu, choose **Deck Editor**. **Deck Editor** appears (Figure 2.8).

Figure 2.8 Deck Editor



3 Open **Position Properties** for the 8-Channel Active Wash ALP by double-clicking on the deck position. **Position Properties** appears (Figure 2.9).

Figure 2.9 Position Properties for an 8-Channel Active Wash ALP

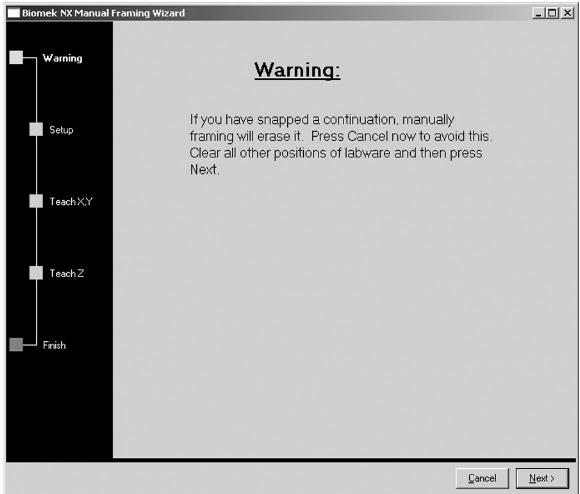


4 In **Name**, verify that the ALP is assigned a unique name.

5 Choose **Manual Teach. Biomek® NX Manual Framing Wizard** opens with a **Warning** (Figure 2.10).

NOTE On the left side of **Manual Framing Wizard**, a list of steps required to complete the teaching process is displayed. As the steps of **Manual Framing Wizard** are accessed, the steps are highlighted on the left.

Figure 2.10 Manual Framing Wizard — Warning



6 Choose **Next. Biomek® NX Manual Framing Wizard** — **Setup** displays either Figure 2.11 or Figure 2.12, depending on whether or not tips are already loaded onto the pod.

Figure 2.11 Manual Framing Wizard if Tips Are Not Already Loaded

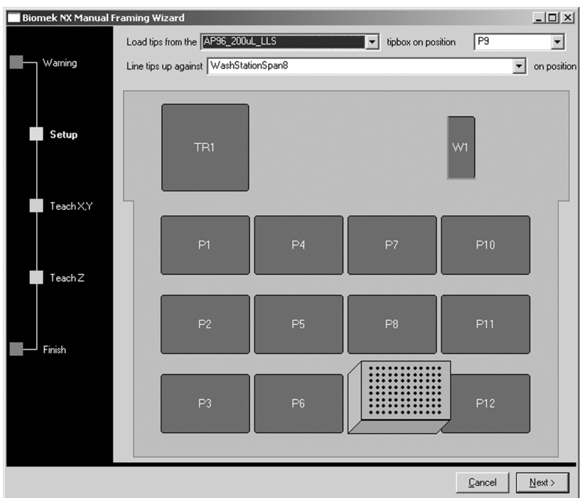


Figure 2.12 Manual Framing Wizard if Tips Are Loaded

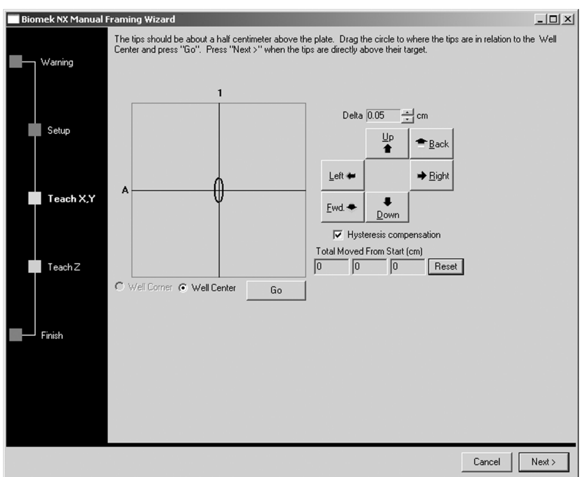
---

7 If no tips are loaded, in **Load tips from the**, select the type of tips to load and the **position** on which the tip box is located (Figure 2.11).

---

8 Choose **Next** to continue to the next screen. **Biomek NX Manual Framing Wizard — Teach X,Y** appears (Figure 2.13).

Figure 2.13 Manual Framing Wizard — Teach X, Y



---

9 To align the tips in the X- and Y-axes with the framing target on top of the ALP, lower the tips in the Z-axis until they are approximately 1 mm above the top of the ALP.

NOTE Since tip height is set in the next step in the **Manual Teaching** process, it is safe to move the pod to any height to make aligning the tips with the microplate easier.

---

10 Visually verify the physical position of the tips in relation to the framing targets on top of the ALP.

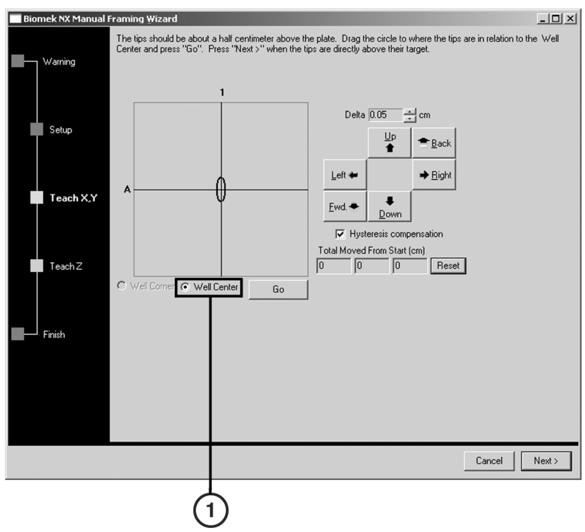
11 Adjust the position of the tip to align it with the framing target by either:

- *Using the Graphic Alignment Tool*
- *Using the Delta Value and Directional Buttons*

Using the Graphic Alignment Tool

The graphic alignment tool (Figure 2.14) is used to instruct Biomek Software of the current position of the tips in relation to the framing target on top of the ALP. Biomek Software uses the information it is given to move the pod so the tips are directly above the target position.

Figure 2.14 Manual Teaching the X- and Y-Axes



1. **Graphic Alignment Tool** — The graphic alignment tool is a visual representation of the tip (small circle) and the framing target on the top of the ALP. The small circle is moved until it represents the tip's current physical location in relation to the framing target on the top of the ALP.

To use the graphic alignment tool:

1 Drag the small circle until it represents the tip's physical position in relation to the framing target on top of the ALP, represented by the intersection of the two lines in the graphical display.

NOTE The small circle represents the tip on the pod. The objective is to provide the software with a representation of the tip's position in relation to the framing target on top of the ALP. The software uses this graphical representation to know approximately how far in any direction the pod must move to align the tips with the framing target on top of the ALP.

2 Select **Go**. The pod moves in accordance with the position of the small circle in relation to the intersection of the two lines.

NOTE When the move is completed, the small circle resets itself to the center of the graphical display. The values displayed in **Total Moved from Start (cm)** changes each time steps 1 and 2 are completed. If desired, the values in **Total Moved from Start (cm)** can be reset to zero by selecting **Reset**.

3 Visually verify the position of the tips on the pod in relation to the framing target on top of the ALP. If the tips are still not accurately positioned above the framing target, repeat steps 1 and 2 until they are accurately positioned above the framing target.

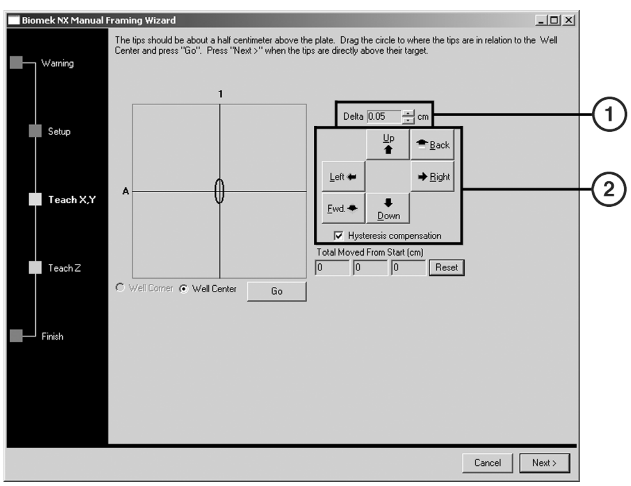
NOTE The tips may also be aligned with the framing target using the delta value and directional buttons (refer to *Using the Delta Value and Directional Buttons*).

4 Once the tip is aligned with the framing target on top of the ALP, choose **Next** to continue. **Biomek® NX Manual Framing Wizard** displays **Teach Z** (refer to *Framing the Z-Axis*).

Using the Delta Value and Directional Buttons

The tip can be positioned manually using the delta values and directional buttons to align it with the framing target on top of the ALP. Pressing one of the directional buttons moves the pod in that direction by the distance specified in **Delta**. Position the tips above the framing target on top of the ALP.

Figure 2.15 Manual Teaching the X- and Y-Axes



1. **Delta Value** — the magnitude of change applied to the tips each time a directional button is selected.
2. **Directional Buttons** — the directional buttons move the head assembly by the amount shown in **Delta** with each press of a button.

To use the delta value and directional buttons to position the tip:

1 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 2.15).

NOTE The default **Delta** value is 0.05 cm. If the tips are a considerable distance from the desired location, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the **Delta** value to fine tune the position (minimum setting is 0.005 cm).

2 Select the **directional button** representing the motion required to physically move the tips into position over the framing target on top of the ALP (Figure 2.15).

NOTE Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

NOTE The tips can be physically positioned over the framing target using:

- the directional buttons in **Manual Teach.**
- the directional keys on the keyboard.
- the directional keys on the numeric keypad.

The directional buttons displayed in **Manual Teach** parallel the keys on the numeric keypad. More specifically, **Fwd.** correlates to the '1' on the numeric keypad, while **Down** is found on the '2', **Left** is found on the '4', **Right** on '6', **Up** on '8', and **Back** on '9'.

3 Visually verify the position of the tips on the pod in relation to the framing target on top of the ALP. If the tips are still not accurately positioned above the framing target on top of the ALP, repeat steps 1 and 2 until they are accurately positioned above the framing target.

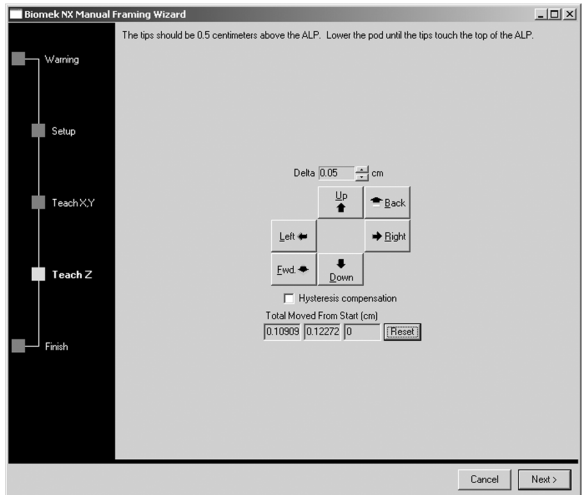
NOTE The tips may also be aligned with the framing target using the graphic alignment tool (refer to *Using the Graphic Alignment Tool*).

4 Once the tips are aligned with the framing target, choose **Next** to continue. **Biomek® NX Manual Framing Wizard** displays **Teach Z** (refer to *Framing the Z-Axis*).

Framing the Z-Axis

After the X- and Y-axes are framed, the Z-axis must be framed to ensure tips are washed at the desired height. The final screen in **Biomek® NX Manual Framing Wizard** is for framing the Z-axis (Figure 2.16).

Figure 2.16 Manual Teaching (Teach Z)



---

1 In **Delta**, select the magnitude of change applied to the pod each time a directional button is selected (Figure 2.16).

NOTE The default **Delta** value is 0.05 cm. If the tip is a considerable distance above the position, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tip is almost to the desired location, reduce the **Delta** value (minimum setting is 0.005 cm).

NOTE Since the X- and Y-axes were framed previously, it is safe to move the pod in the X- and Y-axes if it makes framing the pod in the Z- axis easier.

---

2 Select the **directional button** representing the motion required to physically move the pod down until the tip just touches the framing target on top of the ALP.

NOTE Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

NOTE The tip can be can physically positioned over the framing target on top of the ALP:

- the directional buttons in **Manual Teach.**
- the directional keys on the keyboard.
- the directional keys on the numeric keypad.

The directional buttons displayed in **Manual Teach** parallel the keys on the numeric keypad. More specifically, **Fwd.** correlates to the '1' on the numeric keypad, while **Down** is found on the '2', **Left** is found on the '4', **Right** on '6', **Up** on '8', and **Back** on '9'.

---

3 Once the tip is just touching the framing target, select **Finish**. The pod moves up to its maximum height in the Z-axis, **Manual Teaching** closes, and **Position Properties** appears (Figure 2.9).

---

4 Choose **OK** to save the framing information and close **Position Properties**.

5 If more than one 8-Channel Active Wash ALPs are installed on the deck, repeat the procedure to frame any additional 8-Channel Active Wash ALPs using **Manual Teach.**

6 Choose **Save** to save framing information for all positions and close the **Deck Editor** (Figure 2.8).

NOTE Choosing **Cancel** loses all changes to the deck, including framing information, since the **Deck Editor** was opened.

Using an 8-Channel Active Wash ALP in a Method

The 8-Channel Active Wash ALP is used automatically when the a **Transfer** or **Combine** step is configured to wash tips in the **Tip Handling** configuration, or a **Span-8 Wash Tips** step is inserted into the method. However, if multiple wash ALPs are installed on the deck, some extra steps are required to ensure the desired wash ALP is used for each wash operation.

Configuring Multiple 8-Channel Active Wash ALPs on an Instrument

The 8-Channel Active Wash ALPs are referred to as wash ALPs in the Biomek Software. To ensure that the correct wash ALP is used on an instrument with two or more wash ALPs, each wash ALP must be configured to use a unique liquid type.

To configure a unique liquid type for a wash ALP:

1 In the **Liquid Type Editor**, create a new liquid type or copy an existing liquid type for the wash ALP; for example, create a new liquid type called **WS1_Liquid**.

NOTE Each liquid type must have a unique name; for example, **WS1_Liquid** or **WS2_Liquid**.

NOTE Refer to the *Biomek Software User's Manual*, Chapter 9.2, *Creating New Liquid Types*, for more information on creating new liquid types, and Section 9.4, *Copying and Pasting Liquid Types Within a Project File*, for more information on copying liquid types.

2 In the **Instrument Setup** step, double-click the desired wash ALP. **Labware Properties** for the wash ALP appears (Figure 2.17).

Figure 2.17 Labware Properties for a Wash Station ALP

3 In **Liquid Type:**, select the unique liquid type created for that wash ALP; for example, **WS1_Liquid**.

4 Choose **OK** to save the change and close **Labware Properties**.

5 For each additional wash ALP, repeat steps 2 through 4, selecting the appropriate liquid type for each wash ALP.

NOTE Each wash ALP must use a unique liquid type.

6 In any steps where tips are washed, such as **Transfer** or **Combine**, select a specific wash ALP by selecting the appropriate liquid type in **Wash tips in**.

Removing the 8-Channel Active Wash ALP

WARNING

Always wear protective gloves when draining the 8-Channel Active Wash ALP of fluid.

WARNING

The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION

SPILL HAZARD.

To remove the 8-Channel Active Wash ALP:

1. Turn the waste and source ports on the 8-Channel Active Wash ALP up so that no fluid leaks from the ALP onto the deck.
2. Detach the drainage tube from the waste port on the ALP.
3. Raise the drainage tube until the fluid in the tube drains into the waste container.
4. Remove the tubing from the Biomek NX instrument deck and the waste container.
5. Detach the source tubing from the source port on the ALP.

6 Remove the source tubing from the deck carefully so no liquid remaining in the tubing spills onto the deck.

7 Unlock the pump head by rotating the locking lever counterclockwise (from the front of the pump).

8 Remove the source tubing from the pump head.

9 Drain any fluid remaining in the source tubing into an approved waste container or back into the source container.

10 Loosen the Phillips screws on the ALP base from the deck.

11 Remove the ALP from the deck by lifting until the locating pin clears the locating hole on the deck.

12 Carefully empty the ALP of fluids by turning it over and pouring the waste into an approved waste container.

WARNING

The cleaning wells and reservoir of the 8-Channel Active Wash ALP may contain hazardous chemicals and fluids. Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid.

Storage

Return the 8-Channel ActiveWash ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE Allow the 8-Channel Active Wash ALP to air-dry before returning it to the original packing materials.

Store the peristaltic pump and source and waste tubing according to the instructions from the manufacturer.

Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer. Observe the following guidelines:

- Periodically clean the 8-Channel Active Wash ALP by filling the supply container with a bleach solution and running it through the ALP.
- Check with tubing manufacturer for chemical compatibility information.
- Periodically inspect the tubing for wear and stress fractures.
- Periodically inspect the tubing connections for leakage.
- Replace tubing periodically, or as needed.

NOTE Refer to the pump and tubing manufacturer user manuals for their recommended maintenance procedures and intervals.

Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 2.1 Troubleshooting the 8-Channel Active Wash ALP

IF	THEN
The 8-Channel Active Wash ALP is not functioning correctly	Make sure that the hoses and cables are attached to the ALP properly.
The 8-Channel Active Wash ALP is not draining waste fluid	Look into the wells and reservoir and verify they are not clogged.

CHAPTER 3

Automated Tube Bar Code Reader (ATBCR)

Overview

The Automated Tube Bar Code Reader (ATBCR) (Figure 3.1) presents samples stored in sample containers to the deck so the Span-8 Pod can access the contents of the containers. A tilting mechanism allows sample racks with capped and sealed sample tubes to be tilted from 0° (tubes pointing straight up) to 150° (tubes pointing 60° below horizontal) to mix the contents of the sample containers. An internal bar code reader reads the bar codes of the sample racks and each sample container as the rack is loaded to the presentation point. The sample rack bar code identifies to the software the type of sample containers within the sample rack; the sample container bar codes identify the sample within each sample container.

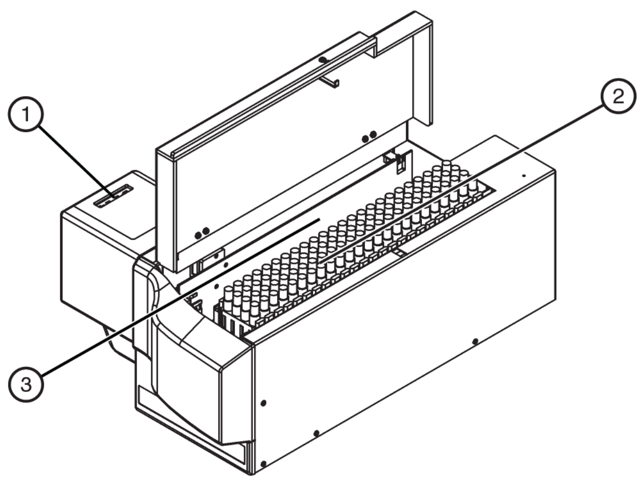
An external power source, connected to the back of the ATBCR and a properly grounded outlet, provides electrical power to the ATBCR. The on/off switch for the ATBCR is located on this external power source.

When the ATBCR is powered on, it must be homed before using it in a method (refer to *Homing the Automated Tube Bar Code Reader*).

The ATBCR is installed on the right side of the instrument and consists of two trays and a presentation point. New samples to be processed are loaded into the right tray, or input tray. The sample racks are then loaded to the presentation point where they are processed by the instrument. After they are processed, they are returned into the left tray, or output tray, and the next sample rack in the input tray is presented.

Sample racks are accessed in the order they are presented, and once they have been returned to the output tray cannot be accessed again in that method without manual intervention to move the rack(s) back to the input tray.

Figure 3.1 Automated Tube Bar Code Reader



1. **Presentation point**
2. **Input tray**
3. **Output tray**

⚠ CAUTION

Always operate the Automated Tube Bar Code Reader (ATBCR) with the lid closed and all covers in place.

When a sample rack is accessed during a method:

- the sample rack in the front of the input tray is moved to the presentation point.
- prior to presenting the rack, the sample rack may be optionally tilted.
- the internal ATBCR bar code reader reads the bar codes for the sample rack and each individual sample container as it is transported to the presentation point.
- the Span-8 Pod accesses the sample containers at the presentation point.
- the sample rack is moved to the front of the output tray and pushed back, pushing any sample racks already in the output tray back.

  NOTE Once a sample rack is placed into the output tray, it cannot be accessed again unless it is manually moved back into the input tray.

- the process is repeated for the next sample rack.

Deck Restrictions and Limitations

The Automated Tube Bar Code Reader (ATBCR) is installed on the right side of the Biomek instrument. When installed, there are some limitations and restrictions on ALPs that may be placed adjacent to the ATBCR in the far right column.

Deck Restrictions on the Biomek FX^P Workstation

When the ATBCR is installed on a Biomek FX^P Laboratory Automation Workstation, the following limitations pertain to the deck positions adjacent to the ATBCR:

- the 1x3 and 1x5 Passive ALPs may not be placed in the far right column.
- no ALP may be placed in the front row of the far right column.
- only the Span-8 Active and Span-8 Passive Wash ALPs may be placed in the second row, in the left half of the position.
- the 1x2 and 1x3 Tube Rack ALPs cannot be placed in the far right column.

Deck Restrictions on the Biomek NX^P Span-8 Workstation

When the ATBCR is installed on a Biomek NX^P Span-8 Laboratory Automation Workstation, the following limitations pertain to the deck positions adjacent to the ATBCR:

- the 4x3 High-Density ALP can only be placed in the back three rows.
- the Half Trash ALP may only be placed in one of the middle two rows.
- the Bar Code Reader ALP, Half Tip Trash ALP, and Span-8 Trash ALP cannot be placed in the front row of the far right column.

Framing the ATBCR

The Automated Tube Bar Code Reader (ATBCR), must be taught manually using the tips. **Manual Framing Wizard** is a wizard-type interface that is used to manually frame deck positions that cannot be framed automatically using the AccuFrame tool.

Manually framing the Automated Tube Bar Code Reader (ATBCR) using tips involves:

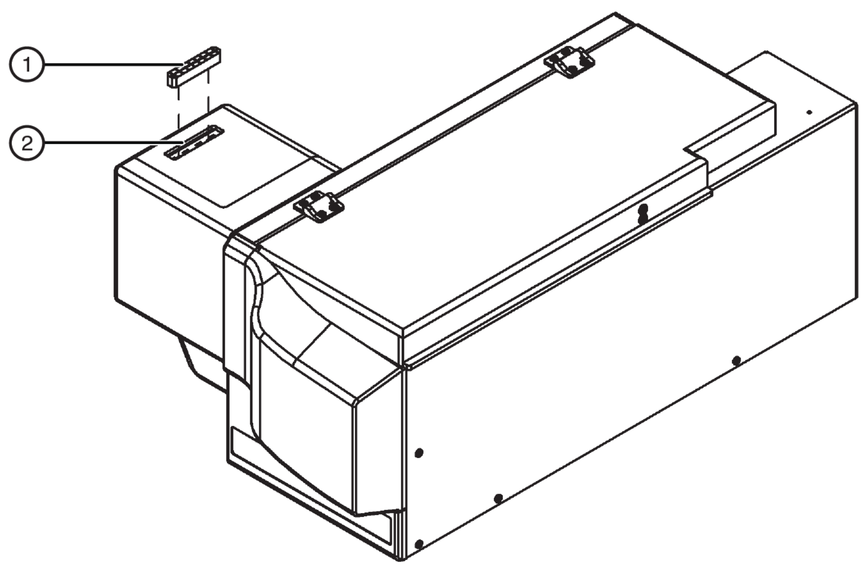
- placing the ATBCR Framing Block directly on the presentation point of the ATBCR.
- loading disposable tips to the probes, if necessary.
- aligning disposable tips or fixed tips with the targets on the ATBCR Framing Block.

To frame the ATBCR using Manual Teach:

---

1 Align the two pins on the bottom of the ATBCR Framing Block with the circular holes on the presentation point of the ATBCR device (Figure 3.2). Make sure the framing block is fully seated.

Figure 3.2 Placing the ATBCR Framing Block on the presentation point



1. ATBCR Framing Block
2. Presentation point

---

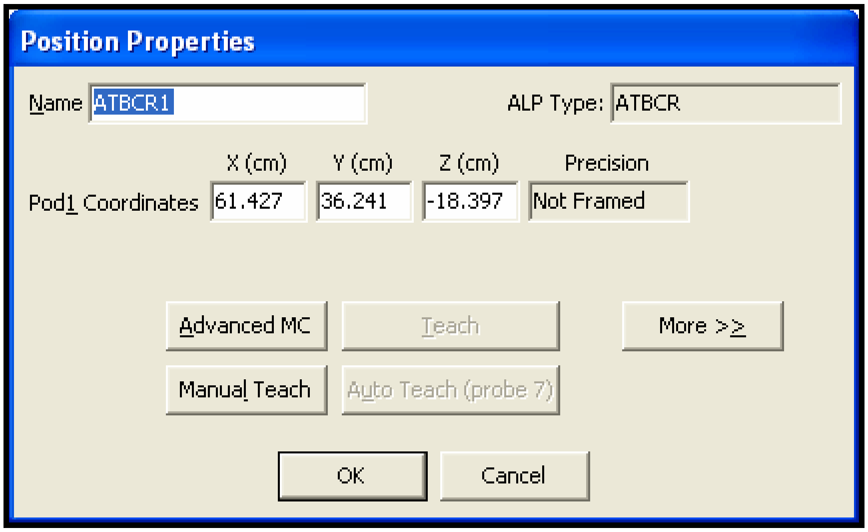
2 Choose **Instrument>Deck Editor** to access the **Deck Editor**.

---

3 Close the lid of the ATBCR.

4 Double-click on the **ATBCR1** position to open **Position Properties** (Figure 3.3).

Figure 3.3 Position Properties for ATBCR1 position on the ATBCR ALP

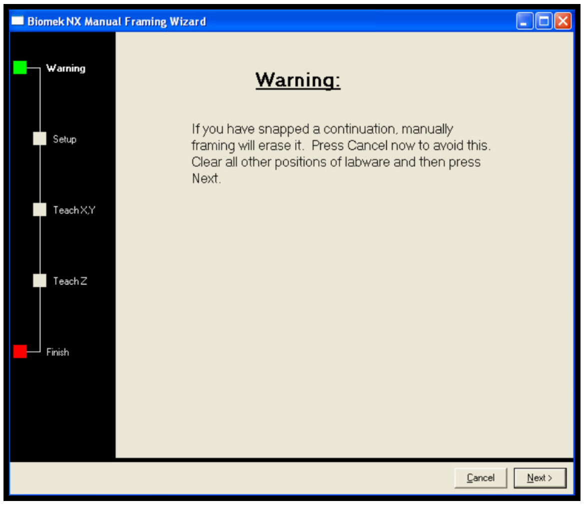


5 **FX^P only** — Select **Pod2** if using a dual pod instrument.

6 In **Position Properties**, choose **Manual Teach. Manual Framing Wizard** opens with a **Warning** (Figure 3.4).

NOTE On the left side of **Manual Framing Wizard**, a list of steps required to complete the teaching process is displayed. As the steps of **Manual Framing Wizard** are accessed, the steps are highlighted on the left.

Figure 3.4 Manual Framing Wizard — Warning



7 Choose **Next** and **Manual Framing Wizard — Setup** is displayed. When **Manual Framing Wizard — Setup** is displayed, either Figure 3.5 or Figure 3.6 appears, depending on whether or not tips are already loaded onto the pod.

Figure 3.5 Manual Framing Wizard — Setup if tips are already loaded

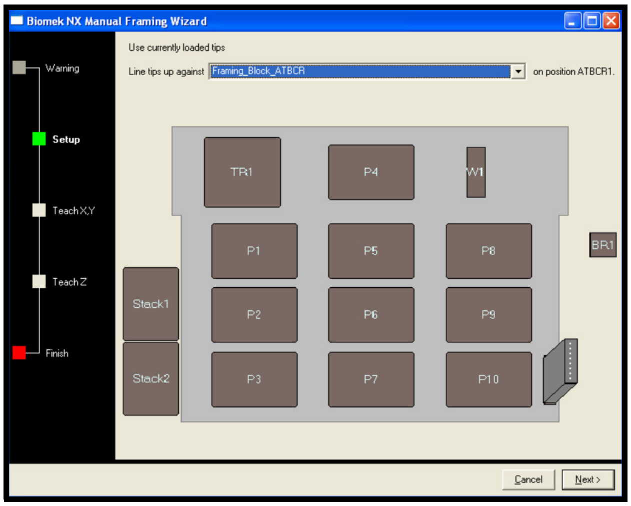
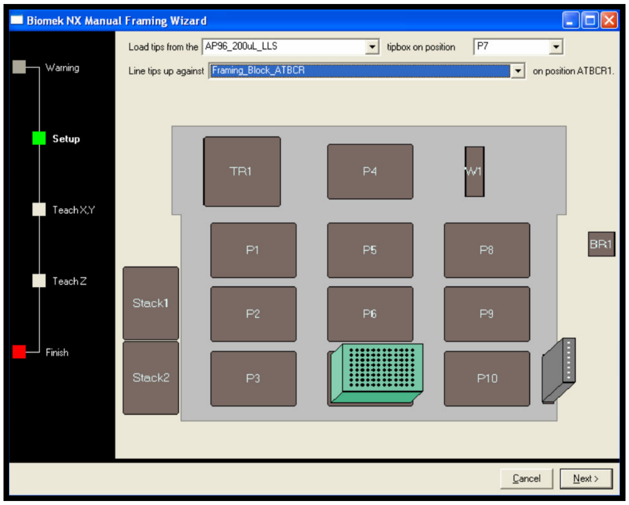


Figure 3.6 Manual Framing Wizard — Setup if tips are not already loaded.



8 If no tips are loaded, in **Load tips from the**, select the tip box type and select a position where tips can be loaded (Figure 3.6).

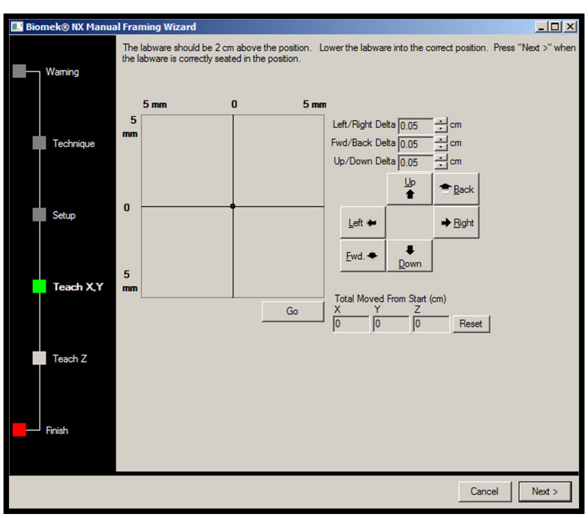
NOTE The tipbox position must be framed before framing the ATBCR1 position.

9 Physically place a tip box of the specified type in the location indicated in **position** on the Biomek workstation.

10 In **Line tips up against**, select **Framing_Block_ATBCR**.

11 Choose **Next** to continue to the next screen. **Manual Framing Wizard — Teach X,Y** appears (Figure 3.7).

Figure 3.7 Framing to the center of a well



12 To align the tips in the X- and Y-axes with the targets on top of the ATBCR Framing Block, lower the tips in the Z-axis until they are approximately 1 mm above the top of the ATBCR Framing Block.

NOTE Since tip height is set in the next step in the Manual Teaching process, it is safe to move the pod to any height to make aligning the tips with the targets easier.

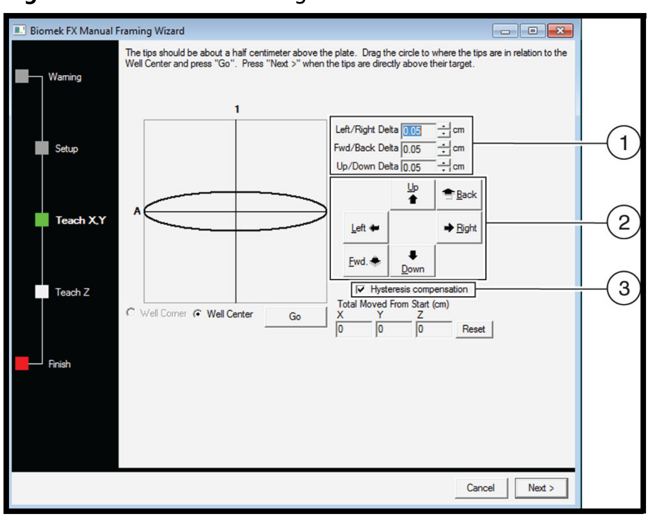
13 Visually verify the physical position of the tips in relation to the framing dots on the ATBCR Framing Block.

14 Adjust the position of the tip to align it with the framing dots by *Using the Delta Value and Directional Buttons*.

Using the Delta Value and Directional Buttons

The tip can be positioned manually using the delta values and directional buttons to align it with the physical position of the targets on top of the ATBCR Framing Block. Pressing one of the directional buttons moves the pod in that direction by the distance specified in **Delta.** Position the tips above the targets on top of the ATBCR Framing Block.

Figure 3.8 Manual Teaching the X- and Y-axes



1. **Delta Value** — The magnitude of change applied to the tips each time a directional button is selected.
2. **Directional buttons** — The directional buttons move the pod by the amount shown in Delta with each press of a button.
3. **Hysteresis compensation** — compensates for physical hysteresis in the mechanical movement of the system.

To use the delta value and directional buttons to position the tip:

1 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 3.8).

NOTE The default **Delta** value is 0.05 cm. If the tips are a considerable distance from the desired location, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the **Delta** value to fine tune the position (minimum setting is 0.005 cm).

2 Leave the **Hysteresis compensation** checkbox selected. This compensates for physical hysteresis in the mechanical movement of the system by moving the pod a set distance away and then back again in the X-, Y-, and Z-axes. This movement is always done the same way and in the same direction, so that hysteresis does not affect the accuracy of framing.

3 Select the directional button representing the motion required to physically move the tips into position over the targets on top of the ATBCR Framing Block (Figure 3.8). Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

NOTE The tips can be physically positioned over the targets using:

- the directional buttons in Manual Teach.
- the directional keys on the keyboard.
- the directional keys on the numeric keypad.

The directional buttons displayed in Manual Teach parallel the keys on the numeric keypad. More specifically, Fwd correlates to the ‘1’ on the numeric keypad, while Down is found on the ‘2’, Left is found on the ‘4’, Right on ‘6’, Up on ‘8’, and Back on ‘9’.

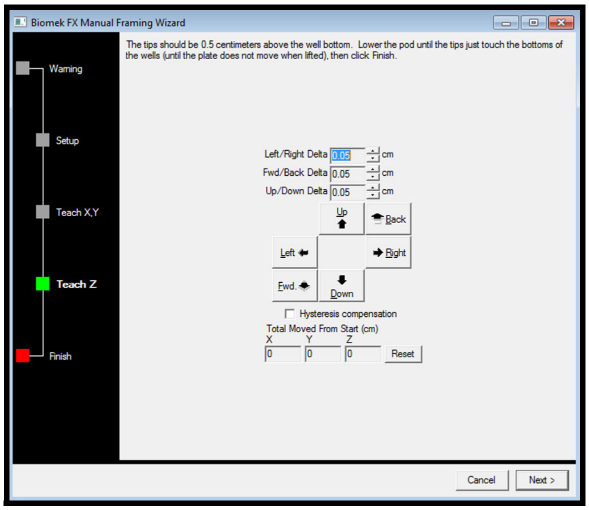
4 Visually verify the position of the tips on the pod in relation to the physical position of the targets on top of the ATBCR Framing Block. If the tips are still not accurately positioned above the targets, repeat step 3 until they are accurately positioned above the target position.

5 Once the tips are aligned with the target position, choose **Next** to continue. **Manual Framing Wizard** displays **Teach Z** (refer to *Framing the Z-Axis*).

Framing the Z-Axis

After the X- and Y-axes are framed, the Z-axis must be framed to ensure aspirate and dispense operations are performed at the desired height. The final screen in **Manual Framing Wizard** is for framing the Z-axis (Figure 3.9).

Figure 3.9 Manual Teaching (Teach Z)



To frame the Z-axis:

1 In **Delta**, select the magnitude of change applied to the pod each time a directional button is selected (Figure 3.9).

NOTE The default **Delta** value is 0.05 cm. If the tip is a considerable distance above the position, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tip is almost to the desired location, reduce the **Delta** value (minimum setting is 0.005 cm).

2 Select the directional button representing the motion required to physically move the pod down until the tip just touches the targets on top of the ATBCR Framing Block. Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

NOTE The tips can be physically positioned over the targets using:

- the directional buttons in Manual Teach.
- the directional keys on the keyboard.
- the directional keys on the numeric keypad.

The directional buttons displayed in Manual Teach parallel the keys on the numeric keypad. More specifically, **Fwd** correlates to the ‘1’ on the numeric keypad, while **Down** is found on the ‘2’, **Left** is found on the ‘4’, **Right** on ‘6’, **Up** on ‘8’, and **Back** on ‘9’.

3 Once the tip is just touching the target position, select **Next**. The pod moves up to its maximum height in the Z-axis, **Manual Teaching** closes, and **Position Properties** appears.

4 Choose **OK** to save the framing information and close **Position Properties**.

5 In **Deck Editor**, choose **Save** to save the deck information, including the framed coordinates for all positions.

NOTE Choosing Cancel closes the Deck Editor without saving changes to the deck, including framing information.

Preparing Samples for Use with the Automated Tube Bar Code Reader

Sample containers are loaded onto the Automated Tube Bar Code Reader (ATBCR) in sample racks. Each sample rack holds up to four sample containers in the available rack positions. Sample containers may be sealed or capped when using piercing tips with the Span-8 Pod. The input tray of the ATBCR holds up to 24 sample racks, or enough to process 96 samples in a single run.

Preparing the samples for use on the Automated Tube Bar Code Reader includes:

- *Preparing Sample Containers for Use with the ATBCR*
- *Preparing Sample Racks for Use with the ATBCR*
- *Attaching Bar Code Labels*

Preparing Sample Containers for Use with the ATBCR

To access samples using the Automated Tube Bar Code Reader, the sample must be placed in appropriate sample containers and loaded into sample racks. Not all sample containers are supported for use with the ATBCR, and some may have limited access with specific types of tips. In addition, sufficient volume of samples needs to be supplied in the sample containers for the Span-8 Pod to be able to aspirate the desired volume from the sample containers.

Preparing samples in sample containers includes:

- *Supported Sample Containers*
- *Tip Compatibility with Sample Containers*
- *Using Insert Cups with Sample Tubes*
- *Using Sealed or Capped Sample Containers*
- *Calculating Minimum Sample Volume*

Supported Sample Containers

WARNING

Only use the recommended containers in the Automated Tube Bar Code Reader. Sample containers not listed may damage the ATBCR or cause pipetting errors.

The following table lists the sample containers that are accepted on the ATBCR, along with their dead volume requirements.

NOTE Dead volume is the volume of sample at the bottom of the container or along the sides that cannot be aspirated by the Span-8 Pod. The total volume must exceed the dead volume to properly aspirate the desired volume.

Table 3.1 Sample Container Dead Volume Requirements

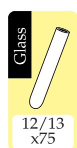
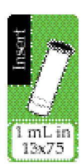
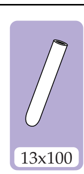
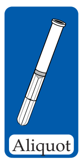
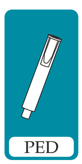
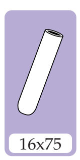
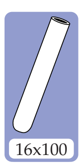
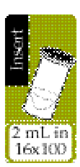
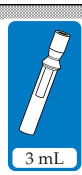
Container Type Label	Sample Container Information	Dead Volume
	12 or 13x75 mm glass tube	500 µL
	12 or 13x75 mm plastic tube	200 µL
	1 mL insert cup in a 13x75 tube	350 µL
	2 mL cup	150 µL
	13x100 mm tube	500 µL

Table 3.1 Sample Container Dead Volume Requirements

Container Type Label	Sample Container Information	Dead Volume
	1 mL insert cup in a 13x100 mm tube	400 µL
	Autoaliquot tube	150 µL
	Pediatric insert cup in a rack adapter	150 µL
	16x75 mm tube	800 µL
	16x100 mm tube	800 µL
	2 mL insert cup in a 16x100 mm tube	200 µL
	3 mL cup in a 16x100 mm rack	150 µL

Tip Compatibility with Sample Containers

The Span-8 Pod is capable of accessing all types of sample containers supported by the Automated Tube Bar Code Reader (ATBCR); however, specific types of tips are recommended to access specific types of sample containers. Table 3.2 shows the tips supported by the Span-8 Pod and their accessibility to the different types of sample containers supported by the ATBCR.

- Tip and container combinations marked YES means that the tip is capable of pipetting at the bottom of the container.
- Tip and container combinations marked NO means that either the tip cannot physically fit inside the container or it is not capable of pipetting at the bottom of the container.

NOTE This table is provided as a general reference and does not cover all commercially available sample containers. Sample containers not listed in the table should be tested at reduced speed to verify the tip can access the bottom of the sample container prior to using them at full speed in a method. It is the user's responsibility to verify that the sample container functions properly with the selected tip type.

CAUTION

Do not use sample container and tip combinations labeled NO. Tips could become wedged inside sample containers.

Table 3.2 Sample Container and Tip Compatibility on the ATBCR

Labware	Tip Type					
	Fixed 60	Fixed 100	P20	P250	P1000	Septa Fluted
ATBCR_Tubes12x75_Rack13x75	NO	YES	YES	YES	YES	YES
ATBCR_Tubes13x75_Rack13x75	NO	YES	YES	YES	YES	YES
ATBCR_Tubes13x100_Rack13x100	NO	YES	NO	YES	YES	YES
ATBCR_Cup_2mL_Rack13x100	YES	YES	YES	YES	YES	YES
ATBCR_Tubes16x75_Rack16x75	NO	YES	YES	YES	YES	YES
ATBCR_Cup_1mL_Tube_13x100_Rack13x100	YES	YES	YES	YES	YES	YES
ATBCR_Container_3mL_Rack16x100	YES	YES	YES	YES	YES	YES
ATBCR_Cup_2mL_Tube_16x100_Rack16x100	YES	YES	YES	YES	YES	YES
ATBCR_PediatricCup_PediatricTube_Rack13x100	YES	YES	YES	YES	YES	YES
ATBCR_Cup_1mL_Tube_13x75_Rack13x75	YES	YES	YES	YES	YES	YES
ATBCR_AutoaliquotTubes_Rack13x100	YES	YES	YES	YES	YES	YES
ATBCR_Tubes16x100_Rack16x100	NO	YES	NO	YES	YES	YES

Using Insert Cups with Sample Tubes

An insert cup has a smaller dead volume than a sample tube, requiring a smaller total volume of sample to process. It may be necessary to place samples in an insert cup to meet the total sample volume required for testing.

NOTE All sample containers placed in a sample rack must be of the same type and must match the container type specified by the rack bar code (see Table 3.4).

WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

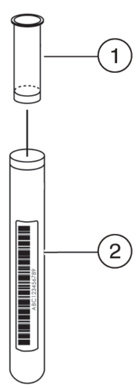
To prepare an insert cup for use with the ATBCR:

1 Transfer the required volume into an insert cup. To calculate the correct sample volume, (refer to *Calculating Minimum Sample Volume*).

NOTE Carefully pipette small sample volumes into the insert cup to prevent air bubbles from forming at the meniscus.

2 Place the insert cup into an appropriate sample tube (Figure 3.10).

Figure 3.10 Loading an insert cup



1. Insert cup
2. Sample tube

WARNING

Use only the container type specified by the container type label on the sample rack. A rack is configured to accept only one type of sample container. Placing an incorrect container type in a rack may damage the instrument or cause pipetting errors.

3 Place the sample tube into an appropriate sample rack. For more information, *Placing Sample Containers in Racks*.

Using Sealed or Capped Sample Containers

The Span-8 Pod on the Biomek FX^Por Biomek NX^P Laboratory Automation Workstations has the capability of piercing seals or septa using septa fluted fixed tips. When these tips are used, they can access sealed or capped sample containers located at the presentation point of the Automated Tube Bar Code Reader (ATBCR).

NOTE For more information about septa fluted tips, refer to the instrument manual:

- **FX^P**—Refer to the *Biomek FX and* FX^P *Laboratory Automation Workstations User's Manual*, *Interchangeable Tips*.
- **NX^P**—Refer to the *Biomek NX and* NX^P *Laboratory Automation Workstations Span-8 Pod User's Manual*, *Interchangeable Tips*.

Using sealed or capped tubes with the ATBCR requires:

- Septa Fluted fixed tips installed on probes 5-8 of the Span-8 Pod and configured in **Hardware Setup**.
- Sealed tubes or vials with caps, lids, or seals that can be pierced and stay in place when pierced.
- Sample containers that fit snugly in the sample racks so that they stay in place when tilted.

  NOTE Test sample containers to ensure proper operation with the ATBCR prior to using samples in a method. Use empty sample containers to verify that containers do not fall out during tilting and that seals can be properly pierced by the tips on the Span-8 Pod at the presentation point.

- Pipetting techniques and templates that are configured properly for accessing labware that must be pierced (refer to *Configuring Pipetting Templates and Techniques to Access Sealed Containers*). The speed for piercing labware should be no higher than 25%, and is recommended to be set at 15%.

  NOTE Test pipetting templates and techniques to ensure that the probes can pierce the seals, caps, or lids. Thicker seals require probes move at a slower speed.

- If necessary, the labware type for labware that requires piercing should have the **Requires Piercing Tips** option selected in the **Labware Type Editor**. **Requires Piercing Tips** can be found on the **Miscellaneous** page of the **Labware Type Editor** under the **Project** tab (refer to *Configuring Sample Racks for Septum Piercing*).

Calculating Minimum Sample Volume

The sample volume in a container must be sufficient to process the extraction. The minimum sample volume required is the sample volume required plus the dead volume for the sample container.

NOTE Dead volume is the volume of sample at the bottom of the container or along the sides that cannot be aspirated by the Span-8 Pod. The total volume must exceed the dead volume to properly aspirate the desired volume.

For example, an assay requires a sample volume of 200 µL. The minimum sample volume required to run this assay using a 2 mL cup is the sample volume (200 µL) plus the dead volume for a 2 mL cup (150 µL from Table 3.1), for a minimum sample volume of 350 µL.

Preparing Sample Racks for Use with the ATBCR

⚠ **CAUTION**

A sample rack is configured to accept only one type of sample container. Do not mix container types within a rack.

Sample racks are available in four different sizes and can be used with any of 12 different sample container types. A bar code label placed on each rack identifies the type of containers stored within the rack to the instrument.

Sample racks also come in a variety of colors to differentiate rack sizes and container types.

The following table lists the different sizes of sample racks, and the accepted container types for each rack size. For more information about sample containers, refer to *Preparing Sample Containers for Use with the ATBCR*.

Table 3.3 Rack Sizes, Accepted Container Types, and Maximum Tilt Speeds

Rack Size	Accepted Sample Containers/Capped Tubes	Maximum Tilt Speed
12x75 mm 13x75 mm	12 or 13x75 mm glass tube 12 or 13x75 mm plastic tube	100%
12x75 mm 13x75 mm	1 mL insert cup in a 13x75 mm tube	No tilt at any speed
13x100 mm	13x100 mm tube	70%
13x100 mm	2 mL cup 1 mL insert cup in a 13x100 mm tube Autoaliquot tube Pediatric insert cup in a rack adapter	No tilt at any speed
16x75 mm	16x75 mm tube	60%
16x100 mm	16x100 mm tube	50%
16x100 mm	2 mL insert cup in a 16x100 mm tube 3 mL cup in a 16x100 mm rack	No tilt at any speed

⚠ **CAUTION**

Exceeding the maximum tilt speed for the labware type can cause the containers to fall out of the rack. Do not exceed the values given above. Do not use any tilt for the containers noted as “No tilt at any speed” in the table above. See *Setting Tilting Parameters* for more information.

Attaching Bar Code Labels

The Automated Tube Bar Code Reader includes an internal Microscan MS-3 bar code scanner which automatically reads the bar codes of the sample rack and all sample containers stored in the sample rack. Bar codes are read when sample racks are presented to the presentation point. Each time the bar code reader attempts to read bar codes, it looks for a rack bar code and up to four sample bar codes.

If the ATBCR bar code reader fails to read any of the five bar codes, errors are handled as configured in the Biomek step or Device Editor action that requested the bar code to be read.

NOTE Sample rack barcodes are required for successful operation of the ATBCR. Sample bar codes are not required, and can be set to a default if the Samples are not bar coded.

Attaching bar code labels to sample racks and sample containers includes:

- *Supported Sample Container Bar Code Formats*
- *Attaching Bar Code Labels to Sample Racks*
- *Attaching Bar Code Labels to Sample Containers*

Supported Sample Container Bar Code Formats

The bar code reader on the ATBCR can read bar codes of any of the following formats:

- CODABAR
- Code 39
- Code 93
- Code 128
- EAN
- Interleaved 2 of 5
- UPCA
- UPCE

The CODABAR, Code 39, and Interleaved 2 of 5 bar code formats must be configured in the ATBCR Calibration Utility to read properly (refer to *Configuring Bar Code Formats*). All other formats are pre-configured to be read properly by the bar code reader.

NOTE Attach labels to the sample racks and sample containers as described in *Attaching Bar Code Labels to Sample Racks* and *Attaching Bar Code Labels to Sample Containers*.

Attaching Bar Code Labels to Sample Racks

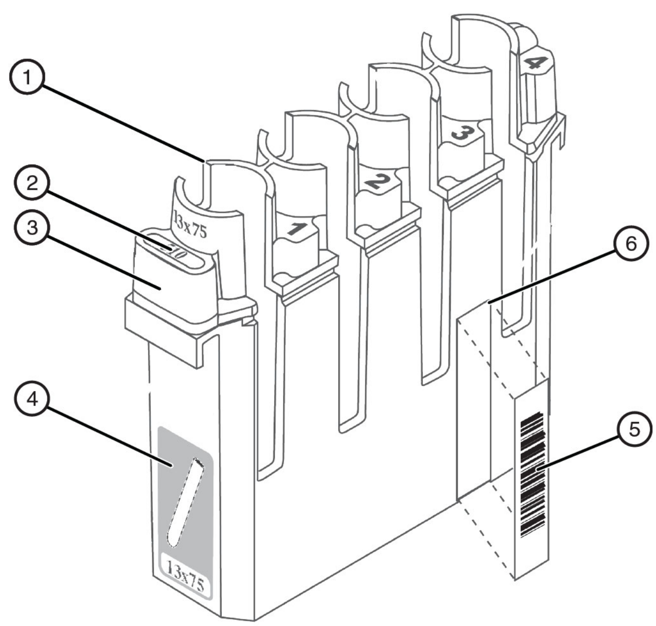
Sample racks are identified by three different types of labels (Figure 3.11):

- Rack bar code label — the identification label scanned by the ATBCR bar code reader that distinguishes one rack from another, and designates the sample container type
- Rack ID label — human-readable identification label that matches the encoded rack bar code label

  NOTE The number on the rack ID label is the same number that is encoded on the rack bar code label. Both labels are supplied together, on the same sheet (Beckman Coulter Sample Rack Label Kit, P/N 471891 for labels 1-500 and P/N 471892 for labels 501-999).

- Container type label — an illustration of the accepted sample container type

Figure 3.11 Sample rack labels



1. **Sample Container position 1**
2. **Rack ID label**
3. **Shoulder**
4. **Container type label**
5. **Rack bar code label**
6. **Rack indentation**

Attaching the Rack Bar Code and Rack ID Labels

The bar code on the rack bar code label identifies to the software the sample container type stored in the sample rack. Bar code ranges are associated with a certain container type (see Table 3.4). An indention to the right of sample position three indicates where the rack bar code label is placed.

The rack ID label is a human-readable label with the same number that is encoded on the rack bar code label. Both the rack bar code label and rack ID label are supplied together on a single sheet (Beckman Coulter Sample Rack Label Kit, P/N 471891 for labels 1-500 and P/N 471892 for labels 501-999).

CAUTION

A sample rack is configured to accept only one type of sample container. Do not mix container types within a rack.

Table 3.4 Default Rack ID ranges for sample containers

Rack ID series	Rack Size	Sample container type
1-49	13 x 75 mm	12x75 mm tube
50-99	13 x 75 mm	13x75 mm tube
100-199	13 x 100 mm	13x100 mm tube
200-299	13 x 100 mm	2 mL cup
300-449	16 x 75 mm	16x75 mm tube
450-499	13 x 100 mm	1 mL insert in 13x100 mm tube
500-599	16 x 100 mm	3mL in 16x100 sample rack
600-649	16 x 100 mm	2 mL insert in 16x100 mm tube
650-699	13 x 100 mm	pediatric insert in adapter
700-799	13 x 75 mm	1 mL insert in 13x75 mm tube
800-849	13 x 100 mm	autoaliquot tube
850-899	*Reserved for custom use.*	
900-949	16 x 100 mm	16x100 mm tube
950-999	*Reserved for custom use.*	

To attach the rack bar code and rack ID labels to the sample rack:

1. Locate the rack indentation on the body of the sample rack. The indentation is to the right of sample container position 3 (Figure 3.11).

2. Lay the rack on a table so the indentation faces up.

⚠ CAUTION

Failure to correctly label racks can result in damage to the instrument and loss of samples due to placement of incorrect container types in the rack or incorrect identification of rack type by the device.

3. Make sure the bar code label is in the appropriate range for the sample container type stored in the sample rack. The bar code range for each container type is configured in the Labware Type Editor, (refer to *Configuring Sample Rack Bar Code Ranges*). See Table 3.4 for the default bar code ranges corresponding to each sample container type.

4. Align the bar code label with the indentation on the rack (Figure 3.11) such that the bar code is nearest the top of the rack and the corresponding rack ID number underneath it.

5. Attach the label securely to the rack. To be sure the rack bar code is scanned correctly, leave no more than a 1 mm gap at the bottom of the label.

6. Rotate the rack so the side closest to sample container position 1 faces up.

7. Align the rack ID label so it is centered with the shoulder adjacent to sample position 1 (Figure 3.11).

8. Attach the label securely to the rack.

Attaching the Container Type Label

The container type label graphically identifies the sample container type to use with the sample rack. Use only the sample container type shown on the container type label with the sample rack.

CAUTION

A sample rack is configured to accept only one type of sample container. Do not mix container types within a rack.

To attach the container type label to the sample rack:

1. Rotate the rack so the side closest to sample container position 1 faces up.

2. Align the container type label so it is centered with the side and near the bottom of the rack, and attach the label securely to the rack (Figure 3.11).

Attaching Bar Code Labels to Sample Containers

WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

A rack bar code is required. Sample container bar codes are highly recommended, but a default bar code can be used if no sample bar codes exist.

Beckman Coulter does not provide sample container bar code labels. Sample container bar code labels must meet the following specifications:

NOTE Bar code reading reliability varies with different bar code printing software. Reliable reading has been achieved using the Intermec Printing Language (IPL). The IPL Programmer's Reference Manual can be obtained from http://www.intermec.com/.

Table 3.5 Sample Container Bar Code Label Specifications

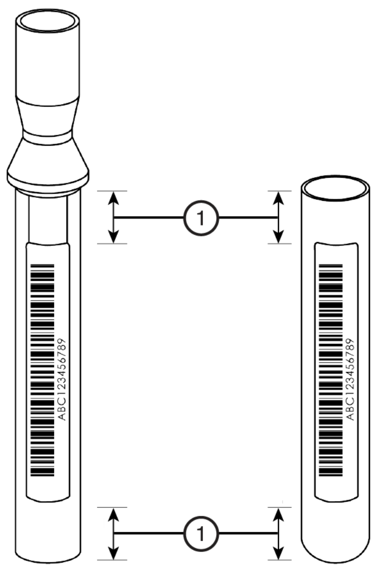
Item	Description
Quiet zones	Minimum: 0.2 inches (5 mm) on each side
Message length	1-24 characters
Bar code length	Maximum: 3.0 inches (80 mm), including quiet zones
Bar code height	Minimum: 0.4 inches (10 mm)
Bar code density	5.0-15 mil (0.13-0.38 mm)
Symbology	CODABAR, Code 39, Code 93, Code 128, EAN, Interleaved 2 of 5, UPCA, UPCE **NOTE** A CRC check digit is required to ensure reliable reading with EAN and UPC bar code formats.
Label print quality	Quality B or better, as specified in CLSI (formerly NCCLS) standard AUTO02-A, Laboratory Automation: Bar Codes for Specimen Container Identification.
Label angular skew	≤ 7.5 degrees tilt
Bar code label background	Printed on reflective, matte finish with a background diffuse reflectance of 70-80%
Bar code label ink color and type (maximum allowed reflectance at the reading wavelength)	10% for ATBCR bar code reader

NOTE The ATBCR bar code reader automatically distinguishes between bar code formats, so samples with bar code labels using different formats can be included on the same rack.

To attach a bar code label to each sample container:

1 Place the bar code label on the sample container so that the label is at least 0.4 inches (10 mm) from the top and bottom of the container (Figure 3.12). Be sure that it is securely fastened.

Figure 3.12 Sample bar code label placement



1. Bar code label should be a minimum of 0.4 inches (10 mm) from the top and bottom of the container.

2 When placing the sample container in the rack, make sure the sample bar code label is centered in the opening slot of its rack position for accurate scanning (refer to *Placing Sample Containers in Racks*).

Using Sample Racks with the Automated Tube Bar Code Reader

The Automated Tube Bar Code Reader (ATBCR) uses four different rack sizes. Each rack holds a specific type of sample container. Racks include rack ID and sample container type labels to help identify each type of rack.

Sample containers are placed in the appropriate sample racks. Sample containers may be capped or sealed and accessed by tips designed to pierce seals. Sample racks are then loaded in the input tray of the ATBCR. The input tray holds 24 racks, or enough to store 96 samples at once. Refer to *Preparing Sample Containers for Use with the ATBCR* for more information on sample containers and *Preparing Sample Racks for Use with the ATBCR* for more information on sample racks.

After the instrument processes the samples, the rack is placed in the output tray. Racks can be unloaded from the output tray at any time as long as the top cover is unlatched. Refer to *Using the Unlatch Step* and *Unlatching the Cover* for information on unlatching the top cover.

Using sample racks with the ATBCR includes:

- *Placing Sample Containers in Racks*
- *Loading a Sample Rack into the ATBCR*
- *Removing a Sample Rack from the ATBCR*
- *Removing Sample Containers from Sample Racks*
- *Cleaning Sample Racks and Sample Containers*
- *Storing Sample Racks and Sample Containers*

Placing Sample Containers in Racks

Each sample rack is identified by a container type label that illustrates the specific type of sample container that can be used with the sample rack. Place sample containers into the four available positions in a sample rack. When the Automated Tube Bar Code Reader (ATBCR) scans the rack, the rack bar code label identifies the type of containers in the rack. The bar code label on each sample container is also scanned.

Place most containers directly in a rack. If using insert cups, place the cups into the appropriate containers or rack inserts before placing them in a rack. For more information about loading racks, refer to *Using Sample Racks with the Automated Tube Bar Code Reader*.

NOTE Do not place an insert cup directly in a sample rack; place insert cups inside a sample container first. For more information, refer to *Using Insert Cups with Sample Tubes*.

NOTE All sample containers placed in a sample rack must be of the same type and must match the container type specified by the rack bar code (see Table 3.4).

⚠ WARNING

Use only the container type specified by the container type label on the sample rack. A rack is configured to accept only one type of sample container. Placing an incorrect container type in a rack may damage the instrument or cause pipetting errors.

⚠ WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

To load sample containers into racks:

1. Make sure that there is a sufficient volume of sample in the sample container. To calculate the sample volume, refer to *Calculating Minimum Sample Volume*.

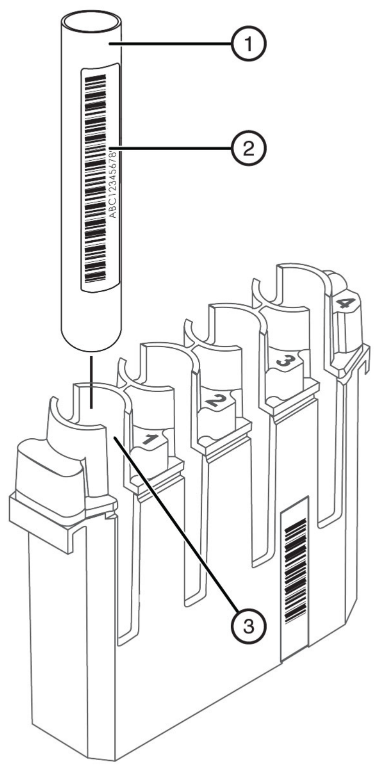
2. If transferring sample to a new sample container, carefully pipette the sample into the sample container or insert cup. Avoid creating air bubbles.

3. Locate the appropriate rack for the sample container (as indicated by the rack ID number and label).

4 Place the sample container in the rack. Be sure the sample bar code label is in good condition, and is properly affixed to the container. When placing the container in a rack, be sure the sample bar code label is on the same side as the sample rack bar code label and is centered in the opening slot of its rack position for accurate scanning (Figure 3.13).

NOTE Make sure the sample bar code label meets the required specifications for the ATBCR bar code reader (refer to *Attaching Bar Code Labels to Sample Containers*).

Figure 3.13 Loading sample container into sample rack



1. Sample container
2. Sample container bar code label
3. Sample rack position 1

5 Repeat step 4 to load up to four sample containers in the sample rack. Make sure all sample containers loaded into the sample rack are of the same type and are loaded to the bottom of the sample rack. The tops of all sample containers should be level with each other.

6 After placing all of the sample containers in the rack, load the rack into a Holder Rack to transfer several racks to the ATBCR at once, or load it directly into the input tray of the ATBCR for processing, (refer to *Loading a Sample Rack into the ATBCR*).

NOTE Replacement Holder Racks are available. They can hold up to 15 racks. Contact your Beckman Coulter Representative for more information.

NOTE For proper sampling of foamy, shaken, or vortexed sample containers using liquid level sensing technology, allow container contents to settle (or centrifuge) prior to running a method so that there is no liquid on the sides of the container.

Loading a Sample Rack into the ATBCR

Tube racks are loaded into the input tray on the right side of the Automated Tube Bar Code Reader (ATBCR). They must be placed such that the bar codes on the rack and the individual tubes are facing the rear of the ATBCR.

If a sample rack is placed in the input tray backwards, the bar code reader will not read the rack or sample container bar codes and errors are handled as configured in the Biomek step or **Device Editor** action that requested the bar code to be read.

CAUTION

Loading tube racks backwards in the input tray when the rack bar code error handling option "Use the configured rack default type" is selected may report improper results.

CAUTION

Loading tube racks backwards in the input tray when the tube bar code error handling option "Ignore, use default bar code, and continue the method" is selected may report improper results.

Each loaded rack must have a rack ID and bar code. If a sample rack bar code is not read, an error results and the rack is processed according to the error handling settings in the configuration of the Biomek step or **Device Editor** action that requested the bar code read.

NOTE Be sure that the rack ID bar code label is in good condition and is properly affixed to the rack. For more information refer to *Attaching the Rack Bar Code and Rack ID Labels*.

⚠ WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

⚠ WARNING

Do not place hands inside of the sample presentation point when the instrument is operating.

⚠ WARNING

Make sure the sample containers placed in the sample rack match the type indicated by the sample rack bar code label. Mismatches may result in damage to equipment or pipetting errors.

To load sample racks into the input tray:

1. Place the sample containers for the requested tests in sample racks. For more information, (refer to *Placing Sample Containers in Racks*).

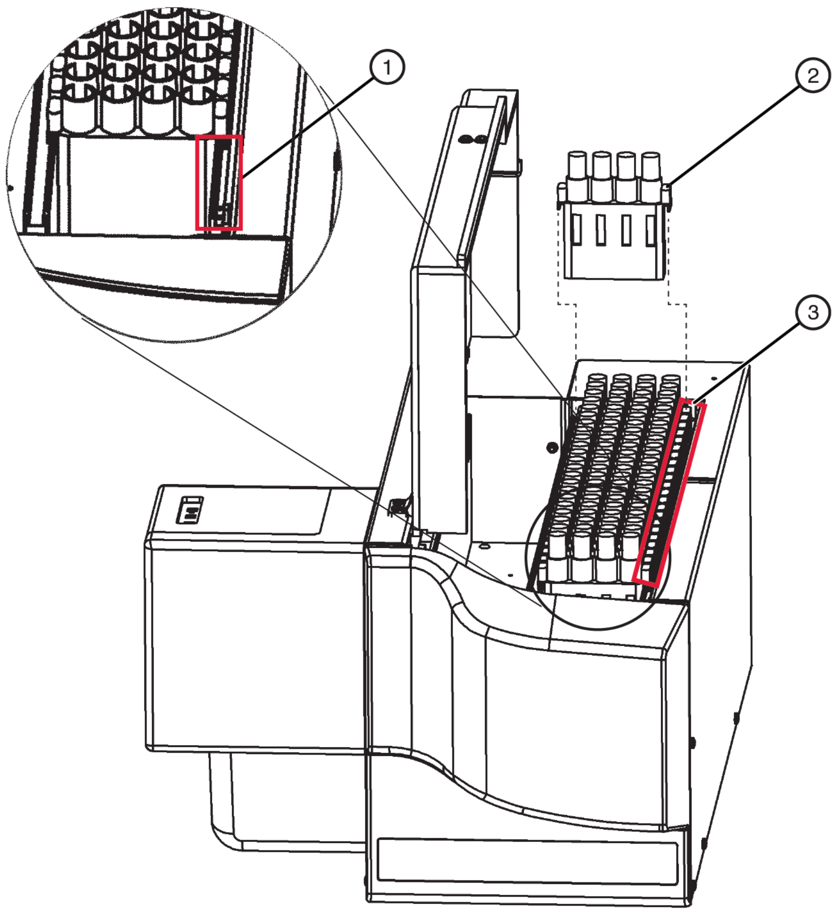
2. For ease of loading sample racks into the ATBCR, first place the desired sample racks (such as those specified in a worklist) in order in a Holding Rack. Contact your Beckman Coulter Representative for more information about Holding Racks.

3. Open the ATBCR cover.

4 Place the arms of the sample rack over the guide rails in the input tray of the ATBCR. Be sure the bar code label is facing the back of the ATBCR (Figure 3.14).

NOTE For most efficient operation, the sample rack should not be placed so far towards the front of the input tray that it is in front of the sensor (Figure 3.14).

Figure 3.14 Loading sample racks into the Automated Tube Bar Code Reader



1. Sensor
2. Sample rack arm
3. Guide rail

5 Repeat step 4 to load additional sample racks to the ATBCR.

6 Close the ATBCR cover.

NOTE For proper sampling of foamy, shaken, or vortexed sample containers using liquid level sensing technology, allow container contents to settle (or centrifuge) prior to running a method so that there is no liquid on the sides of the container.

Removing a Sample Rack from the ATBCR

Samples that have been processed are in the output tray on the left. The first samples accessed are in the tube rack nearest the back of the Automated Tube Bar Code Reader (ATBCR).

After each sample in a rack is processed, the ATBCR moves the rack to the output tray of the ATBCR. The offload area holds up to 24 racks.

The ATBCR cover remains locked during a method until it is unlocked using an **Unlatch** step, (refer to *Using the Unlatch Step*). When the cover is unlatched, sample racks may be accessed. The cover may also be unlatched outside a method using the **Device Editor, (refer to** *Unlatching the Cover*).

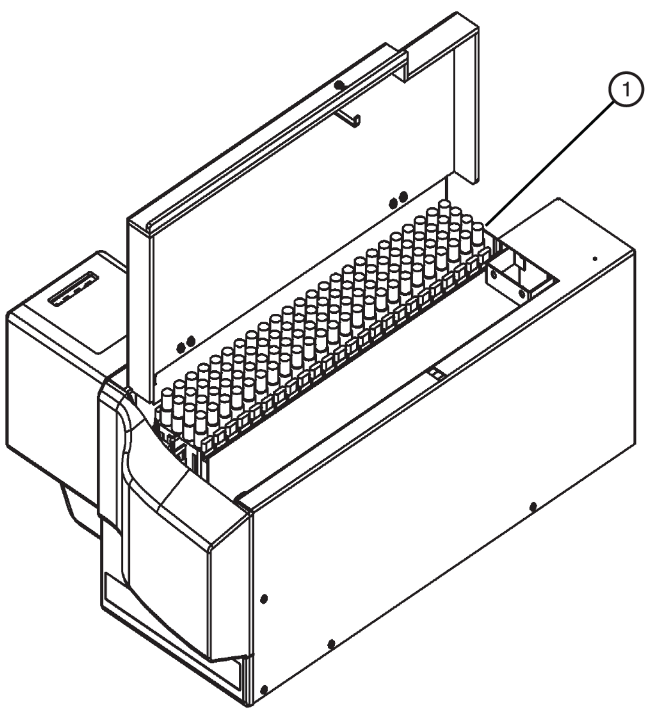
WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

To remove a sample rack from the Automated Tube Bar Code Reader:

1 After the ATBCR cover is unlocked, open the cover (Figure 3.15).

Figure 3.15 Unloading sample racks from the Automated Tube Bar Code Reader



1. First sample rack accessed in the back of the output tray.

2 Lift the sample rack from the output tray straight up off of the guide rail.

3 Place the sample rack in a Holder Rack for storage.

4 Repeat steps 2 and 3 until all sample racks are removed from the output tray.

5 Close the cover.

Removing Sample Containers from Sample Racks

WARNING

Handle and dispose of biohazard materials according to proper laboratory procedures. Proper hand, eye, and facial protection is required.

Sample containers may be removed from sample racks to use the racks again with different samples.

To remove a sample container from the sample rack:

1 Hold the sample rack firmly with one hand.

2 Carefully lift the sample container straight up out of the sample rack.

Cleaning Sample Racks and Sample Containers

Sample racks may be cleaned in a dishwasher or an autoclave. Racks may also be washed by hand using a brush and a mild detergent.

After cleaning sample racks, make sure the rack bar code label is still readable. If necessary, replace the rack bar code label according to the procedure in *Attaching the Rack Bar Code and Rack ID Labels*.

Cleaning of sample containers depends on what type of sample was stored in the sample container. Clean sample containers according to laboratory procedures appropriate for the contents of the sample container.

Storing Sample Racks and Sample Containers

When not in use, sample racks should be stored in Holder Rack. Replacement racks are available. Contact your Beckman Coulter Representative for more information.

Sample containers should be stored in a manner compliant with laboratory protocols and procedures.

Using the Automated Tube Bar Code Reader in Biomek Software

Biomek Software is used to configure and operate the Automated Tube Bar Code Reader (ATBCR) on the deck of a Biomek liquid handler. Only one ATBCR may be placed on the deck of a Biomek liquid handler.

Using the ATBCR in Biomek Software includes:

- *Configuring the Automated Tube Bar Code Reader in Biomek Software*
- *Using the Automated Tube Bar Code Reader in a Biomek Method*
- *Manually Controlling the Automated Tube Bar Code Reader*

Configuring the Automated Tube Bar Code Reader in Biomek Software

Before using the Automated Tube Bar Code Reader (ATBCR) in methods, Biomek Software needs to be configured and set up to make use of the ATBCR. Typically, this configuration needs to occur only once, but it may be necessary to modify the settings later.

Configuring the ATBCR for use in Biomek Software includes:

- *Configuring the Automated Tube Bar Code Reader in the Deck Editor*
- *Configuring Pipetting Templates and Techniques to Access Sealed Containers*
- *Configuring Sample Racks in the Labware Type Editor*

NOTE Tilting parameters and bar code settings for the Interleaved 2 of 5, Codabar, and Code 39 bar code formats may also be configured. Refer to *Calibrating the Automated Tube Bar Code Reader*.

Configuring the Automated Tube Bar Code Reader in the Deck Editor

Before using the Automated Tube Bar Code Reader in an automated method, Biomek Software must know the location of the ATBCR on the deck. The software representation of the instrument deck is configured in the **Deck Editor**.

The installer adds the ATBCR to the active deck during initial installation; however, if a new deck is created, it may be necessary to add the ATBCR to the new deck using the **Deck Editor**.

Configuring the Automated Tube Bar Code Reader in the Deck Editor includes:

- *Adding an Automated Tube Bar Code Reader to the Deck*
- *Setting Automated Tube Bar Code Reader Position Properties*

NOTE Refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck for more information on the **Deck Editor**.

Adding an Automated Tube Bar Code Reader to the Deck

A new Automated Tube Bar Code Reader (ATBCR) can be added to the deck on the right side in the front using the **Deck Editor.** Deck positions are named automatically when an ATBCR is added to the deck.

NOTE Only one ATBCR may be placed on the deck of a Biomek liquid handler.

To add an ATBCR to the deck:

1. Select **Instrument>Deck Editor**. The **Deck Editor** appears.

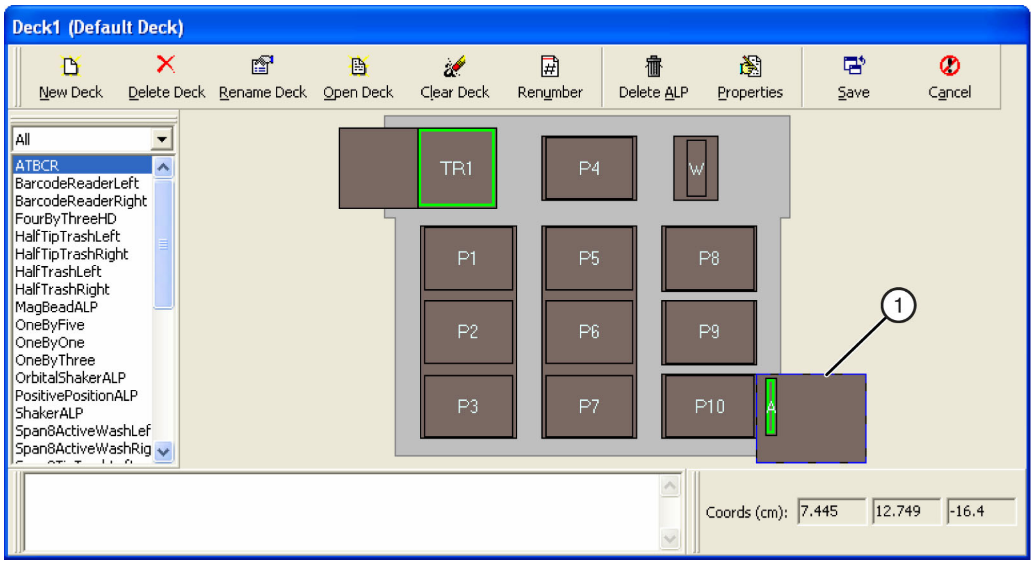
2. Create a new deck or open the desired deck to which the Automated Tube Bar Code Reader is to be added. Refer to the *Biomek Software User's Manual, Preparing and Managing the Deck.*

3 Click and hold the mouse button on the **ATBCR** in the ALP Types List. Notice that the location capable of supporting the ALP is indicated by a dashed rectangle in **Deck Editor**.

4 Drag and drop **ATBCR** from the ALP Types List to the outlined location on the deck. The ALP appears and the deck position is named automatically (Figure 3.16).

NOTE The deck position may be renamed, if desired (refer to *Setting Automated Tube Bar Code Reader Position Properties*).

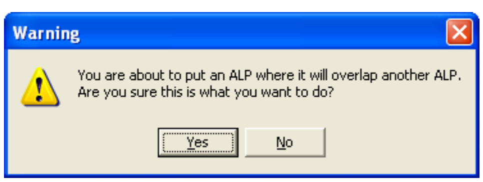
Figure 3.16 ATBCR added to the Deck Editor of a Biomek NX^P Span-8 instrument



1. ATBCR added to deck.

NOTE If the ATBCR is about to be placed where another ALP is currently placed on the deck, the following warning appears (Figure 3.17). Delete the currently placed ALP(s) before placing the ATBCR on the deck. Refer to the *Biomek Software User's Manual, Preparing and Managing the Deck*.

Figure 3.17 Warning appears because an ALP is about to be placed where it overlaps another ALP



Setting Automated Tube Bar Code Reader Position Properties

After an ATBCR is placed on the deck, set the properties of the presentation point **ATBCR1**. Refer to the Biomek Software User's Manual, Preparing and Managing the Deck, for a description of all ALP and deck position properties.

Since the presentation point needs to be associated with the ATBCR, the **Device association** must be set for the **ATBCR1** position.

To set deck position properties for the ATBCR presentation point:

1. Select the **ATBCR1** position on the Deck View of the **Deck Editor** to modify properties for the position.

2. Select **Properties** from the **Deck Editor** toolbar.

   OR

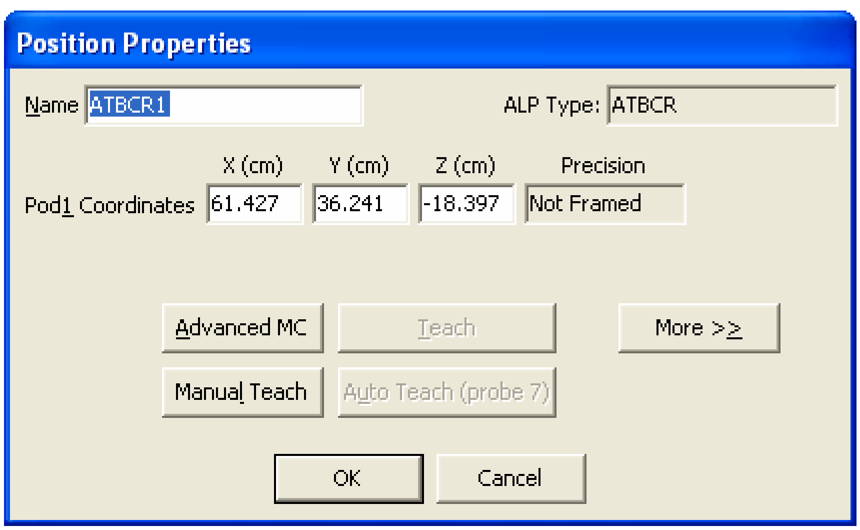
   Double-click on the deck position.

   OR

   Right-click on the **ATBCR1** position and select **Properties** from the menu.

   Position Properties appears. (Figure 3.18).

   Figure 3.18 Position Properties for ATBCR1 position (NX^P version shown)

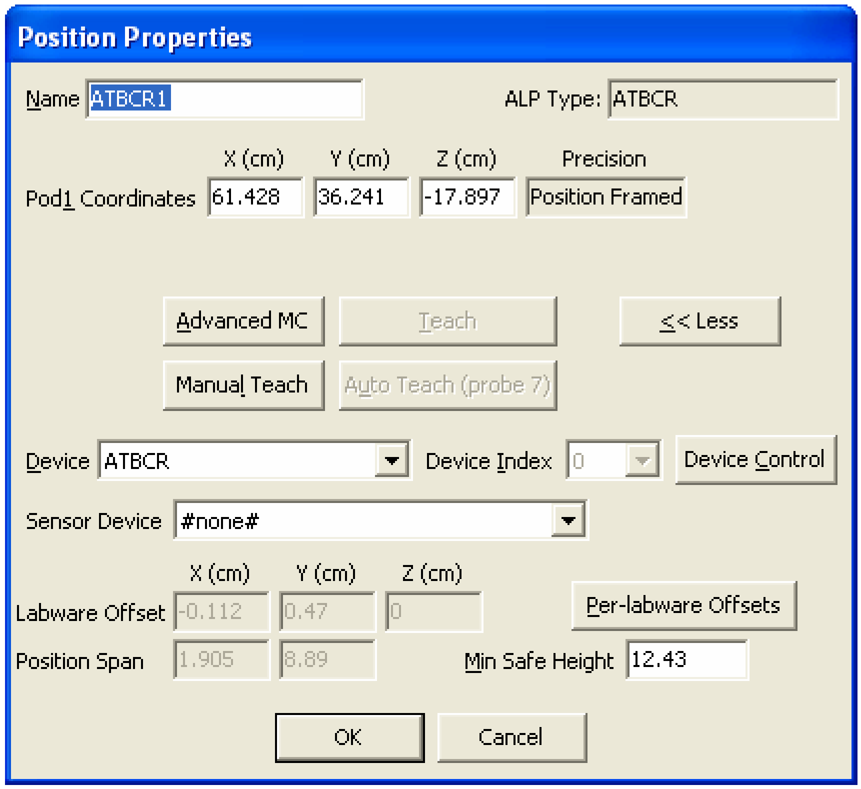
   NOTE The deck position is highlighted on the Deck View with a pink line inside the ALP.

3. In **Name**, enter a new name or leave the default name of **ATBCR1.**

4. Frame the presentation point to specify the X, Y, and Z Coordinates of the appropriate pod, if necessary; see *Framing the ATBCR*.

5 Select **More>>** to display the device association and labware offset options (Figure 3.19).

Figure 3.19 ATBCR Position Properties with More chosen (NX^P version shown)



6 In **Device**, choose **ATBCR** to associate the Automated Tube Bar Code Reader with the presentation point position. The ALP position is outlined in green to indicate it is associated with a device.

7 Choose **OK** to save the position properties. **Current Deck** appears.

8 Choose **Save** to save the deck and close the **Deck Editor**.

Configuring Pipetting Templates and Techniques to Access Sealed Containers

When accessing sealed or capped sample containers, the pipetting technique and template used to access the sample containers must be configured properly. In order to pierce the seals or caps, the Span-8 Pod must descend through the seal or cap at a reduced speed.

Optimizing pipetting operations for piercing includes:

- *Optimizing Pipetting Templates for Piercing*
- *Configuring Pipetting Techniques for Piercing*

Optimizing Pipetting Templates for Piercing

The default Span-8 Septa Piercing template uses a single **Move Axes** steplet to move the probes down, pierce the cap or seal, and move to the desired aspirate height at a reduced speed. This can slow down pipetting actions that access sealed or capped tubes. Adding additional **Move Axes** steplets to the pipetting template may help to speed up those pipetting actions and increase overall throughput.

The speed of pipetting actions can be controlled by the Pipetting Template in several ways:

- Using a single **Move Axes** steplet to move to the top of the tube, pierce the seal or cap, and move to the aspirate height at a reduced speed. This is the behavior defined in the default Span-8 Septa Piercing template.
- Using two **Move Axes** steplets: the first to move near the top of the tube at full speed, followed by a second to pierce the seal or cap and move to the aspirate height at a reduced speed. Follow the directions in the example below up to step 5 to configure this behavior.
- Using three **Move Axes** steplets: the first to move near the top of the tube at full speed, the second to pierce the seal or cap at a reduced speed, and the third to move to the aspirate height at full speed. Follow all of the directions in the example below to configure this behavior.

NOTE The following is an example of one possible way to configure a pipetting template. A number of factors, such as the labware type and type of seal used, may impact the performance of the Pipetting Templates. All values should be tested and adjusted as needed for a specific application.

To modify a pipetting template to increase throughput:

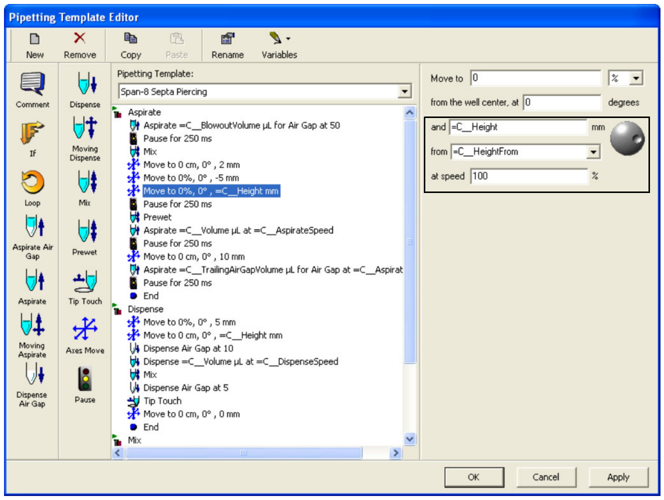
1. From the **Project** menu, choose **Pipetting Template Editor**.

2. From the **Pipetting Template** drop-down list, select the desired pipetting template to modify.

   NOTE To create a new pipetting template, select New, or Copy to make a copy of a similar pipetting template to modify. Refer to the *Biomek Software User's Manual* for more information about creating new pipetting templates in the **Pipetting Template Editor**.

3. Under **Aspirate**, locate the first **Move Axes** steplet (Figure 3.20). This is the steplet that moves the probes to the aspirate height prior to aspirating. This step is configured using variables to move the probes to a height inside the labware at a speed specified by the technique.

Figure 3.20 Pipetting Template Editor



4 Insert a **Move Axes** steplet above the first **Move Axes** steplet.

5 Configure the new **Move Axes** steplet to Move to **2 mm from Top at speed 100%** (see Move Axes 1 in Table 3.6). This instructs the Span-8 Pod to move its probes to a height 2 mm above the top of the labware (in this case, the sealed or capped tubes) at its full speed (100%).

NOTE As the pipetting template is configured now, the probes move near the top of the tube at full speed and then pierce the seal or cap and move to the aspirate height at a reduced speed specified by the technique.

6 Insert another **Move Axes** steplet after the two **Move Axes** steplets.

7 Configure the new **Move Axes** steplet to Move to **=C_Height mm from =C_HeightFrom at speed 100% (see Move Axes 3 in Table 3.6).**

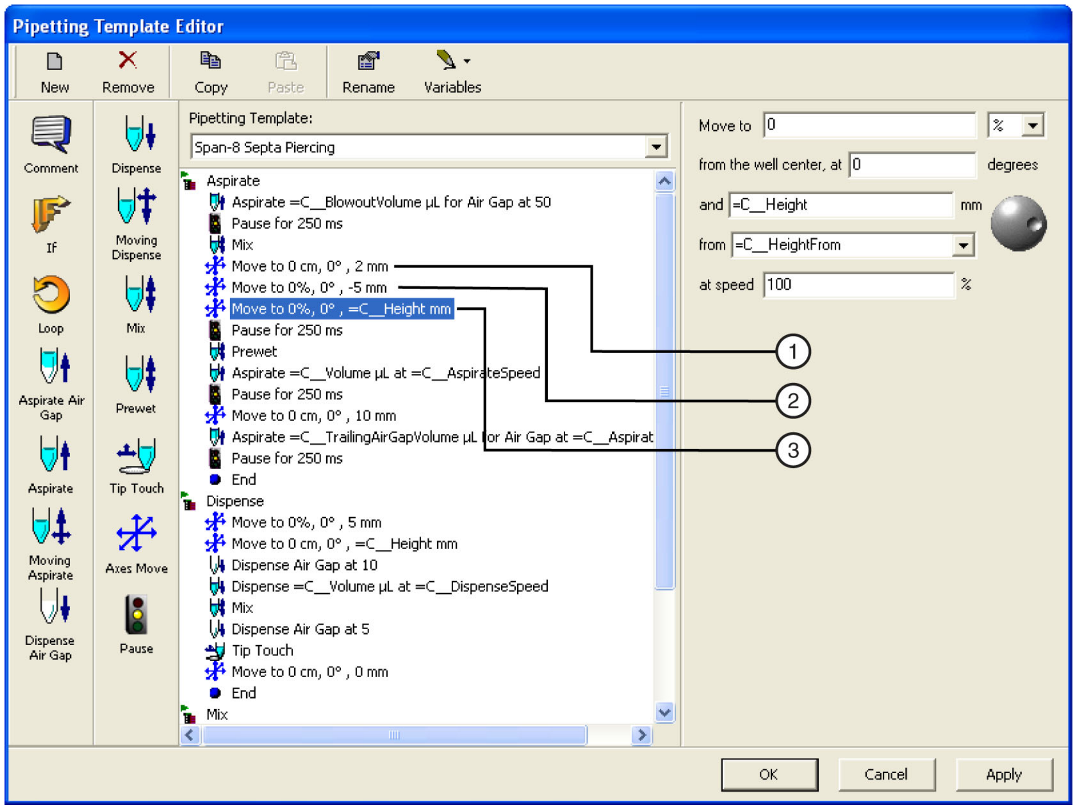
8 Select the second **Move Axes** steplet.

9 Modify the steplet configuration to Move to **-5 mm from Top at speed =C_Speed** % (see Move Axes 2 in Table 3.6).

10 The pipetting template is now configured (Figure 3.21).

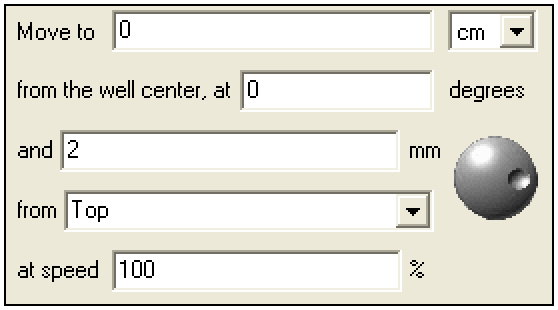
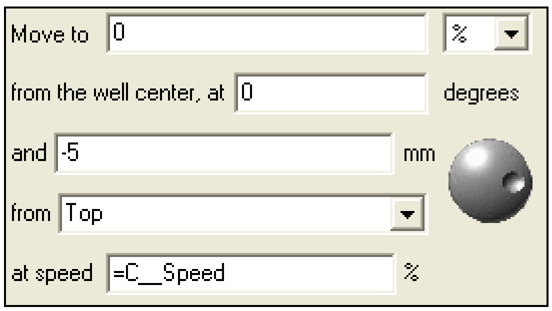
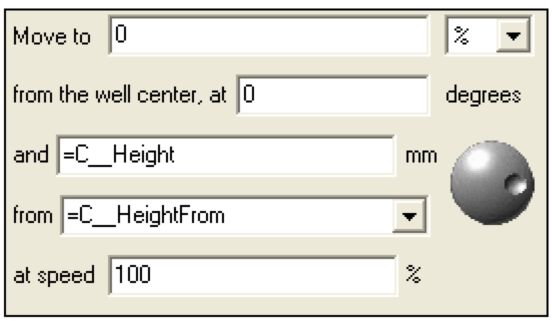
11 If sealed or capped tubes will be accessed for dispense operations, the dispense template also needs to be modified. Repeat steps 3-10 under **Dispense**, if desired.

Figure 3.21 Pipetting Template Editor with three Move Axes steplets



1. Move Axes 1
2. Move Axes 2
3. Move Axes 3

Table 3.6 Pipetting Template Move Axes steplet configurations for piercing optimized for throughput

Steplet	Configuration	What it does
Move Axes 1		Moves the probes down to a height 2 mm above the top of the tube at full speed (100%), in preparation for piercing in the next steplet.
Move Axes 2		Moves the probes to pierce the seal or cap to a height 5 mm below the top of the labware at a reduced speed configured in the pipetting technique used for the aspirate.
Move Axes 3		After piercing the seal, moves to the aspirate height configured in the technique at full speed (100%).

Configuring Pipetting Techniques for Piercing

The pipetting technique selected for any pipetting operations on sealed or capped tubes need to be configured properly to utilize the correct pipetting template and to provide the proper speed and pipetting height.

To modify a pipetting technique for piercing:

1 From the **Project** menu, choose **Technique Browser**.

2 In Technique Browser, select the desired pipetting technique to modify.

NOTE Choose **New** to create a new technique. In **Technique Properties**, make sure the Context Information is selected correctly. This includes selecting Span-8 Pod under **Pod** and SeptaFluted under **tips**. Other options may be selected as required for the specific application of the technique.

3 Choose **Edit** from the toolbar; right-click on the technique and choose **Edit**; or double-click the technique to open the technique in the **Technique Editor**.

4 In **Pipetting Template**, select the pipetting template designed for piercing sealed or capped tubes. The default piercing pipetting template is **Span-8 Septa Piercing**.

NOTE To create or modify a pipetting template for piercing operations, refer to *Optimizing Pipetting Templates for Piercing*.

5 Select the **Aspirate** tab to modify how the technique operates when aspirating from a capped or sealed tube.

6 In **Move within the well at... speed**, enter the desired speed for the pod to move into the well. This is the speed that the context variable **C_Speed** represents in the pipetting template.

NOTE To pierce through the seal or cap, the speed should be no higher than 25%. Slower speeds are needed to pierce through thicker seals or caps, while higher speeds are possible for thinner or pre-slit seals or caps. Test speeds to verify that the probes can successfully pierce the seal or cap used with the sample container. If the probes have trouble piercing even at very slow speeds (less than 5%), select the **Requires Piercing Tips** option for the labware type to access the tubes one at a time (refer to *Configuring Sample Racks for Septum Piercing*).

7 Configure the remaining fields as desired for the aspirate action (refer to the *Biomek Software User's Manual*).

8 Select the **Dispense** tab to modify how the technique operates when dispensing into a capped or sealed tube.

9 In **Move within the well at... speed**, enter the desired speed for the pod to move into the well. This is the speed that the context variable **C_Speed** represents in the pipetting template.

NOTE To pierce through the seal or cap, the speed should be no higher than 25%. Slower speeds are needed to pierce through thicker seals or caps, while higher speeds are possible for thinner or pre-slit seals or caps. Test speeds to verify that the probes can successfully pierce the seal or cap used with the sample container. If the probes have trouble piercing even at very slow speeds (less than 5%), select the **Requires Piercing Tips** option for the labware type to access the tubes one at a time, (refer to *Configuring Sample Racks for Septum Piercing*).

10 Configure the remaining fields as desired for the dispense action (refer to the *Biomek Software User's Manual*).

11 Choose **OK** to save the changes to the technique and close the **Technique Browser**.

Configuring Sample Racks in the Labware Type Editor

Sample racks hold up to four sample containers and are presented to the presentation point of the Automated Tube Bar Code Reader for access by the Span-8 Pod. Bar codes on the sample racks identify the type of sample containers held by the sample rack. The Labware Type Editor allows these sample racks to be configured to identify important information about the sample racks and containers within the Biomek Software.

Use the Labware Type Editor for:

- *Configuring Sample Rack Bar Code Ranges*
- *Configuring Sample Racks for Septum Piercing*

Configuring Sample Rack Bar Code Ranges

WARNING

The tubes contained in a rack should always match the expected tube type specified by the rack bar code.

The Automated Tube Bar Code Reader (ATBCR) uses the sample rack bar code to determine the type of tubes contained in the rack. Biomek Software then uses that information about the type of tubes contained in the rack to determine appropriate pipetting heights and access the tubes accurately.

The acceptable bar code ranges for each rack and tube combination are set in Biomek Software with the **Labware Type Editor**. A minimum and maximum bar code value for each labware type is set. The valid bar code range for a labware type is all values from the specified minimum rack bar code to the specified maximum rack bar code.

For example, a 13x100 mm tube in a 13x100 mm rack has a minimum bar code of 100 and a maximum bar code of 199 (see Table 3.7). The valid bar code range for this tube and rack combination is therefore 100-199. When the ATBCR encounters a rack with a bar code in this range, it identifies the rack type to Biomek Software, which then uses that labware type definition for all actions which access that tube rack.

To specify the minimum and maximum rack bar codes for a sample container and rack type:

1 From the **Project** menu, choose **Labware Type Editor**.

2 Double-click on the desired rack labware type.

OR

Right-click on the desired rack labware type and choose **Edit**.

OR

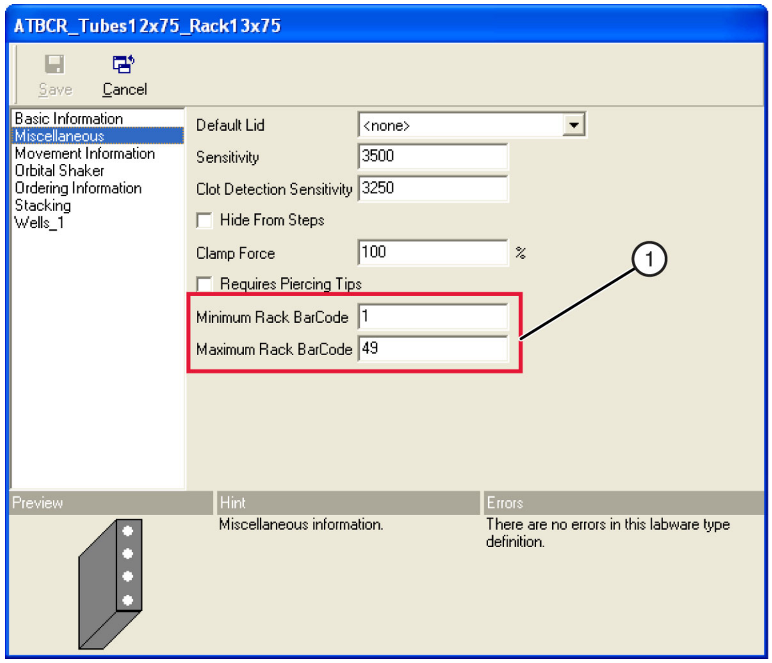
Select the desired rack labware type and choose **Edit** from the toolbar.

The Labware Type definition for the selected rack labware type appears.

NOTE To quickly locate the desired rack labware type, in **Filter**, select **Tuberack** to show only the labware types that are tube racks.

3 From the list of screens displayed on the left, select **Miscellaneous** (Figure 3.22).

Figure 3.22 Labware Type Editor — miscellaneous configuration



1. Minimum and Maximum Rack Bar Codes

4 In **Minimum Rack Bar Code**, enter the smallest bar code value to associate with the selected rack type. Default values for **Minimum Rack Bar Code** are displayed in Table 3.7.

5 In **Maximum Rack Bar Code**, enter the largest bar code value to associate with the selected rack type. Default values for **Maximum Rack Bar Code** are displayed in Table 3.7.

NOTE If the bar code ranges for two or more tube rack types overlap, a validation error occurs and the Biomek method will not execute.

Table 3.7 Default bar code ranges for sample racks

Sample Container Type	Labware Type Name	Min-Max Rack Bar Codes
12x75 mm tube	ATBCR_Tubes12x75_Rack13x75	1-49
13x75 mm tube	ATBCR_Tubes13x75_Rack13x75	50-99
13x100 mm	ATBCR_Tubes13x100_Rack13x100	100-199
2 mL cup	ATBCR_Cup_2mL_Rack13x100	200-299
16x75 mm	ATBCR_Tubes16x75_Rack16x75	300-449
1 mL insert in 13x100 mm tube	ATBCR_Cup_1mL_Tube_13x100_Rack13x100	450-499
3mL in 16x100 sample rack	ATBCR_Container_3mL_Rack16x100	500-599
2 mL insert in 16x100 mm tube	ATBCR_Cup_2mL_Tube_16x100_Rack16x100	600-649
pediatric insert in adapter	ATBCR_PediatricCup_PediatricTube_Rack13x100	650-699
1 mL insert in 13x75 mm tube	ATBCR_Cup_1mL_Tube_13x75_Rack13x75	700-799
autoaliquot tube	ATBCR_AutoaliquotTubes_Rack13x100	800-849
Reserved for custom use		850-899
16x100 mm tube	ATBCR_Tubes16x100_Rack16x100	900-949
Reserved for custom use		950-999

Configuring Sample Racks for Septum Piercing

Most sample containers with seals or caps can be accessed normally using all four probes to access the four sample containers simultaneously. However, if the probes are having difficulty getting through the seals or caps, it may be necessary to access sample containers one at a time. This can be done by selecting the **Requires Piercing Tips** option on the **Miscellaneous** page of the **Labware Type Editor**.

When the **Requires Piercing Tips** option is selected, Biomek Software does several things:

- Biomek Software makes sure that Septa Piercing tips are installed on the Span-8 Pod and configured in **Hardware Setup**.
- The probes access the sample containers one at a time instead of simultaneously.
- The pipetting technique uses the settings on the **Piercing** tab of the **Technique Editor** (refer to the Biomek Software User's Manual, Section 10.4.7, Setting Piercing Values (NX^P-S8 and FX^P only)).

When the **Requires Piercing Tips** option is NOT selected:

- Biomek Software uses whatever tips are installed. If they are not piercing tips, there is a greater risk of having bent or damaged tips, damaged septa, or even a contaminated deck if any septa are driven into the tube.
- The probes access all four sample containers simultaneously.

To configure sample racks for septum piercing:

1 From the **Project** menu, choose **Labware Type Editor**.

2 Double-click on the desired rack labware type.

OR

Right-click on the desired rack labware type and choose **Edit**.

OR

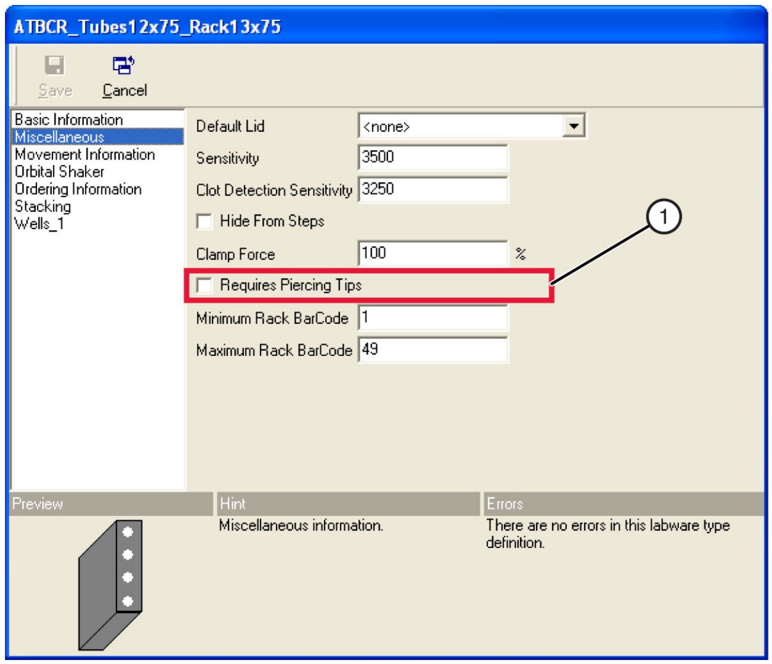
Select the desired rack labware type and choose **Edit** from the toolbar.

The Labware Type definition for the selected rack labware type appears.

NOTE To quickly locate the desired rack labware type, in **Filter**, select **Tuberack** to show only the labware types that are tube racks.

3 From the list of screens displayed on the left, select **Miscellaneous** (Figure 3.22).

Figure 3.23 Labware Type Editor — miscellaneous configuration



1. Requires Piercing Tips

4 Select **Requires Piercing Tips.** This tells Biomek Software that the racks contain sealed tubes and that it should access the tubes according to the piercing configuration for the pipetting technique used to access the tubes. Sample containers in racks with the **Requires Piercing Tips** option selected will be accessed one at a time.

Using the Automated Tube Bar Code Reader in a Biomek Method

The Automated Tube Bar Code Reader can be used in Biomek methods. Specialized ATBCR steps are used to control operations of the ATBCR. Other Biomek steps, such as the **Transfer** and **Combine** steps, are used to control the Biomek pod to access the tubes in a tube rack located at the presentation point. Programming steps like **Loop**, **If**, and **Worklist** can also be used in conjunction with the ATBCR to further control operations.

NOTE Sample racks at the presentation point of the ATBCR may only be accessed by probes 5 through 8. Because of this limitation, samples cannot be transferred from sample containers at the ATBCR to wells in the back rows of a microplate (rows A-D on a 96-well plate) located on a deck position in the back row of the Biomek workstation.

Using the ATBCR in a method includes:

- *Using the ATBCR Steps*
- *Using the ATBCR in a Loop Step*
- *Reloading the Input Tray During a Method*
- *Using Data Sets with the ATBCR*
- *Recovering from an Aborted Method with the ATBCR*

Using the ATBCR Steps

The Automated Tube Bar Code Reader software install creates a new **ATBCR** step palette with specialized steps to control operations at the ATBCR.

The ATBCR step palette contains six steps needed to use the Automated Tube Bar Code Reader (ATBCR) in a Biomek method:

- *Using the Initialize Step*
- *Using the Count Racks Step*
- *Using the Present Rack Step*
- *Using the Store Rack Step*
- *Using the Report Step*
- *Using the Unlatch Step*

Using the Initialize Step

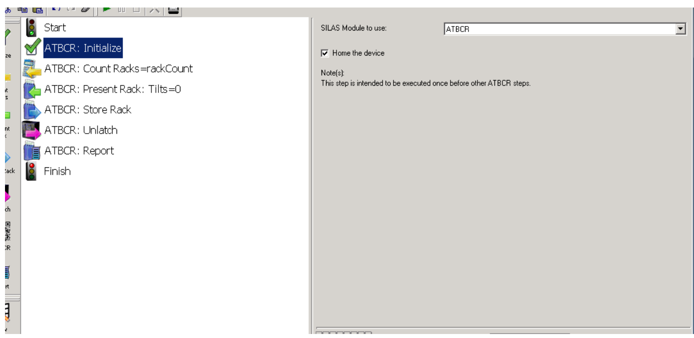
The **Initialize** step prepares the ATBCR for operation and removes recorded bar code data sets from earlier runs from Biomek Software. An **Initialize** step must be used in a method before any other ATBCR steps are used.

To use the Initialize step in a method:

1 Insert the **Initialize** step into the Method View (Figure 3.24).

NOTE If the Initialize step is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder* for more information on the Palette Builder.

Figure 3.24 Initialize step configuration



2 In **SILAS module to use**, select the desired **ATBCR** SILAS module to initialize. If only one **ATBCR** module is present, it is auto-selected.

3 Choose **Finish** or any step following the **Initialize** step in the Method View to validate the step configuration.

When you run the initialization with any tilts included, the system presents a caution dialog box to be sure that you are using capped tubes.

Figure 3.25 Tilt Warning Dialog

Using the Count Racks Step

The **Count Racks** step counts the number of racks stored in the input tray and saves it to a variable. That variable can then be used to configure other steps in the method, such as a **Loop** step to define the number of iterations of the loop to perform.

When the Count Racks step is executed, it:

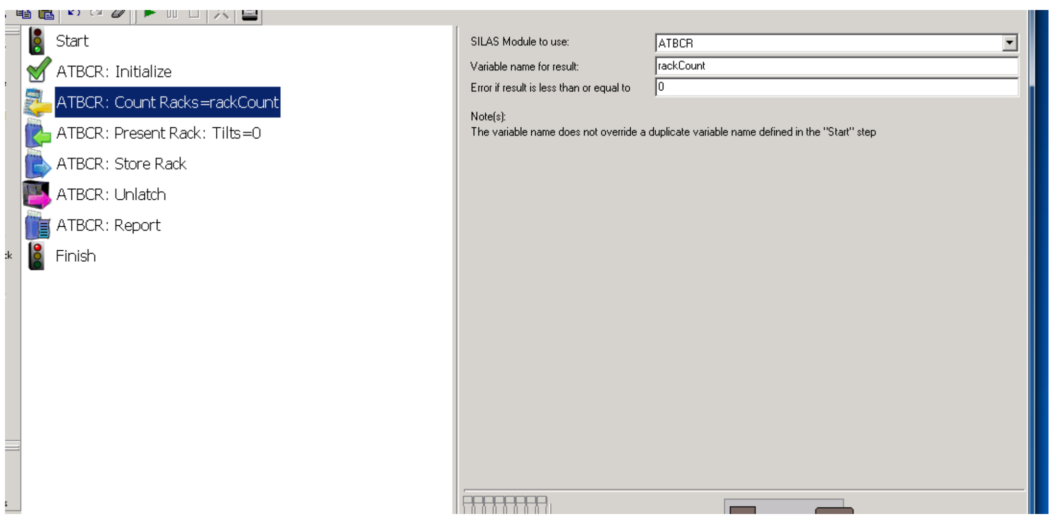
- counts the number of racks in the input tray
- creates a variable with the specified name
- sets the value of the variable created to the number of racks counted.

To use the Count Racks step in a method:

1 Insert the **Count Racks** step into the Method View (Figure 3.26).

NOTE If the Count Racks step is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder* for more information on the Palette Builder.

Figure 3.26 Count Racks step configuration



2 In **SILAS module to use**, select the ATBCR SILAS module of the ATBCR device of which to count racks. If only one ATBCR module is present, it is auto-selected.

3 In **Variable name for result**, enter the desired name for the variable to which the rack count is saved. This variable name can be entered in other step configurations. Refer to the *Biomek Software User's Manual, Using Variables and Expressions in a Method*, for more information about using variables in a method.

NOTE The default value is **rackCount**. The variable name must not match the name of any variable created in the **Start** step. The **Count Racks** step cannot override the value of a variable defined in the **Start** step.

4 In **Error if less than or equal to**, enter at what count value the step should report an error if there are not at least the specified value tube racks in the input tray. If **Count Racks** returns a value that is less than or equal to the value specified, Biomek Software returns an error.

NOTE The maximum number of tube racks that can be held in the input tray is 24, so the value entered should be less than 24. Entering a negative value will mean it never reports an error, as the count will always be at least 0.

5 Choose **Finish** or any step following the **Count Racks** step in the Method View to validate the step configuration.

Using the Present Rack Step

The **Present Rack** step is used to bring a sample rack from the input tray of the Automated Tube Bar Code Reader (ATBCR) to the presentation point. As the rack is presented, the bar codes are read. Rack bar codes identify to Biomek Software the type of tubes in the rack, while the tube bar codes are assigned to a data set specified in the step configuration. Refer to *Using Data Sets with the ATBCR* for more information on how data sets are used with the ATBCR.

The **Present Rack** step also allows:

- specifying a default rack type
- tilting tube racks a configured number of times before presenting it to agitate the contents of the tubes
- defining error handling settings when a rack or tube bar code is missing
- breaking out of a loop if there are no more racks.

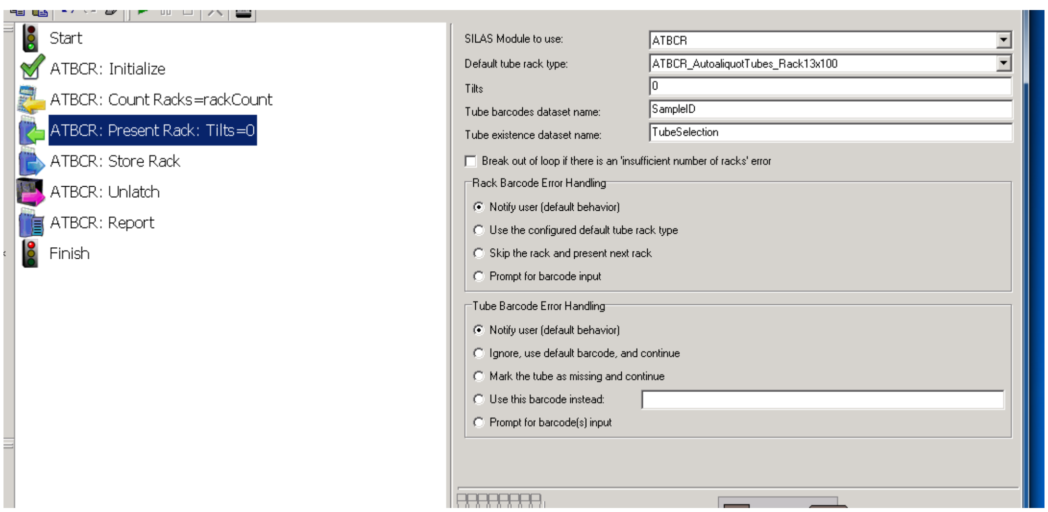
NOTE The **Present Rack** step cannot be used when a rack is already at the presentation point. Use a **Store Rack** step (refer to *Using the Store Rack Step*) to send the rack back to the output tray of the ATBCR before presenting a new rack.

To use the Present Rack step in a method:

1 Insert the **Present Rack** step into the Method View (Figure 3.27).

NOTE If the **Present Rack** step is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder*, for more information on the Palette Builder.

Figure 3.27 Present Rack step configuration



2 In **SILAS module to use**, select the ATBCR SILAS module of the ATBCR device at which to present a rack. If only one ATBCR module is present, it is auto-selected.

CAUTION

A mismatch between the Default Tube Rack type and the physical rack present when ignoring missed rack bar codes may result in damage to equipment, damage to labware, improper pipetting, and/or spilled samples.

3 In **Default tube rack type**, select the rack labware type to use as a default. If the error handling is set to ignore missed rack bar codes and use the default type, this is the rack type that is used.

NOTE A Default Tube Rack must be specified, even if the error handling is not set to use the default type. Biomek Software also uses the default tube rack to validate the method. If no Default Tube Rack is set, the method will not validate or run.

CAUTION

Tilting should only be used with sealed or capped tubes. Tilting unsealed or uncapped tubes may result in samples spilled inside the ATBCR.

CAUTION

Using sealed or capped tubes requires proper tips to be used for piercing the seals or septa. Using tips that are not equipped for piercing may result in damage to equipment, damage to labware, improper pipetting, and/or spilled samples.

4 In **Tilts**, enter the number of times to tilt the tube rack to agitate the tube contents prior to moving the rack to the presentation point.

NOTE Tilting is performed as configured in the ATBCR Calibration Utility. Refer to *Setting Tilting Parameters* for details and to configure the tilting settings.

5 In **Tube barcodes dataset name**, enter the desired name for the dataset that stores the tube bar code. The default value is **SampleID**. Refer to *Using Data Sets with the ATBCR* for more information on how data sets are used with the ATBCR.

6 In **Tube existence dataset name**, enter the desired name for the dataset that specifies if a tube is present or not. A value of **TRUE** is assigned to this data set if a proper bar code is read for the tube; if no bar code is read for the tube, or there is an error reading the tube bar code and error handling is configured to **Mark the tube as missing and continue the method**, the value for this data set is set to **FALSE**. The default value is **TubeSelection**. Refer to *Using Data Sets with the ATBCR* for more information on how data sets are used with the ATBCR.

7 Select **Break out of loop if there is an 'insufficient number of racks' error**, if desired. When selected, if the **Present Rack** step is in a **Loop** step, and the configured action cannot be completed because the input tray is empty, it automatically breaks out of the loop.

NOTE If the **Present Rack** step is not contained inside a loop and Break out of the current loop is selected, a validation error occurs.

NOTE When not selected and a **Present Rack** step cannot be completed because the input tray is empty, a prompt appears with options to Retry, Break, or Abort. This allows the ATBCR to be reloaded during a method, (refer to *Reloading the Input Tray During a Method*).

CAUTION

Loading tube racks backwards in the input tray when the rack bar code error handling option "Use the configured rack default type" is selected may report improper results.

8 In **Rack Bar Code Error Handling**, select the desired setting:

- **Notify user (default behavior)** — interrupt the method and present a dialog for the user to specify the desired action. The method is halted until the user input is entered.
- **Use the configured default tube rack type** — access the sample containers using the labware type definition for the tube rack specified in **Default test tube rack type**.

  NOTE Using the default rack type when the actual rack at the presentation point does not match the default may result in crashes, inaccurate pipetting, or other undesired side effects.

- **Skip the rack and present next rack** — store the rack for which the bar code read failed and present the next rack from the input tray. If a Report is generated, the skipped rack is captured in the report.
- **Prompt for barcode input** — interrupt the method and present a dialog for the user to enter the rack bar code. The method is halted until the rack bar code is entered.

⚠ CAUTION

Loading tube racks backwards in the input tray when the tube bar code error handling option “Ignore, use default bar code, and continue the method” is selected may report improper results.

9 In **Tube Barcode Error Handling**, select the desired setting:

- **Notify user (default behavior)** — interrupt the method and present a dialog for the user to specify the desired action. The method is halted until the user input is entered.
- **Ignore, use default barcode, and continue** — continue with the method using a default tube bar code of an empty string for any missing bar codes. The tube is still accessed during pipetting steps using the **TubeSelection** data set to specify the wells to transfer (refer to *Using Data Sets with the ATBCR*).
- **Mark the tube as missing and continue** — continues the method after marking the tube as missing by setting the value of the data set for tube existence to **False**. The tube will not be accessed during any pipetting steps when using the **data set for tube existence** to specify the wells to transfer (refer to *Using Data Sets with the ATBCR*). If an ATBCR report is generated, the missed tube is captured in the report.
- **Use this barcode instead** — assigns a specified bar code to the tube. This can be useful with dynamic methods that use the bar code for decision making.

  NOTE If Use this bar code instead is selected, enter the desired bar code in the adjacent text field.

- **Prompt for barcode(s) input** — interrupt the method and present a dialog for the user to enter the tube bar code. The method is halted until the tube bar code is entered.

10 Choose **Finish** or any step following the **Present Rack** step in the Method View to validate the step configuration.

Using the Store Rack Step

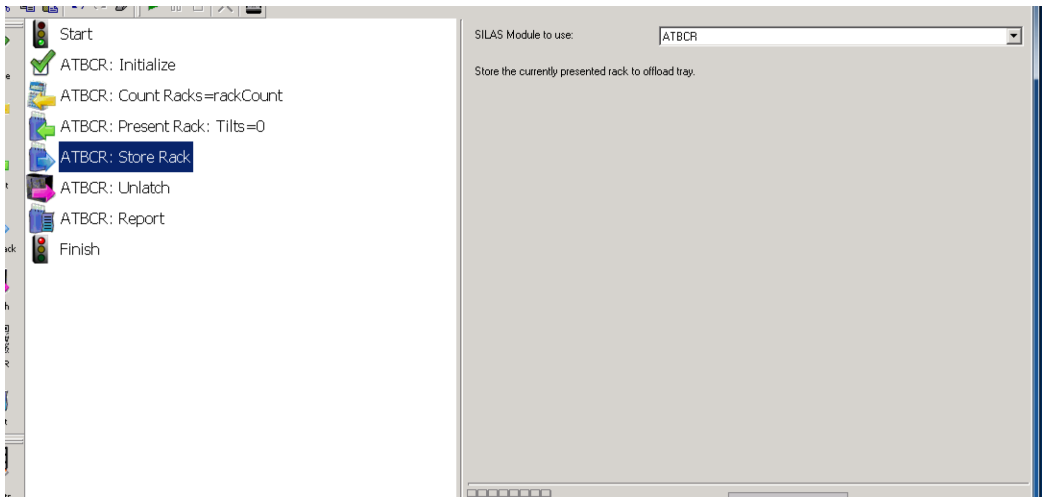
The **Store Rack** step is used to send a sample rack from the presentation point to the output tray of the Automated Tube Bar Code Reader (ATBCR).

To use the Store Rack step in a method:

1 Insert the **Store Rack** step into the Method View (Figure 3.28).

NOTE If the **Store Rack** is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder,* for more information on the Palette Builder.

Figure 3.28 ATBCR Store Rack configuration



2 In **SILAS module to use**, select the ATBCR SILAS module of the ATBCR device at which to store a rack. If only one ATBCR module is present, it is auto-selected.

3 Choose **Finish** or any step following the **Store Rack** step in the Method View to validate the step configuration.

Using the Report Step

The **Report** step is used to generate a report of actions and errors involving the Automated Tube Bar Code Reader (ATBCR).

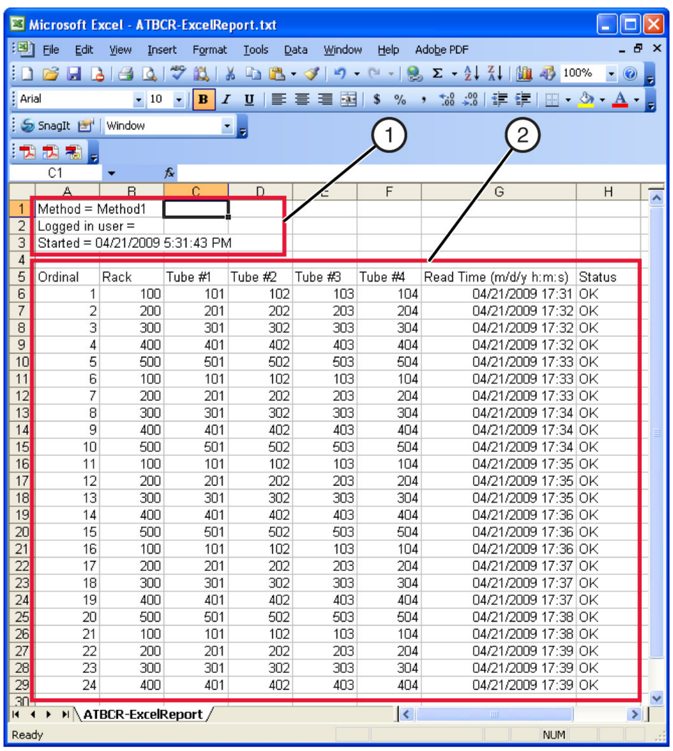
The Report step generates a CSV file that contains the following information:

- Header information, including name of the method run, logged in user, method start time, and ATBCR serial number.
- Rack and tube bar codes, in the order they are read.
- Date and time each rack was read.
- Error status of any unread or missing tubes for each rack.

Reports can be generated in two formats:

- **Optimize for Microsoft Excel compatibility** (Figure 3.29)—format the report in tab-delimited columns which can be opened in Microsoft Excel.

Figure 3.29 Example of a report optimized for Excel compatibility generated by the ATBCR Report step

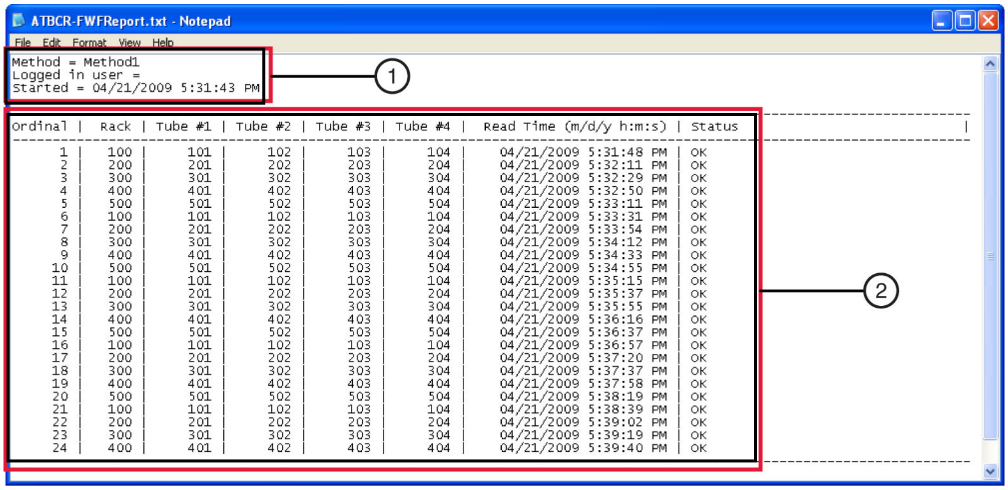


Ordinal	Rack	Tube #1	Tube #2	Tube #3	Tube #4	Read Time (m/d/y h:m:s)	Status
1	100	101	102	103	104	04/21/2009 17:31	OK
2	200	201	202	203	204	04/21/2009 17:32	OK
3	300	301	302	303	304	04/21/2009 17:32	OK
4	400	401	402	403	404	04/21/2009 17:32	OK
5	500	501	502	503	504	04/21/2009 17:33	OK
6	100	101	102	103	104	04/21/2009 17:33	OK
7	200	201	202	203	204	04/21/2009 17:33	OK
8	300	301	302	303	304	04/21/2009 17:34	OK
9	400	401	402	403	404	04/21/2009 17:34	OK
10	500	501	502	503	504	04/21/2009 17:34	OK
11	100	101	102	103	104	04/21/2009 17:35	OK
12	200	201	202	203	204	04/21/2009 17:35	OK
13	300	301	302	303	304	04/21/2009 17:35	OK
14	400	401	402	403	404	04/21/2009 17:36	OK
15	500	501	502	503	504	04/21/2009 17:36	OK
16	100	101	102	103	104	04/21/2009 17:36	OK
17	200	201	202	203	204	04/21/2009 17:37	OK
18	300	301	302	303	304	04/21/2009 17:37	OK
19	400	401	402	403	404	04/21/2009 17:37	OK
20	500	501	502	503	504	04/21/2009 17:38	OK
21	100	101	102	103	104	04/21/2009 17:38	OK
22	200	201	202	203	204	04/21/2009 17:39	OK
23	300	301	302	303	304	04/21/2009 17:39	OK
24	400	401	402	403	404	04/21/2009 17:39	OK

1. Header Information
2. Bar Code Information

- **Optimize for readibility on a fixed-width font** (Figure 3.30)—format that right justifies columns using spaces; when opened in Microsoft Excel, does not automatically format into columns.

Figure 3.30 Example of a report optimized for readibility generated by the ATBCR Report step



Ordinal	Rack	Tube #1	Tube #2	Tube #3	Tube #4	Read Time (m/d/y h:m:s)	Status
1	100	101	102	103	104	04/21/2009 5:31:48 PM	OK
2	200	201	202	203	204	04/21/2009 5:32:11 PM	OK
3	300	301	302	303	304	04/21/2009 5:32:29 PM	OK
4	400	401	402	403	404	04/21/2009 5:32:50 PM	OK
5	500	501	502	503	504	04/21/2009 5:33:11 PM	OK
6	100	101	102	103	104	04/21/2009 5:33:31 PM	OK
7	200	201	202	203	204	04/21/2009 5:33:54 PM	OK
8	300	301	302	303	304	04/21/2009 5:34:12 PM	OK
9	400	401	402	403	404	04/21/2009 5:34:33 PM	OK
10	500	501	502	503	504	04/21/2009 5:34:55 PM	OK
11	100	101	102	103	104	04/21/2009 5:35:15 PM	OK
12	200	201	202	203	204	04/21/2009 5:35:37 PM	OK
13	300	301	302	303	304	04/21/2009 5:35:55 PM	OK
14	400	401	402	403	404	04/21/2009 5:36:16 PM	OK
15	500	501	502	503	504	04/21/2009 5:36:37 PM	OK
16	100	101	102	103	104	04/21/2009 5:36:57 PM	OK
17	200	201	202	203	204	04/21/2009 5:37:20 PM	OK
18	300	301	302	303	304	04/21/2009 5:37:37 PM	OK
19	400	401	402	403	404	04/21/2009 5:37:58 PM	OK
20	500	501	502	503	504	04/21/2009 5:38:19 PM	OK
21	100	101	102	103	104	04/21/2009 5:38:39 PM	OK
22	200	201	202	203	204	04/21/2009 5:39:02 PM	OK
23	300	301	302	303	304	04/21/2009 5:39:19 PM	OK
24	400	401	402	403	404	04/21/2009 5:39:40 PM	OK

1. Header Information
2. Bar Code Information

The information displayed in the ATBCR report is described in the table below.

Table 3.8 Information displayed in ATBCR report

Property	Description	Additional Information
Header Information		
Method	Name of the method run from which the report was generated.	
Logged in user	User name of the user logged in at the time the report was generated.	If Accounts & Permissions is not installed and enabled, Logged in user is left blank.
Started	Date and time stamp of when the method started.	
Bar Code Information		
Ordinal	The order in which the rack was accessed.	When unloading the output tray of the ATBCR, the rack listed as Ordinal 1 is located at the back.
Rack	The bar code read for the rack.	
Tube #1 - Tube #4	The bar codes read for each of the tubes in the rack.	A $ indicates that the tube was missing.
Read Time	The time at which the rack and tube bar codes were read.	
Status	A description of any errors when reading bar codes.	If **Status** is **OK**, the rack and all tube bar codes were read properly.

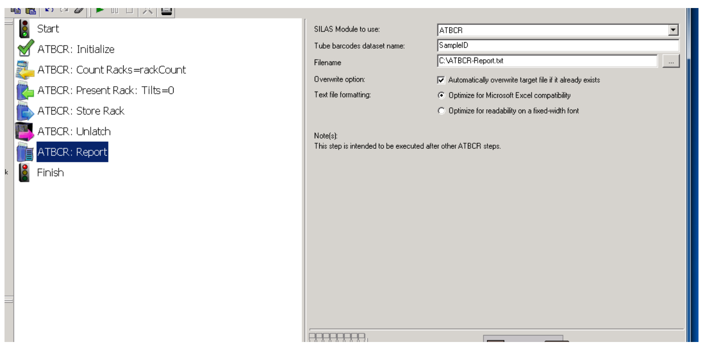
To use the Report step in a method:

1 Insert the **Report** step into the Method View (Figure 3.31).

NOTE If the **Report** step is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder* for more information on the Palette Builder.

NOTE The report is generated when the **Report** step is executed during the method run. If the method is aborted before the **Report** step is executed, no report is generated. Add the **Report** step as early in the method as possible following the actions on the Automated Tube Bar Code Reader.

Figure 3.31 Report step configuration



2 In **SILAS Module to use**, select the ATBCR SILAS module of the ATBCR device to generate a report for. If only one ATBCR module is present, it is auto-selected.

3 In **Tube barcodes dataset name**, enter the name of the data set that contains bar code values for the samples. This should match the value entered in the **Present Rack** step. The default value is **SampleID**.

4 In **Filename**, browse to and select the destination folder to save the report and specify a file name. Make sure the file name ends with a .txt extension. The default is **C:\ATBCR-Report.txt**.

5 In **Overwrite option**, select **Automatically overwrite target file if it already exists**, if desired.

NOTE If the Overwrite file option is not selected and a file with the name specified in Write report to this text file already exists, a validation error occurs.

6 In **Text file formatting**, select the desired option:

- **Optimize for Microsoft Excel compatibility** — format the report in tab-delimited columns which can be opened in Microsoft Excel.
- **Optimize for readability on a fixed-width font** — format that right justifies columns using spaces.

7 Choose **Finish** or any step following the **Report** step in the Method View to validate the step configuration.

Using the Unlatch Step

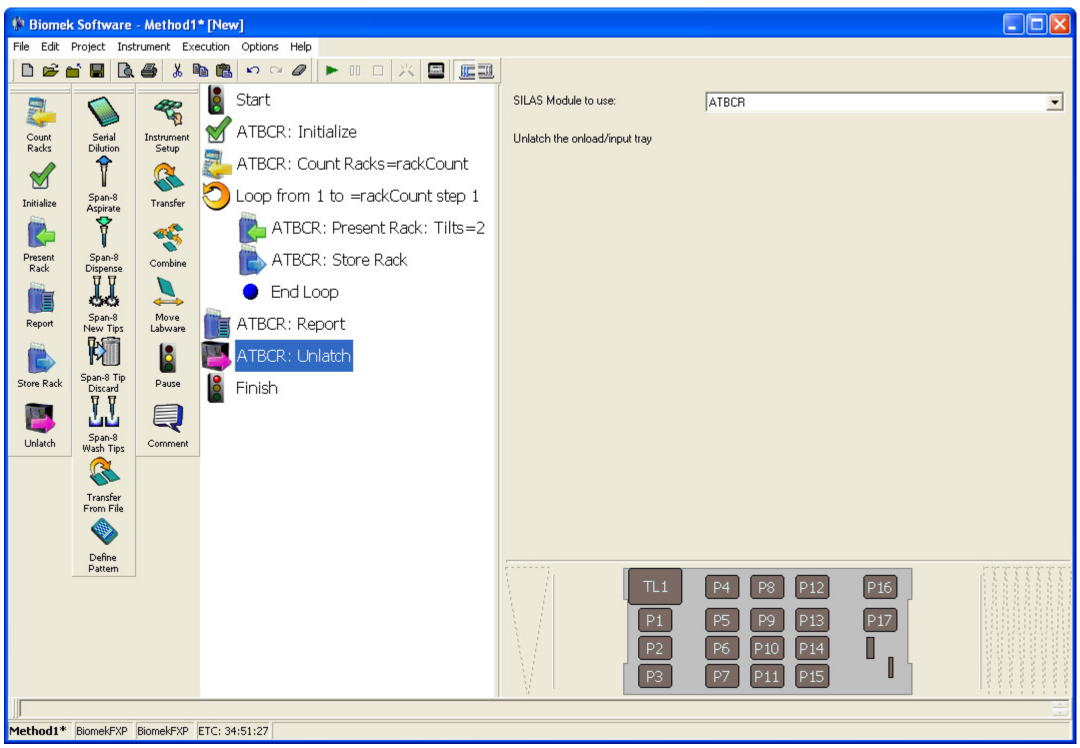
The **Unlatch** step unlatches the input tray, allowing access to add and remove tube racks from the tray. Using an **Unlatch** step just prior to the **Finish** step unlatches the cover and prepares the ATBCR to be unloaded at the completion of the method. It may also be used in the middle of a method to unlatch the cover and allow the input rack to be reloaded during a method (see *Reloading the Input Tray During a Method*).

To use the Unlatch step in a method:

1 Insert the **Unlatch** step into the Method View (Figure 3.32).

NOTE If the **Unlatch** step is not displayed, add it from the Palette Builder. The **ATBCR** steps are found in the **ATBCR** category on the Steps tab of the Palette Builder. Refer to the *Biomek Software User's Manual, Using the Step Palette Builder*, for more information on the Palette Builder.

Figure 3.32 Unlatch step configuration



2 In **SILAS module to use**, select the ATBCR SILAS module of the ATBCR device to unlatch. If only one ATBCR module is present, it is auto-selected.

3 Choose **Finish** or any step following the **Unlatch** step in the Method View to validate the step configuration.

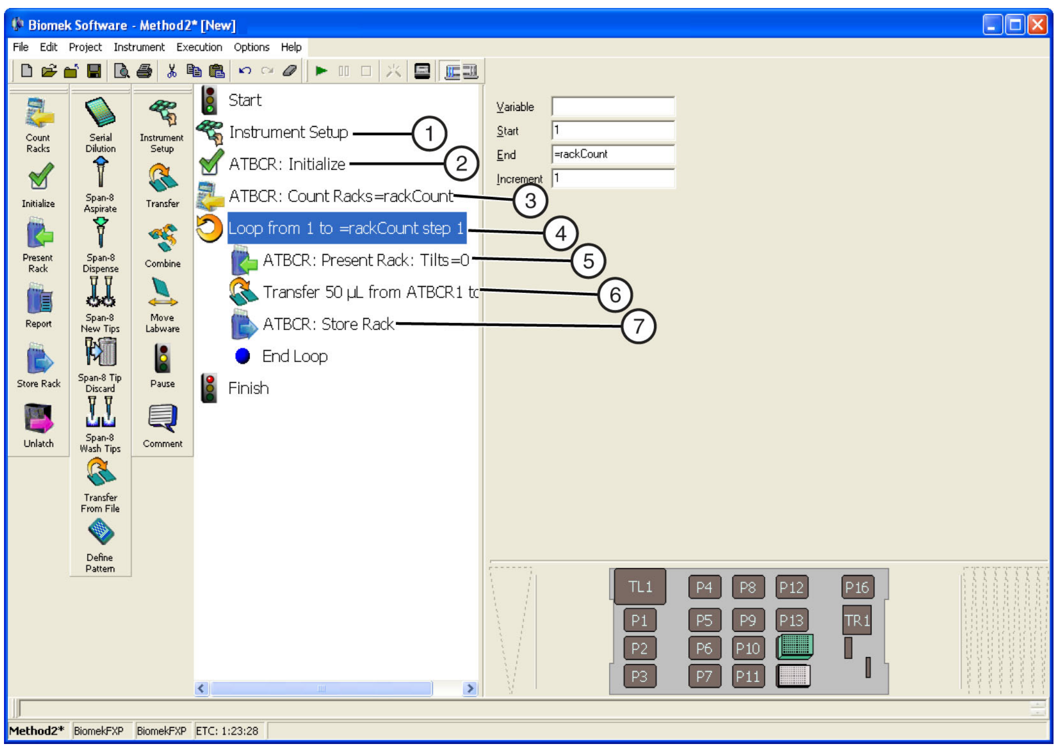
Using the ATBCR in a Loop Step

A tube rack holds only four tubes, making it possible to transfer only four samples at a time. To transfer from several source tubes on tube racks, it may be useful to use a **Loop** step to perform several iterations of a **Present Rack**, **Transfer**, and **Store Rack** cycle.

The example method below (Figure 3.33) shows how to use a **Loop** step to transfer samples from up to 96 tubes stored in up to 24 racks to a 96-well microplate. The steps inside the loop perform the following for each iteration or cycle:

- Presents the next rack from the input tray of the ATBCR.
- Transfers the samples from all four source tubes to the next four available wells on the 96-well microplate destination.
- Stores the rack back in the output tray of the ATBCR.

Figure 3.33 Example method using Loop and Transfer with ATBCR



The following table outlines the Biomek steps used to create the method shown in Figure 3.33 and the actions required to configure the method.

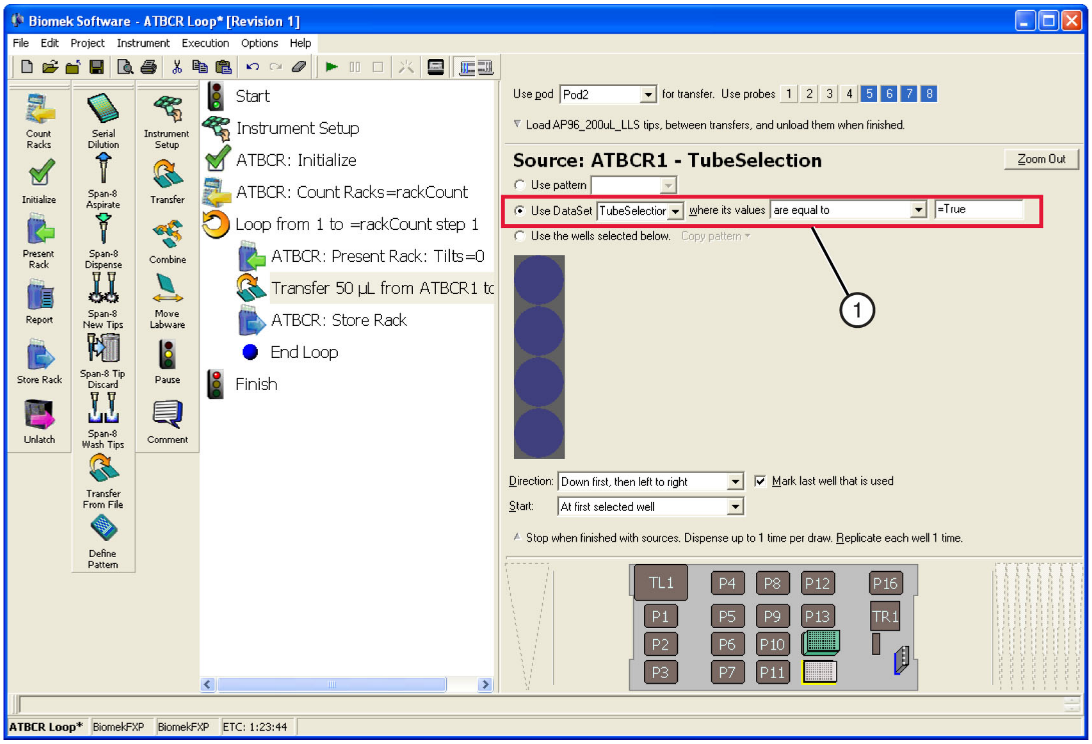
Table 3.9 Using a Loop step to transfer from multiple sample racks to a 96-well plate

Step	Description	Actions
1	Insert an **Instrument Setup** step and add the required labware.	**1.** Insert an Instrument Setup step into the Method View. **2.** Drag an LLS-capable tip box to any accessible deck position. **3.** Drag a 96-well microplate to any accessible deck position.
2	Insert an **Initialize** step.	Insert an **Initialize** step into the Method View.
3	Insert and configure a **Count Racks** step.	Refer to *Using the Count Racks Step*.
4	Insert and configure a **Loop** step.	**1.** Insert a **Loop** step into the Method View. **2.** In **Start**, enter **1**. **3.** In **End**, enter **=rackCount**. This is the variable that stores the number of racks in the input tray from the **Count Racks** step (3). **4.** In **Increment**, enter **1**. **5.** Add the following steps between the **Loop** and **End Loop** icons: • **Present Rack** • **Transfer** • **Store Rack**
5	Configure the **Present Rack** step.	Refer to *Using the Present Rack Step*.

Table 3.9 Using a Loop step to transfer from multiple sample racks to a 96-well plate

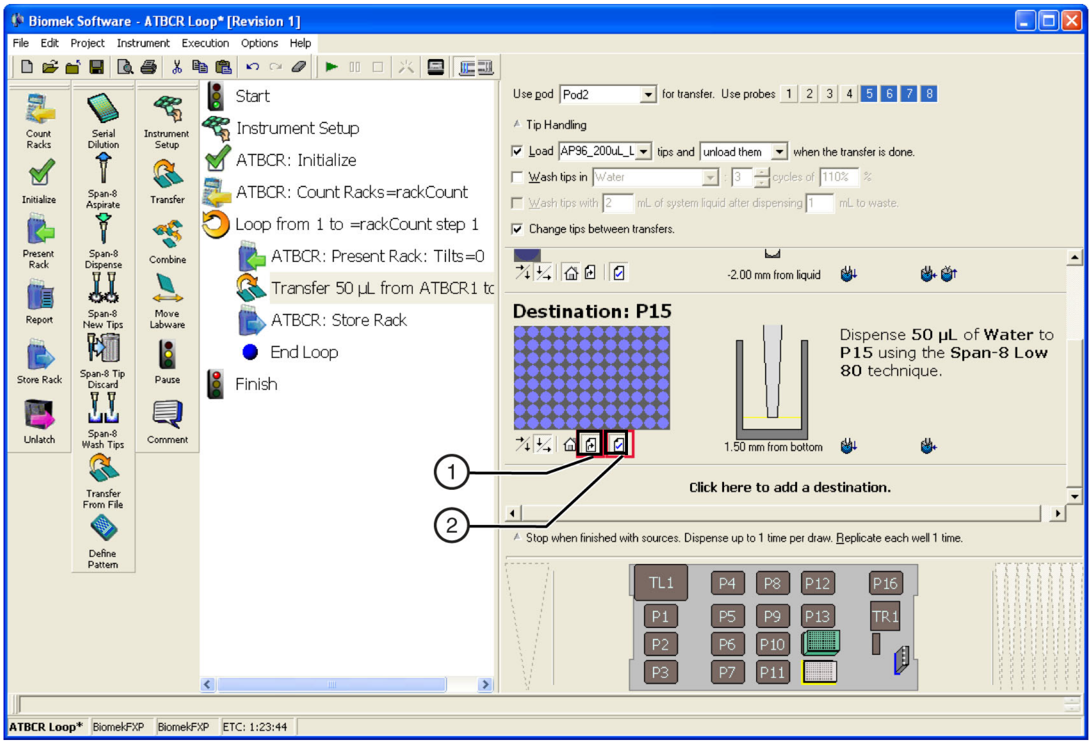
Step	Description	Actions
6	Configure the **Transfer** step.	**1.** In **Probes**, select **5-8**. Only probes 5-8 can access tubes at the presentation point. **2.** On the Current Deck Display, click on the tube rack at **ATBCR1** to add the tube rack as the source labware. **3.** On the Current Deck Display, click on the 96-well microplate to add it as the destination labware. **4.** In the **Source Labware**, double-click the graphic of the tube rack to zoom in on it. **5.** Select the **Use Data Set** option and configure it to *Use Data Set* **TubeSelection** *where its values* **are equal to =True** (Figure 3.34). **6.** In the **Destination Labware** configuration, select **Start after last marked well** and **Set mark** by clicking on the icons beneath the labware graphic (Figure 3.35). **NOTE** Marks allow for subsequent transfers to begin after the last well that the previous transfer accessed. If either of these options is not selected, each iteration of the **Loop** will begin at the first well of the destination plate. **7.** Enter the volume to transfer. **8.** In **Transfer Details**, be sure you have the **Stop when finished with** option open, then select **Sources**. This option tells Biomek Software that the **Transfer** step is complete when all the selected sources have been transferred. **NOTE** If **Destinations** is selected, it attempts to continue transferring from the four tubes at **ATBCR1** until each of the 96 wells on the destination has received a source.
7	Configure the **Store Rack** step.	Refer to *Using the Store Rack Step*.

Figure 3.34 Using Tube Selection data set to configure the source wells to aspirate in Transfer step



1. Using data set to configure well patterns

Figure 3.35 Setting and using marks in a Transfer step



1. Start after last marked well
2. Set mark

Reloading the Input Tray During a Method

The input tray of the Automated Tube Bar Code Reader (ATBCR) holds up to 24 racks, or 96 samples, which may be processed with uninterrupted operation of the Biomek workstation. It is possible to process more than 96 samples in a single method by manually removing sample racks from the output tray and reloading the input tray during a method by unlatching the cover and using a **Pause** step to pause the method and prompt the user to reload the input tray.

When the **Pause** step halts the instrument, the amber indicator lights on the front of the unit are activated, and a prompt appears. The prompt displays the text inserted in the **Pause** step configuration and requires acknowledgement before the method continues. Refer to the Biomek Software User’s Manual for more information about using the **Pause** step in a method.

When loading tube racks into the input tray, make sure that the bar codes on the rack and the individual tubes are facing the rear of the ATBCR. If a sample rack is placed in the input tray backwards, the bar code reader will not read the rack or sample container bar codes and errors are handled as configured in the Biomek step or **Device Editor** action that requested the bar code to be read.

CAUTION

Loading tube racks backwards in the input tray when the rack bar code error handling option "Use the configured rack default type" is selected may report improper results.

CAUTION

Loading tube racks backwards in the input tray when the tube bar code error handling option "Ignore, use default bar code, and continue the method" is selected may report improper results.

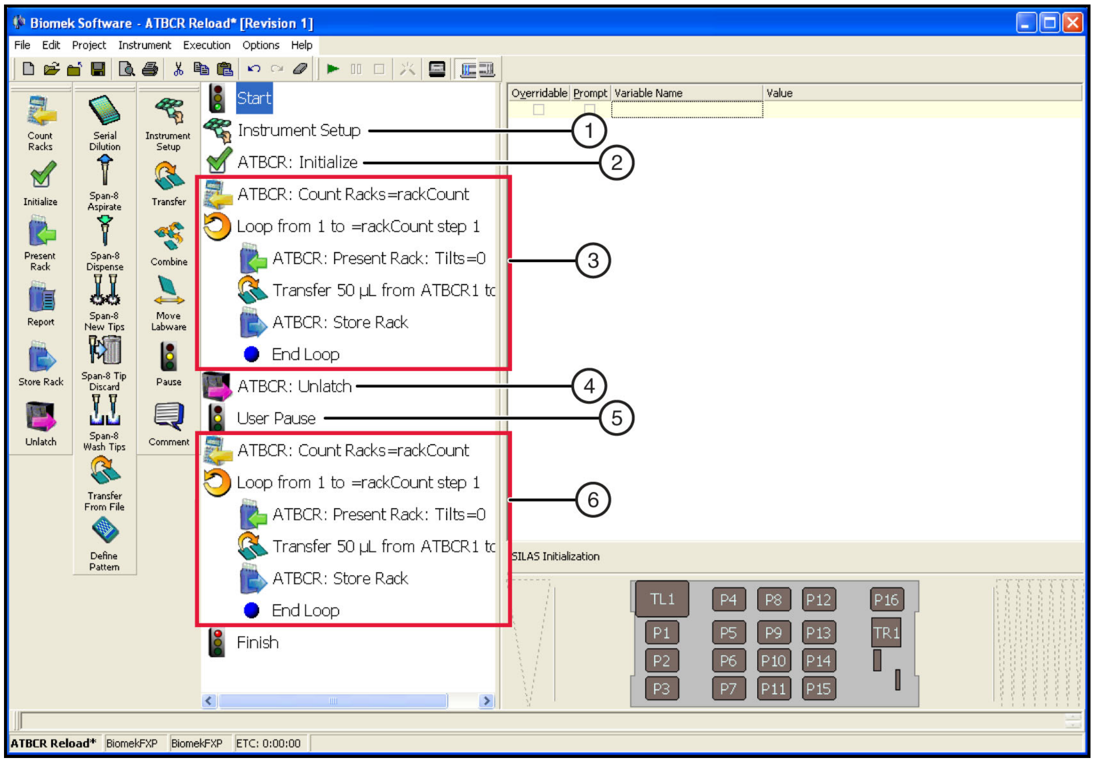
The prompt from the Pause step displays two options:

- **OK** — closes the prompt and continues the method. Choose this option after unloading the output tray and loading sample racks to the input tray.
- **Abort** — stops the current method. Any steps remaining in the method, including any **ATBCR Report** steps, are not completed and any logs or reports that would be generated by those steps are not created.

The example method below shows how to process more than 96 samples in a run by reloading the input tray. The method performs the following:

- Transfers up to 96 samples from sample racks presented to the ATBCR presentation point to first destination labware at P6 (Loop 1).
- Transfers up to another 96 samples from sample racks presented to the ATBCR presentation point to second destination labware at P7 (Loop 2).

Figure 3.36 Example method using Loop and Transfer with ATBCR



The following table outlines the Biomek steps used to create the method in Figure 3.36 and the actions required to configure the method.

Table 3.10 Using a Loop step to transfer from multiple sample racks to a 96-well plate

Step	Description	Actions
1	Insert an Instrument Setup step and add the required labware.	**1.** Insert an Instrument Setup step into the Method View. **2.** Drag an LLS-capable tip box to any accessible deck position. **3.** Drag two or more 96-well microplates to any deck positions. **NOTE** Do not use a deck position in the back row. Not all wells are accessible by the Span-8 Pod.
2	Insert an **Initialize** step.	Insert an **Initialize** step into the Method View.

Table 3.10 Using a Loop step to transfer from multiple sample racks to a 96-well plate

Step	Description	Actions
3	Insert and configure a **Count Racks** step and a **Loop** step to transfer samples from up to 24 sample racks to a 96-well microplate.	Refer to *Using the ATBCR in a Loop Step*, for more information, if necessary.
4	Insert an **Unlatch** step.	Insert an **Unlatch** step into the Method View. The **Unlatch** step unlatches the cover of the ATBCR and allows access to the input and output trays for emptying and reloading.
5	Insert and configure a **Pause** step.	**1.** Insert a **Pause** step into the method view. **2.** Select **Pause the whole system and display this message**, and enter the desired message in the text box. When the system pauses, a prompt appears displaying the message entered here.
6	Insert and configure another **Count Racks** step and a **Loop** step to transfer samples from up to 24 sample racks to a second 96-well microplate.	**1.** Configure the **Count Racks** and **Loop** steps the same as in 3 above. **2.** Repeat steps 4-6 as desired to process even more samples.

When the method is run, the top cover is unlatched and a prompt displaying the message entered in the **Pause** step (5) is displayed after the first **Loop** is completed. When the prompt appears, manually unload the output tray, load new sample racks to the input tray, and choose **OK** to continue the method.

Using Data Sets with the ATBCR

When sample container bar codes are read, two data sets are created for each sample:

- **SampleID** is a data set that identifies the sample. When the sample container bar code is read, the value of the bar code is set as the value for the **SampleID** data set.
- **TubeSelection** is a data set which specifies if the sample should be used in later steps, such as a **Transfer** step. This data set is set to a value of **True** in most cases. There are two situations in which it is set to **False**:
  - — No sample container is present in the position. Each rack has default bar codes in each sample position that are read when no sample container is present in that position. When this value is read, Biomek Software sets the **TubeSelection** data set to **False**.
  - — No bar code is read for the sample container, and the **Tube Bar Code Error Handling** settings are configured to **Mark the tube as missing and continue the method**. The sample is marked as missing by setting the **TubeSelection** data set to **False**.

NOTE Refer to the *Biomek Software User's Manual Using Sample Tracking and Data Sets In a Method* for more information about data sets.

NOTE The names of the two data sets created for the ATBCR can be configured in the **Present Rack** step (see *Using the Present Rack Step*). The examples below use the default names of **SampleID** and **TubeSelection** for these data sets.

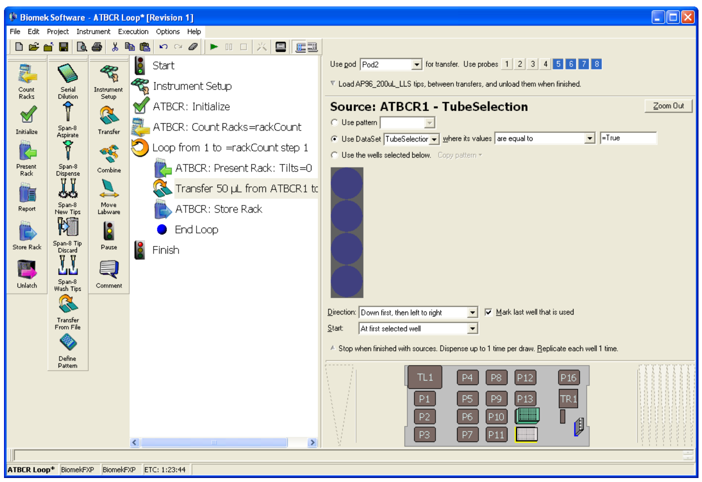
To take advantage of the **TubeSelection** data set, the well pattern for steps accessing the ATBCR needs to be specified using the **TubeSelection** data set.

To use the tube existence data set to specify the well pattern:

1 In the **Transfer** step, add the sample rack as a **Source** or **Destination**.

2 Double-click the sample rack in the **Source** or **Destination** configuration to zoom in on the rack (Figure 3.37).

Figure 3.37 Transfer step using TubeSelection data set to specify source wells



3 Select **Use DataSet** and choose **TubeSelection** to use the tube existence data set to specify the wells to transfer.

4 In **where its values**, choose **are equal to** and enter **=True** to transfer only those wells that have a value of **True** for the data set **TubeSelection**.

Recovering from an Aborted Method with the ATBCR

If a method is aborted while the Span-8 Pod is accessing tubes contained in a sample rack, the instrument needs to be put into a safe state prior to running another method.

NOTE The Automated Tube Bar Code Reader does not support the **Snap Continuation** feature of Biomek Software. Snapping a continuation in a method that uses the ATBCR may or may not have the expected results.

Restoring the instrument to a safe state after aborting a method includes:

- moving the pod away from the presentation point
- storing any rack at the presentation point
- unlatching the lid to allow access for unloading and loading tube racks

To prepare the instrument for another method after aborting a method:

1. From the **Instrument** menu, choose **Manual Control**. **Manual Control** appears.

2. Choose **Advanced Controls>Pod1** to access **Advanced Manual Control** for the Span-8 Pod.

   NOTE FX^P — for a dual pod instrument, select **Pod2**.

3. Choose **Move Z-Max** to move the pod to a safe height.

4. Choose **Close** to close **Advanced Manual Control**.

5. In **Manual Control**, click on a position away from the presentation point of the ATBCR.

   NOTE FX^P — for a dual pod instrument, make sure that **Pod2** is selected.

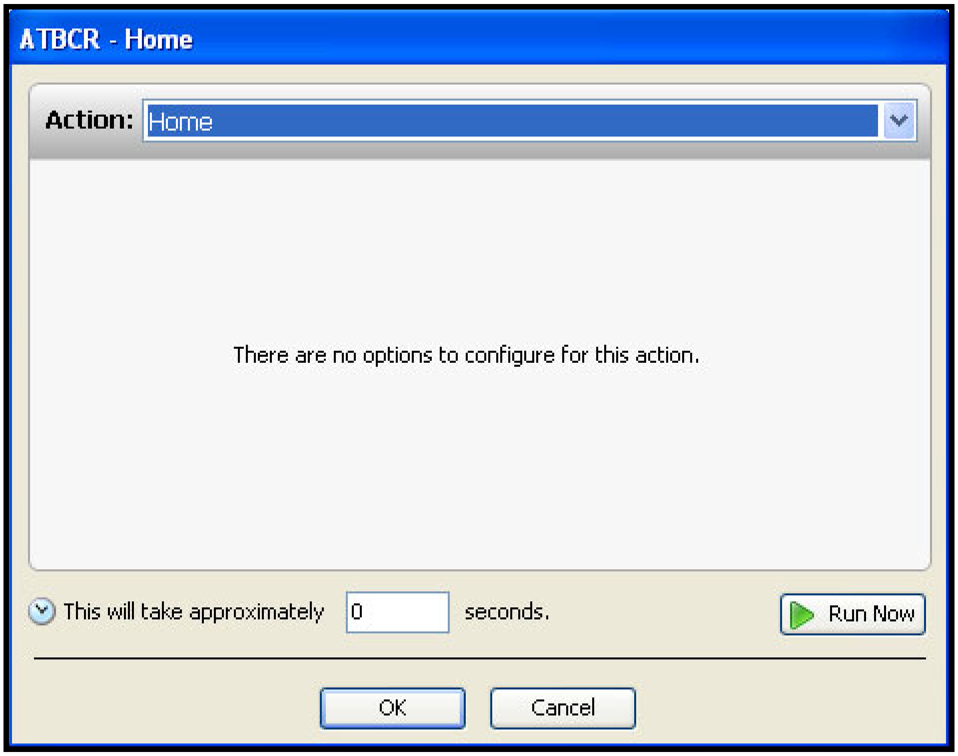
6. Choose **Exit** to close **Manual Control**.

7. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.

8. In **Device**, choose **ATBCR**.

9 Choose **Action Commands**. **ATBCR** appears (Figure 3.38).

Figure 3.38 ATBCR Device Action Commands



10 In **Action**, choose **Store Rack**:

11 Choose **Run Now** to store the sample rack from the presentation point to the output tray.

12 Choose **OK** to dismiss the **Command complete** message.

13 In **Action**, choose **Unlatch**.

14 Choose **Run Now** to unlatch the lid of the ATBCR.

15 Choose **OK** to dismiss the **Command complete** message.

16 Choose **Cancel** to close the ATBCR commands.

17 Choose **Close** to close **Device Editor**.

Manually Controlling the Automated Tube Bar Code Reader

Device Editor allows users to manually control ATBCR actions, such as presenting and storing racks or unlatching the cover, outside of methods.

The Device Editor is used for:

- *Configuring Options for the Automated Tube Bar Code Reader*
- *Calibrating the Automated Tube Bar Code Reader*
- *Performing Actions in the Device Editor*

Configuring Options for the Automated Tube Bar Code Reader

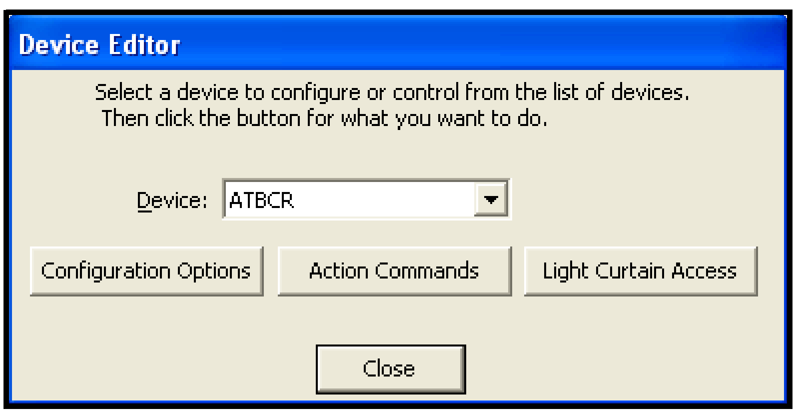
Configuration Options for the ATBCR allow for the communications port to which the ATBCR is connected to be configured. It also displays the module version and default communication timeout as read-only values.

NOTE The default communication timeout is how long Biomek Software waits for a response from the ATBCR module before displaying a timeout error.

To set the configuration options for the ATBCR:

1 From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears (Figure 3.39).

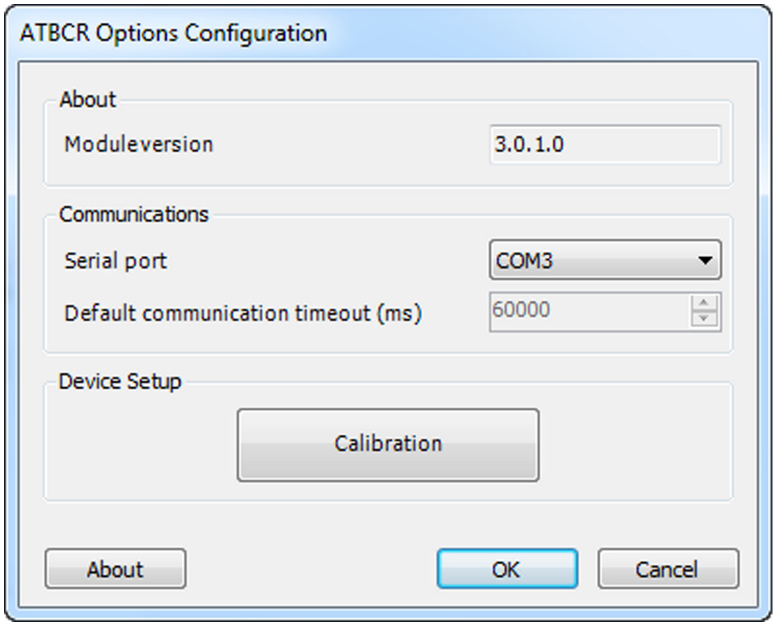
Figure 3.39 Selecting the ATBCR in the Device Editor



2 In **Device**, choose **ATBCR**.

3 Choose **Configuration Options. ATBCR Options Configuration** appears (Figure 3.40).

Figure 3.40 ATBCR configuration options



4 In **Serial port**, select the communications port on the Automation Controller to which the ATBCR is connected.

5 Choose **OK** to save the changes and close **ATBCR Options Configuration**, or **Cancel** to close **ATBCR Options Configuration** without saving changes.

6 Choose **Close** to dismiss the **Device Editor**.

Calibrating the Automated Tube Bar Code Reader

The **ATBCR Calibration Utility** sends information to the ATBCR firmware that helps control the tilting actions and bar code reading. The ATBCR Calibration Utility has a series of action buttons which allow some basic control of the ATBCR device on the top, and three tabs which allow for the configuration of various settings that can be sent to the firmware.

The action buttons under **Common Actions** perform operations as configured in the ATBCR module, which can be accessed through the **Device Editor**. There are also two actions under Data which allow settings to be stored to or retrieved from the ATBCR device. Table 3.11 shows the actions available on the **ATBCR Calibration Utility**.

Table 3.11 Action buttons on the ATBCR Calibration Utility

Action	Description
Data	
Save	Sends the entered parameters and settings to the ATBCR device.
Refresh	Reads values from the ATBCR devices and refreshes the parameter values displayed to the values read from the device.
Common Actions	
Initialize	Checks that there is a device attached to the controller.
Home	Homes the ATBCR device.
Unlatch	Unlatches the cover on the ATBCR device.
Present	Moves a sample rack from the input tray to the presentation point.
Offload	Stores a sample rack from the presentation point to the output tray.
Barcode On	Turns on the bar code reader.
Barcode Off	Turns off the bar code reader.
Count Rack	Counts the number of racks in the input tray.

The first two tabs allow for:

- *Setting Tilting Parameters*
- *Configuring Bar Code Formats*

The third tab is for Beckman Coulter Technical Support use only. If the parameters on the **Service Adjustments** tab need to be modified, contact Beckman Coulter Customer Technical Support.

Setting Tilting Parameters

⚠ CAUTION

Tilting should only be used with sealed or capped tubes. Tilting unsealed or uncapped tubes may result in samples spilled inside the ATBCR.

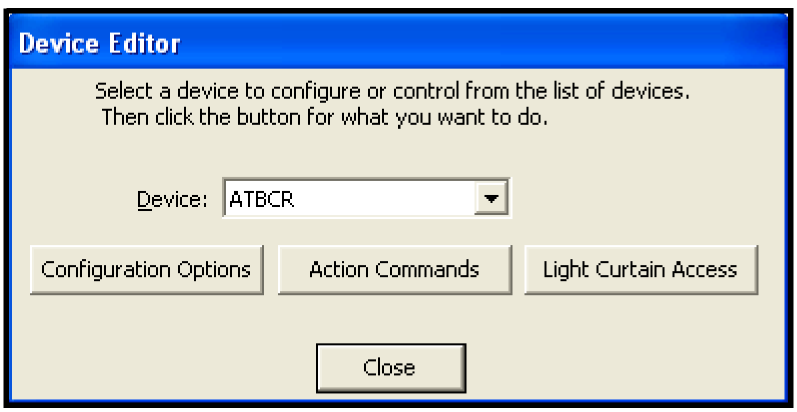
When the ATBCR presents a rack, it can optionally tilt the rack before presenting to agitate the contents of the tubes. The specific details of how that tilting occurs are configured on the **Tilting Parameters** tab.

When the ATBCR performs tilting, it first tilts to the start angle, then moves at the set speed to the end angle and back. It repeats this motion for the number of times it is configured to tilt.

To configure the tilting settings:

1 From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears (Figure 3.41).

Figure 3.41 Selecting the ATBCR in the Device Editor



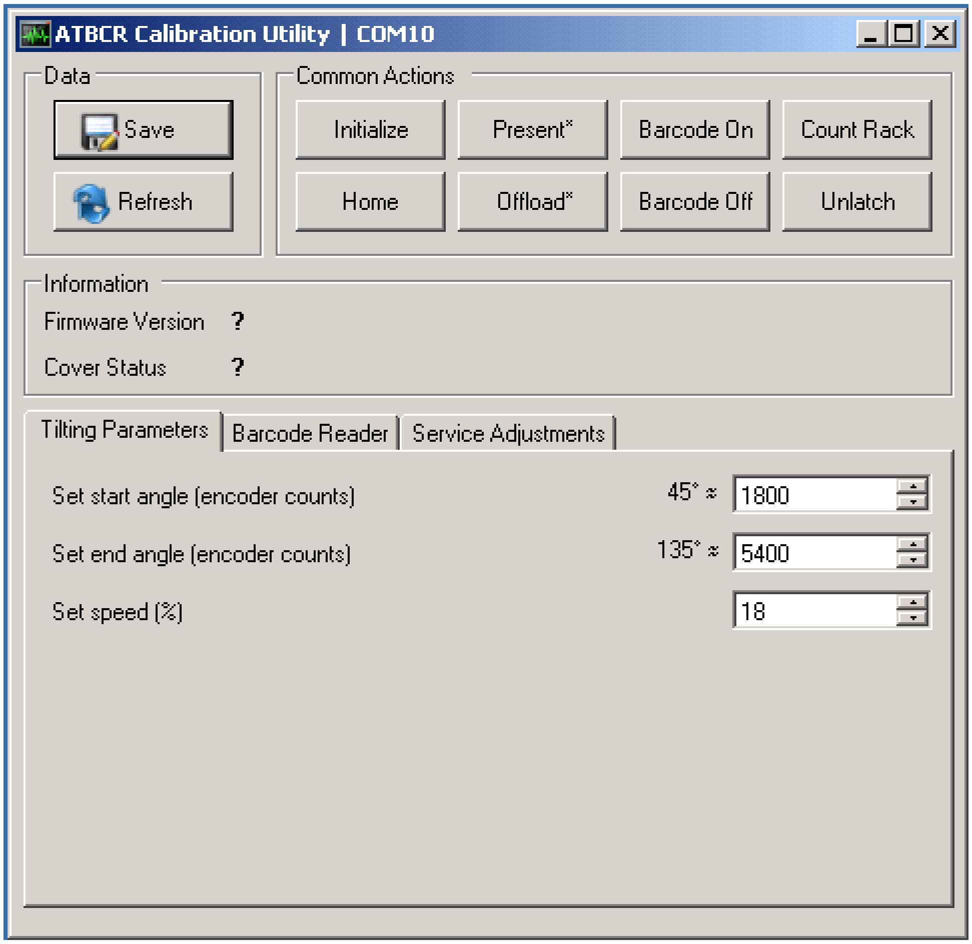
2 In **Device**, choose **ATBCR**.

3 Click on **Configuration Options**.

4 In **Device Setup**, choose **Calibration**. **ATBCR Calibration Utility** appears.

5 If necessary, select the **Tilting Parameters** tab to display the tilting configuration options (Figure 3.42).

Figure 3.42 ATBCR Calibration Utility — Tilting Parameter tab



6 In **Set start angle**, enter the encoder count value that corresponds to the starting angle for the tilting action (1 degree is approximately 33 encoder counts). The angle is displayed in read-only to the left of the encoder count value. An angle of 0° indicates the tubes are pointing straight up, and an angle of 90° indicates the tubes are pointing horizontally. The maximum angle the sample rack can be tilted is 150° (6000 encoder counts).

7 In **Set end angle**, enter the encoder count value that corresponds to the ending angle for the tilting action (1 degree is approximately 33 encoder counts). The angle is displayed in read-only to the left of the encoder count value. An angle of 0° indicates the tubes are pointing straight up, and an angle of 90° indicates the tubes are pointing horizontally. The maximum angle the sample rack can be tilted is 150° (6000 encoder counts).

CAUTION

The default tilt positions are 45° and 135°. Depending on labware and tilt speed, changing the tilt positions may cause the sample rack to be dislodged from its carrier. Do not use a non-default tilt angle without prior verification.

8. In **Set speed**, enter the speed of the tilting operation as a percentage of the maximum speed of the ATBCR device.

CAUTION

Not all tube types can be tilted at 100% speed. The default tilt speed for the instrument is 30%. Tilting larger tubes at 100% speed may result in the tube falling out of the carriage. The tilting speed must be limited to the largest tube type to be used in a method. See Table 3.3 for recommended maximum tilt speeds.

9. Choose **Save** to send the new tilting values to the ATBCR device firmware. All future tilting operations will use the new values.

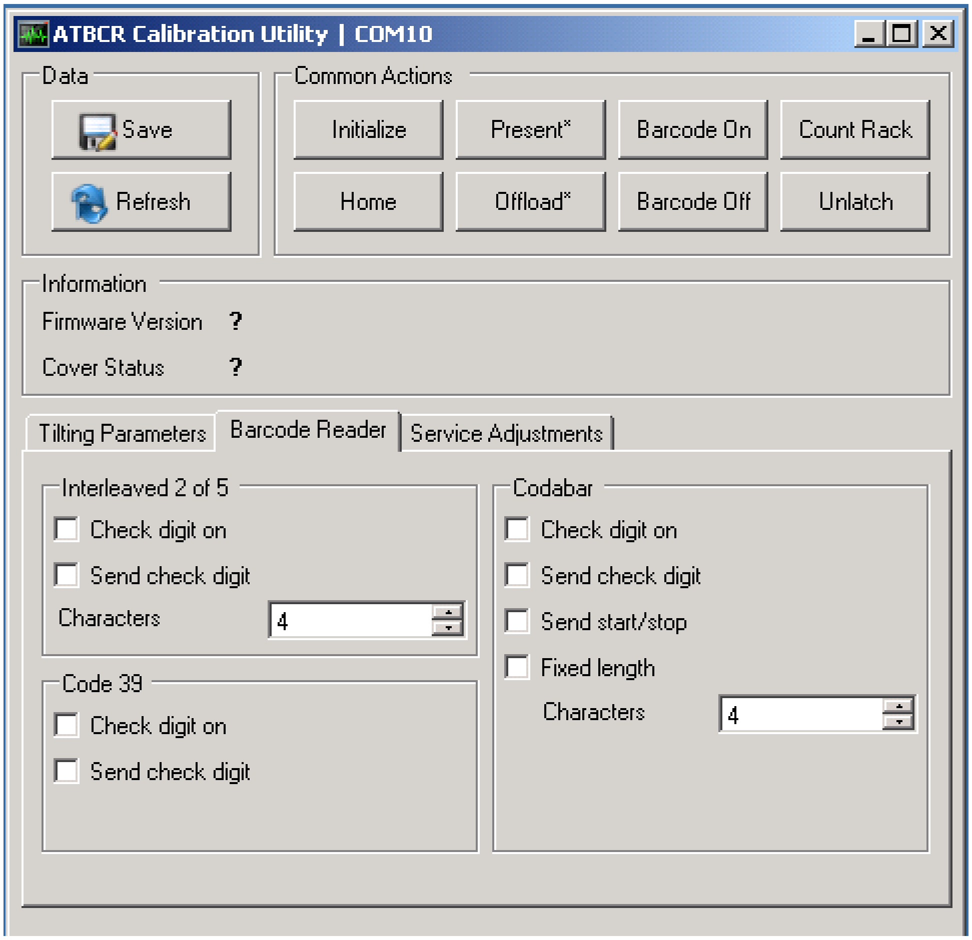
Configuring Bar Code Formats

The Interleaved 2 of 5, Codabar, and Code 39 bar code formats have some options which may be configured (Figure 3.43). These options specify to the ATBCR how the bar codes on sample tubes are configured and must be set to match the bar codes that are used to properly read the bar codes.

These formats can optionally use a check digit. A check digit is an optional number located at the far right of the bar code that verifies the information in the bar code was entered correctly. The ATBCR bar code reader needs to know if bar codes used on samples that it reads include a check digit and whether or not to send the check digit.

NOTE The ATBCR supports all bar code formats listed in *Supported Sample Container Bar Code Formats*; however, only these three formats require additional configuration.

Figure 3.43 ATBCR Calibration Utility—Barcode Reader tab



Configuring Interleaved 2 of 5 Bar Code Formats

1 In **Interleaved 2 of 5**, select **Check digit on** to indicate that bar codes of this format include a check digit.

2 In **Interleaved 2 of 5**, select **Send check digit** to include the check digit in the bar code read. When not selected, the check digit is read and verified but not included in the bar code for any logs or reports.

3 In **Interleaved 2 of 5**, in **Characters**, specify how many characters are encoded in each bar code.

NOTE If the bar code does not contain the specified number of characters, the bar code is rejected as not read and handled according to the tube bar code error handling settings for the step or module action configuration that requested the read.

4 Choose **Save** to send the new bar code settings to the ATBCR device firmware. All future bar code reads will use the new settings.

Configuring Codabar Bar Code Formats

1 In **Codabar**, select **Check digit on** to indicate that bar codes of this format include a check digit.

2 In **Codabar**, select **Send check digit** to include the check digit in the bar code read. When not selected, the check digit is read and verified but not included in the bar code for any logs or reports.

3 In **Codabar**, select **Send start/stop** to include the start and stop characters in the bar code read. When not selected, the start and stop characters are read to indicate the start and end of the bar code but are not included in the bar code for any logs or reports.

4 If your bar codes are fixed-length (always have the same number of characters), select **Fixed length** and set **Characters** to the character length of your bar codes.

5 Choose **Save** to send the new bar code settings to the ATBCR device firmware. All future bar code reads will use the new settings.

Configuring Code 39 Bar Code Formats

1 In **Code 39**, select **Check digit on** to indicate that bar codes of this format include a check digit.

2 In **Code 39**, select **Send check digit** to include the check digit in the bar code read. When not selected, the check digit is read and verified but not included in the bar code for any logs or reports.

3 Choose **Save** to send the new bar code settings to the ATBCR device firmware. All future bar code reads will use the new settings.

4 Click the **X** to close **ATBCR Calibration** Utility.

5 Click **OK** to close **ATBCR Options** configuration.

6 Choose **Close** to dismiss the **Device Editor**.

NOTE The **Service Adjustments** tab is for the use of Beckman Coulter authorized service personnel only. Do not make any changes on that tab.

Performing Actions in the Device Editor

The ATBCR module action configuration, accessed through the **Device Editor**, is used to perform actions at the Automated Tube Bar Code Reader outside of a method.

Actions that may be performed at that ATBCR using the ATBCR module include:

- **Initialize** — checks that a device is connected to the control system.
- **Home** — moves the rack transport to its home position and gives Biomek Software a starting point for controlling the Automated Tube Bar Code Reader (ATBCR). See *Homing the Automated Tube Bar Code Reader*.
- **Present Rack** — move the next rack in the input tray to the presentation point. May read the bar code and perform tilting prior to presenting the rack. See *Presenting and Storing Racks*.
- **Store Rack** — move a rack from the presentation point to the output tray of the ATBCR. May read the bar codes prior to storing. See *Presenting and Storing Racks*.
- **Unlatch** — unlatches the top cover of the ATBCR, allowing access to the input tray. See *Unlatching the Cover*.
- **Count Racks** — counts the number of racks in the input tray of the ATBCR. See *Counting Racks*.

Initializing the Automated Tube Bar Code Reader

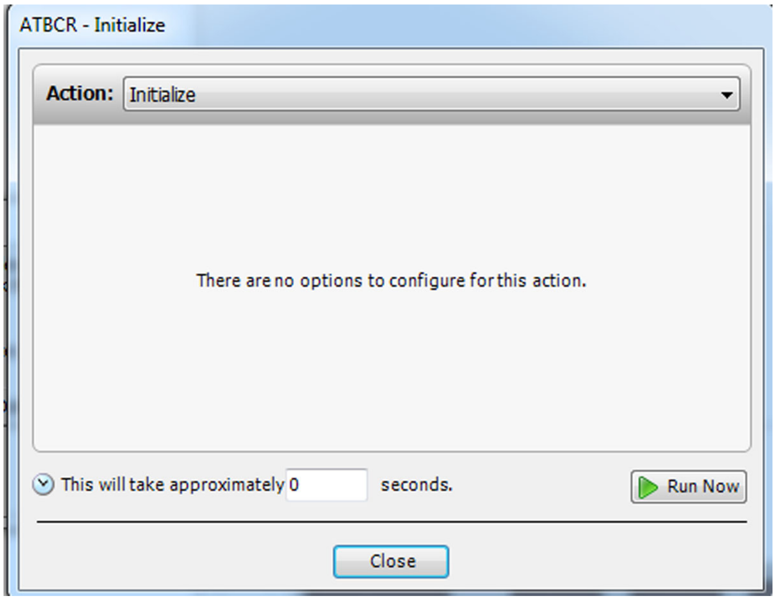
The **Initialize** command checks to make sure that there is an Automated Tube Bar Code Reader (ATBCR) device attached to the controller. It is a good practice to use this command whenever you power up the device to be sure that there is a cood connection between the ATBCR and the controller.

To initialize the ATBCR

1. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.
2. In **Device**, choose **ATBCR**.
3. Choose **Action Commands**. **ATBCR** appears.

4 In **Action**, choose **Initialize** (Figure 3.44).

Figure 3.44 ATBCR Device Action Commands — Initialize



5 Choose **Run Now** to initialize the ATBCR. The **Initialize** command is executed immediately.

6 Click **OK** to dismiss the **Command Complete** dialog.

7 Select **Close** after completing the action configuration. The **ATBCR** module action configuration closes.

8 Choose **Close** to dismiss the **Device Editor**.

Homing the Automated Tube Bar Code Reader

The **Home** command moves the rack transport to its home position and gives Biomek Software a starting point for controlling the Automated Tube Bar Code Reader (ATBCR). The ATBCR needs to be homed each time it is powered on before running in a method.

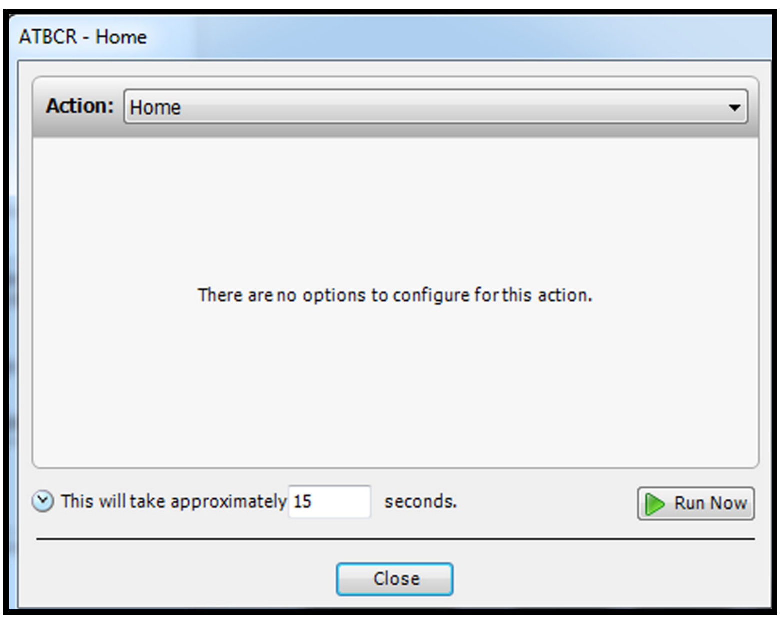
CAUTION

Make sure the probes of the Span-8 Pod are not positioned inside the sample rack at the presentation point prior to homing.

To home the ATBCR:

1. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.
2. In **Device**, choose **ATBCR**.
3. Choose **Action Commands**. **ATBCR** appears.
4. In **Action**, choose **Home** (Figure 3.45).

Figure 3.45 ATBCR Device Action Commands — Home



5. Choose **Run Now** to home the ATBCR. The **Home** command is executed immediately.
6. Click **OK** to dismiss the **Command Complete** dialog.

7 Select **Close** after completing the action configuration. The **ATBCR** module action configuration closes.

8 Choose **Close** to dismiss the **Device Editor**.

Presenting and Storing Racks

The Automated Tube Bar Code Reader (ATBCR) can be controlled manually to present and store racks. It can also read bar codes before presenting or storing the rack, which can be used to test the bar code reader. Prior to presenting the rack, it may tilt the rack a specified number of times to agitate the contents of the tubes in the rack.

To manually present or store a rack using the Device Editor:

1. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.

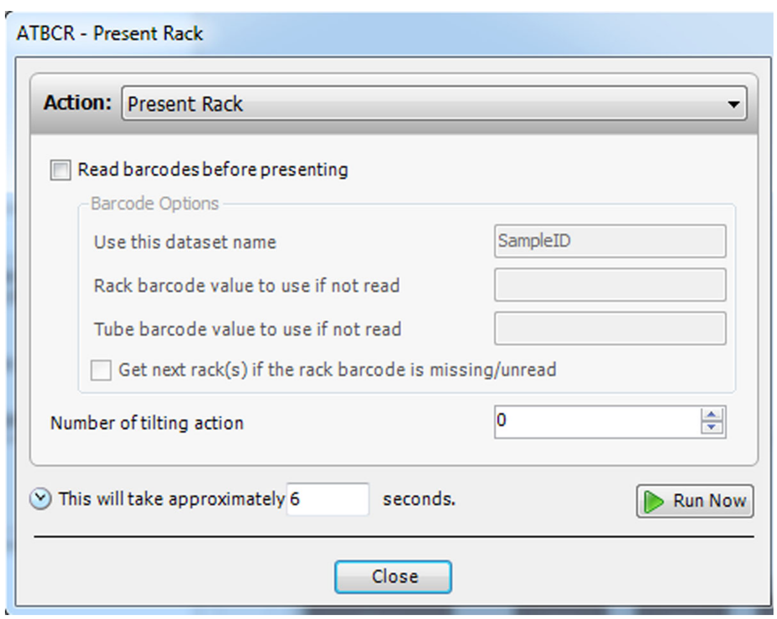
2. In **Device**, choose **ATBCR**.

3. Choose **Action Commands. ATBCR** appears.

4. In **Action**, choose the desired function:

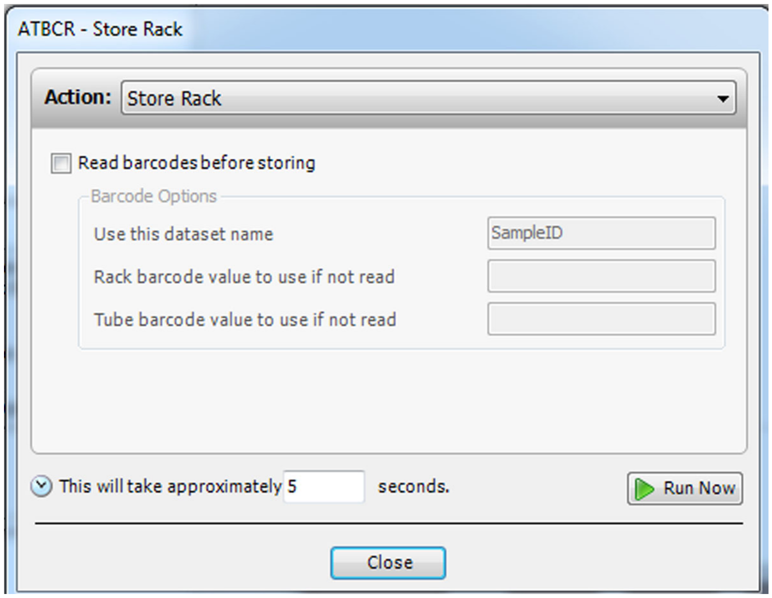
   - **Present Rack** (Figure 3.46) — move the next rack in the input tray to the presentation point. May read the bar code and perform tilting prior to presenting the rack.

Figure 3.46 ATBCR Device Action Commands — Present Rack



- **Store Rack** (Figure 3.47) — move a rack from the presentation point to the output tray of the ATBCR. May read the bar codes prior to storing.

Figure 3.47 ATBCR Device Action Commands — Store Rack



5 Select **Read barcodes before presenting/storing** to read the rack and tube bar codes prior to presenting or storing the rack. **Barcode Options** become active.

6 If **Read barcodes** is selected, in **Use this dataset name**, enter the desired name for the dataset that stores the tube bar code. The default value is **SampleID**. Refer to *Using Data Sets with the ATBCR* for more information on how data sets are used with the ATBCR.

7 If **Read barcodes** is selected, in **Rack barcode value to use if not read**, enter the bar code value to return when the rack bar code is not read.

8 If **Read barcodes** is selected, in **Tube barcode value to use if not read**, enter the bar code value to return when a tube bar code is not read.

9 For a **Present Rack** action, select **Get next rack(s) if the rack barcode is missing/unread** to automatically send a rack to the output tray and get the next rack from the input tray of the ATBCR when the rack barcode is not read.

CAUTION

Tilting should only be used with sealed or capped tubes. Tilting unsealed or uncapped tubes may result in samples spilled inside the ATBCR.

10 For a **Present Rack** action, in **Number of tilting action**, enter the number of times to tilt the rack to agitate the contents of the tubes prior to presenting the rack. The rack is tilted the specified number of times.

NOTE Tilting is performed as configured in the ATBCR Calibration Utility. Refer to *Setting Tilting Parameters* for details and to configure the tilting settings.

11 Choose **Run Now** to perform the configured **Action**.

The selected command is executed immediately.

12 Select **Close** after completing the action configuration. The **ATBCR** module action configuration closes.

Unlatching the Cover

The Automated Tube Bar Code Reader (ATBCR) cover automatically latches when a method is started. To gain access to the input tray and output tray of the ATBCR, the cover must first be unlatched so that it may be opened.

To unlatch the cover of the ATBCR:

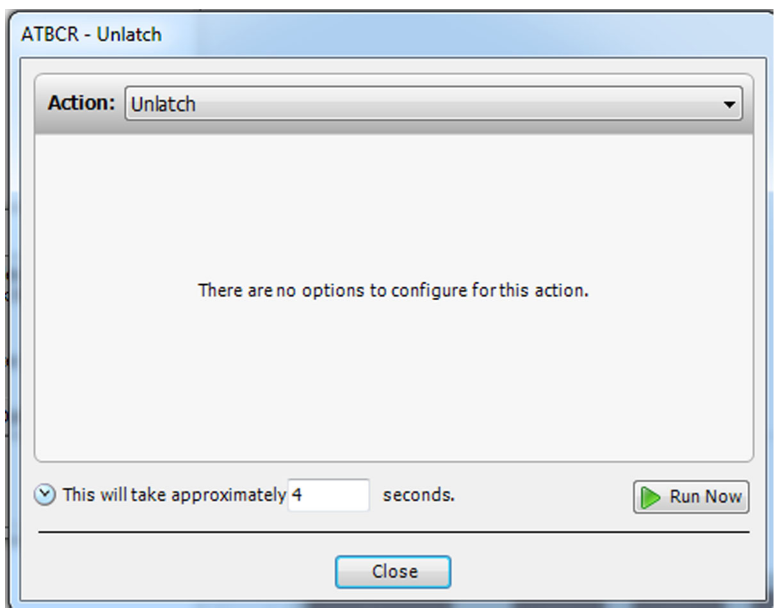
1. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.

2. In **Device**, choose **ATBCR**.

3. Choose **Action Commands**. **ATBCR** appears.

4. In **Action**, choose **Unlatch** (Figure 3.48).

   Figure 3.48 ATBCR Device Action Commands — Unlatch

5. Choose **Run Now** to perform the configured **Action**.

6. Click **OK** to dismiss the **Command Complete** dialog.

7. Select **Close** after completing the action configuration. The **ATBCR** module action configuration closes.

Counting Racks

The Automated Tube Bar Code Reader (ATBCR) can count the number of racks stored in the input tray.

To count the number of racks in the ATBCR:

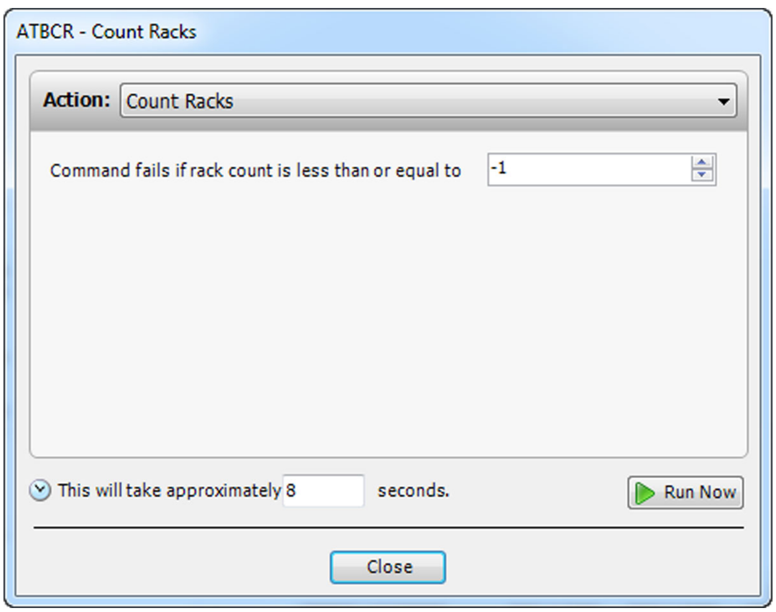
1. From the **Instrument** menu, choose **Device Editor**. **Device Editor** appears.

2. In **Device**, choose **ATBCR**.

3. Choose **Action Commands**. **ATBCR** appears.

4. In **Action**, choose **Count Racks** (Figure 3.49).

   Figure 3.49 ATBCR Device Action Commands — Count Racks

5. In **Command fails if rack count is less than or equal to**, enter at what count value the step should report an error if there are not at least the specified value tube racks in the input tray. If **Count Racks** returns a value that is less than or equal to the value specified, an error is returned.

   NOTE The maximum number of tube racks that can be held in the input tray is 24, so the value entered should be less than 24. Entering a negative value will mean it never reports an error, as the count will always be at least 0.

6. Choose **Run Now** to perform the configured **Action**. A dialog displaying the number of racks counted in the input tray is displayed.

7 Click **OK** to dismiss the **Command Complete** dialog.

8 Select **Close** after completing the action configuration. The **ATBCR** module action configuration closes.

9 Click **Close** to exit the **Device Editor**.

Maintenance and Troubleshooting

Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Wipe up all spills on the ATBCR immediately according to laboratory procedures. Check reagent labels to ensure that cleaning solutions are nonreactive with the spilled liquid.

When cleaning the ATBCR, make sure that cleaning solutions do not degrade or react with the following common materials that liquid spills may come into contact with on the ATBCR:

- acrylic
- aluminum with chemical conversion coating
- stainless steel
- urethane

NOTE The materials listed above are only a partial list of those materials likely to come into contact with liquid and does not include all materials used in the ATBCR.

Troubleshooting

Do not attempt to repair the Automated Tube Bar Code Reader (ATBCR) without first contacting Beckman Coulter Customer Technical Support.

Table 3.12 Troubleshooting the Automated Tube Bar Code Reader (ATBCR)

IF	THEN
Bar codes on sample rack repeatedly are not read.	Make sure the sample rack is loaded properly in the input tray. Verify that the bar code label is applied in the correct location and is in good condition. If necessary, replace the sample rack bar code label.
Bar codes on sample containers repeatedly are not read.	Make sure that sample containers are properly loaded into the sample rack and the bar code label is facing the right direction. Verify that the sample bar code label is applied correctly and in good condition. If necessary, replace the bar code label on the sample container. If using Interleaved 2 of 5, Codabar, or Code 39 bar code formats, verify the bar code settings are correct, (refer to *Configuring Bar Code Formats*).
Probes on the Span-8 Pod are not properly accessing sample containers.	Make sure the sample container type matches the type expected for the sample rack and all sample containers in the rack are of the same type. Frame the presentation point of the ATBCR (refer to *Framing the ATBCR*).
The ATBCR cover does not unlatch as expected.	In Biomek Software, use the Device Editor to manually control the ATBCR (refer to *Manually Controlling the Automated Tube Bar Code Reader*).
Tips do not pierce caps or seals.	Verify that all the requirements for septum piercing specified in *Using Sealed or Capped Sample Containers* are met. If piercing still fails, contact Beckman Coulter Customer Technical Support.

Specifications

Table 3.13 System Specifications

Item	Description
Environment	Indoor use only
Power Requirements	US: 100–240VAC @ 6 amps max Europe: 200-240VAC, 50Hz
Dimensions:	29.6” (L) x 17.8” (W) x 12” (H) 75.2 cm (L) x 45.2 cm (W) x 30.5 cm (H)
Weight	42 lbs. (19.1 kg)
Ambient Operating Temperature	5-30°C (41-86°F)
Humidity Restrictions	<85% (non-condensing) @ 30°C (86°F)
Altitude Restrictions	up to 2000m (6562ft)
Installation Category	Category II
Pollution Degree	2
Sound Pressure Level	Maximum sound pressure: 74 dB Maximum sound pressure at 1 meter: 65.5 dB
Communications to Host	RS-232 port

CHAPTER 4

Bar Code Reader ALP

Overview

WARNING

Class II laser product. This product conforms to applicable requirements of 21 cfr 1040 at the date of manufacture.

The Biomek Bar Code Reader ALP (Figure 4.1) is an active ALP that scans bar code labels applied to the narrow sides of labware. The Biomek Bar Code Reader is powered through an external power supply.

NOTE Due to the bar code reader weight and its extension beyond the edge of the Biomek deck, a counterweight has been added to the opposing side of the Bar Code Reader ALP.

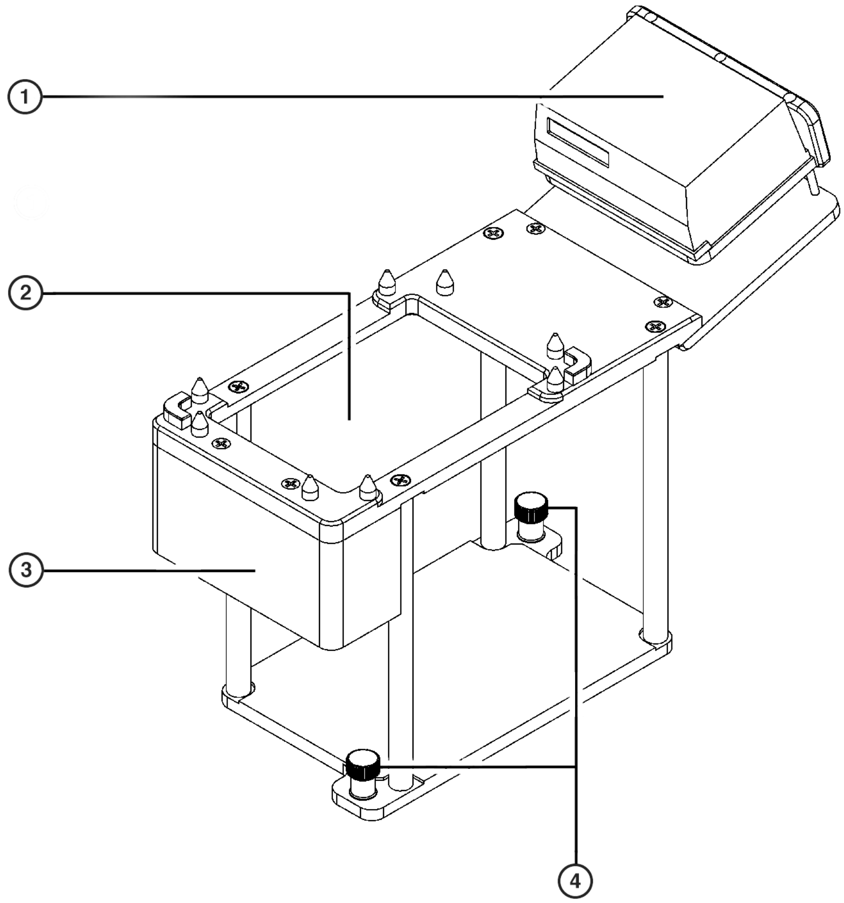
The following bar codes are supported by the Bar Code Reader:

- Code 39
- Codabar (US and Japan)
- I 2 of 5
- UPCA
- UPCE
- EAN
- Code 128
- Code 93

The sections in this chapter include:

- *Installing the Bar Code Reader ALP*
- *Applying Labels to Labware*
- *Framing Instructions*
- *Using the Bar Code Reader ALP in a Method*
- *Removing the Bar Code Reader ALP*
- *Storage*
- *Troubleshooting*

Figure 4.1 Bar Code Reader ALP



1. Bar Code Reader Unit
2. Labware Is Positioned Here
3. Counterweight
4. Thumbscrews

Installing the Bar Code Reader ALP

Installing the Bar Code Reader ALP includes choosing the deck position on the deck, mounting the ALP to the deck, and properly aligning the laser.

Deck Positions for the Bar Code Reader ALP

Because of its size, the Bar Code Reader ALP is mounted on one of the outside deck positions, so that the Bar Code Reader itself extends beyond the edge of the Biomek deck. Use the Biomek Software **Deck Editor** to determine available deck positions when mounting the Bar Code Reader ALP on the Biomek instrument.

Mounting the Bar Code Reader ALP

WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING

Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To mount the Bar Code Reader ALP, complete the following:

NOTE The Bar Code Reader ALP uses a cable that splits into two destinations: power and communications.

1. Turn off power to the Biomek instrument before adding the Bar Code Reader ALP to the deck.

2. Position the Bar Code Reader ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.

3. Fasten the Bar Code Reader ALP to the deck using the thumbscrews on the base of the ALP.

4. Connect the power line of the split cable to a power supply using the included power cord.

5 Connect the power supply to an AC outlet.

NOTE Make sure the cable routing does not interfere with the operation of the Biomek instrument.

6 Connect the serial communication cable to a communication port on the back of the PC.

Aligning the Bar Code Reader ALP Laser Beam

WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING

Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

Appropriate alignment of the Bar Code Reader ALP laser beam accommodates scanning of slightly skewed labels and requires little adjustment to the Bar Code Reader itself.

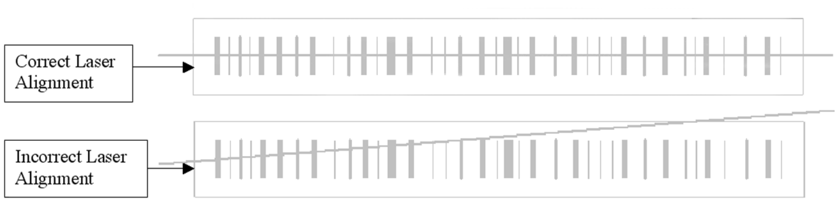
To align the laser beam correctly, complete the following:

1 Position a piece of labware labeled with a bar code on the Bar Code Reader ALP.

2 Visually verify that the red laser beam is scanning across the bar code. If not, the Bar Code Reader position needs to be adjusted.

3 The laser beam should pass over all vertical bars on the bar code label simultaneously. Correct and incorrect laser/label alignments are shown below (Figure 4.2). In the graphic, the top laser is aligned correctly, while the bottom laser is not.

Figure 4.2 Bar Code Reader — Laser Beam Position Over Bar Code Label



4 Turn the height adjustment screw under the bar code reader on Bar Code Reader ALP until the laser beam is correctly aligned on the bar code.

WARNING

If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads may occur.

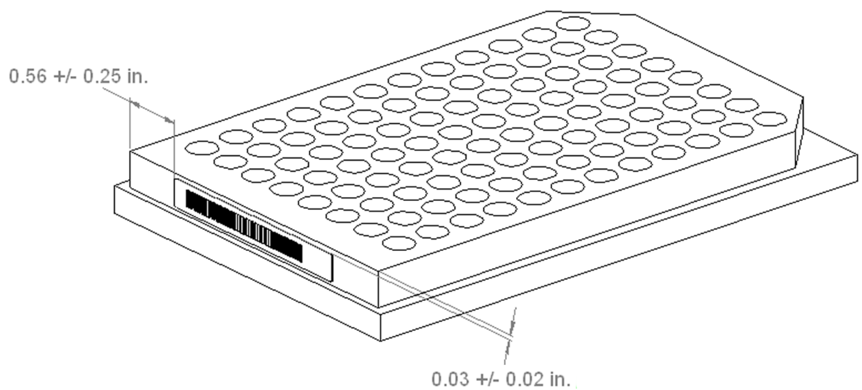
WARNING

If a label is applied by any means other than a Print & Apply device, an increase in bad reads or no reads may occur.

Applying Labels to Labware

NOTE Increasing the vertical height of the bars on the label is suggested to enhance the accuracy of the Bar Code Reader.

Figure 4.3 Bar Code Reader — Label Positioning on a Microplate



Framing Instructions

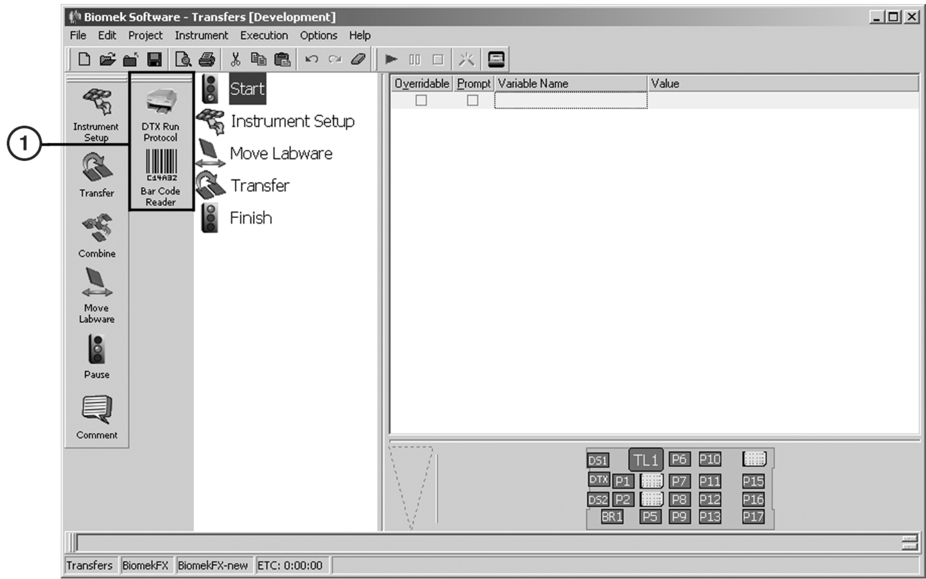
Frame the Bar Code Reader ALP according to the framing instructions in the manual of the Biomek instrument upon which the ALP is installed.

Using the Bar Code Reader ALP in a Method

To read bar code labels in a method, a **Bar Code Reader** step must be configured. **Move Labware** steps move labware with bar code labels to read to and from the bar code reader as needed.

The **Bar Code Reader** step is available on the **Integrated Devices** step palette immediately after performing the Bar Code Reader software installation (Figure 4.4).

Figure 4.4 The Integrated Devices Step Palette Shown in the Main Editor



1. **Integrated Devices Step Palette** — the steps available on this palette depend on which integrated devices are installed on the system.

To read bar code labels in a method:

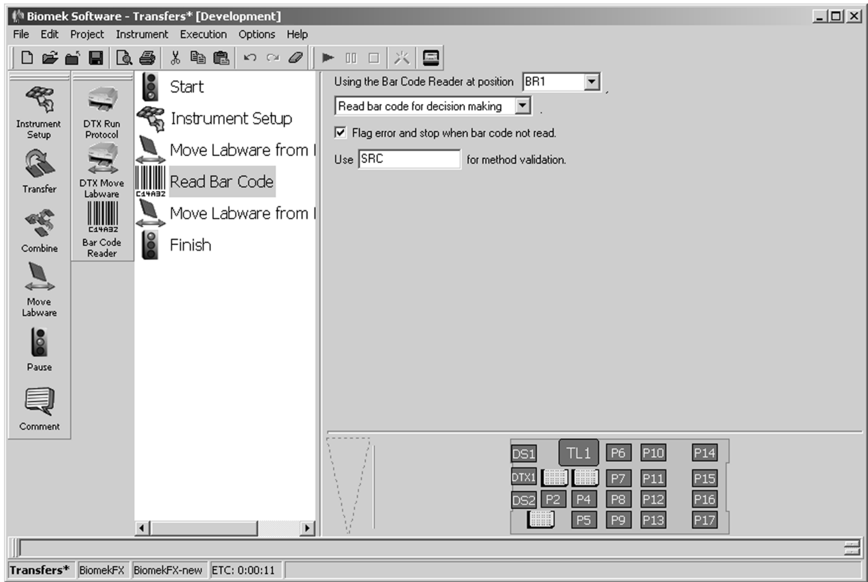
1 To move labware to the Bar Code Reader ALP, insert a **Move Labware** step into the Method View and configure as desired (refer to the Biomek Software User's Manual, Section 16.4, Move Labware Step).

2 Insert a **Bar Code Reader** step into the Method View (Figure 4.5).

CAUTION

Do not use the Bar Code Reader step under the SILAS category in the Step Palette Builder. The Bar Code Reader Step from the Integrated Devices step palette must be used to ensure the Bar Code Reader operates properly.

Figure 4.5 Bar Code Reader Step Inserted in the Method View



3 In **Using the Bar Code Reader at position**, select the bar code reader to scan bar codes.

4 Select the desired bar code reading option:

- **Initialize** — establishes communication between Biomek Software and the ALP only; no bar code is read. To read bar codes, insert another **Bar Code Reader** step into the method and configure it with the desired bar code reading option.

  NOTE By default, Biomek Software is configured to establish communication with the ALP automatically at the start of each method run. Initializing the ALP with a **Bar Code Reader** step is required only when the default configuration has been manually changed to disable automatic loading of the **BarcodeReader** SILAS module.

- **Read bar code for logging** — the bar code is saved in the pipetting logs (refer to the *Biomek Software User's Manual*, Sections 27.2.3, *Pipetting Log,* 27.2.4, *Span8Pipetting Log (FX, NX-S8 only)*, and 27.3.6, *UnifiedPipetting Log Contents*).
- **Read bar code for decision making** — the results of the bar code read determine the next operation performed in the method. Refer to *Configuring a Method Where Bar Codes are Read for Decision Making*, for an example of how this option may be used in a method.

5 When **Read bar code for logging** or **Read bar code for decision making** is selected, select **Flag error and stop when bar code is not read** to stop the method immediately and notify users that the bar code was not read successfully.

6 When **Read bar code for decision making is selected**, in **Use. . . for method validation**, enter a substitute bar code value to be used during method validation. Validation can be performed satisfactorily only when a substitute value is entered. Refer to *Validating Methods When Read Bar Codes for Decision Making is Selected*, for detailed information.

Configuring a Method Where Bar Codes are Read for Decision Making

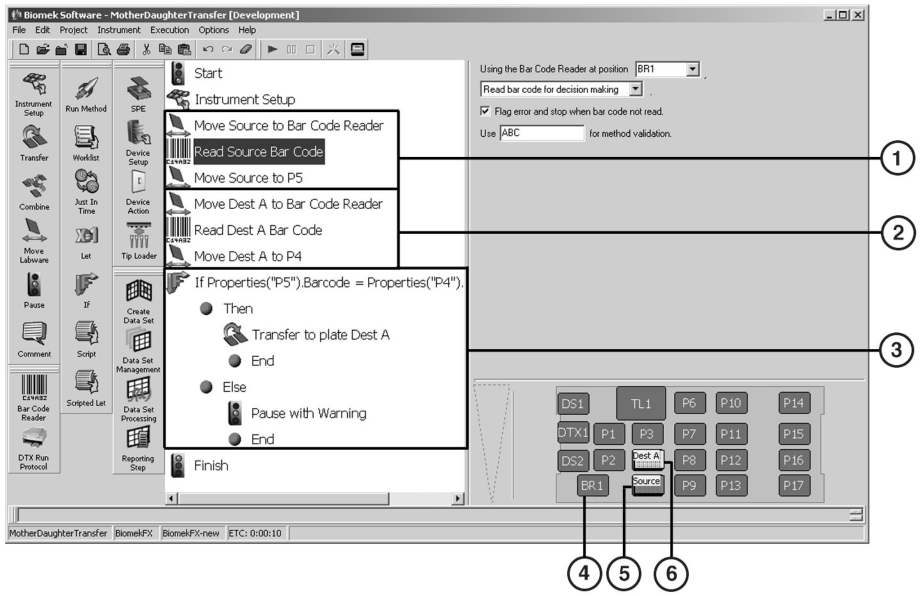
When **Read bar code for decision making** is selected in a **Bar Code Reader** step, the results of the bar code read determine which operations that follow in the method are performed. The example method shown in Figure 4.6 is configured to transfer liquid from source plates to destination plates only when both plates have the correct bar codes.

Bar codes are read for both plates and then compared using an expression configured in an **If** step. When the bar codes are correct, the transfer is performed. When they are incorrect, the method pauses and displays a message that tells users the bar codes do not match. Table 4.1 provides a detailed description of the example method configuration broken down by the numbered steps shown in Figure 4.6.

NOTE Because reading bar codes for decision making creates a dependent operation based on the results of the bar codes read, the validation process during method building will stop while waiting for the results of the read before continuing. Since bar codes are not read during validation, the software does not know which operation to validate next.

To ensure validation completes satisfactorily, the **Bar Code Reader** step provides the option to enter a value that is substituted in place of actual bar codes during validation (refer to *Validating Methods When Read Bar Codes for Decision Making is Selected*).

Figure 4.6 A Method Configured to Read Bar Codes for Decision Making



1. See Step 1, Table 4.1
2. See Step 2, Table 4.1
3. See Step 3, Table 4.1
4. Bar Code Reader ALP (BR1)
5. Source Plate (P5)
6. Destination Plate (P4)

Table 4.1 Example of a Method Where Bar Codes are Used for Decision Making

Step	Description	Actions
1	Move the source plate to the Bar Code Reader ALP, read the bar code, then move the plate back to the original deck position.	1. Configure a **Move Labware** step to move the plate **Source** from **P5** to the Bar Code Reader ALP (**BR1**) (refer to the *Biomek Software User's Manual*, Section 16.4, *Move Labware Step*). 2. Configure a **Bar Code Reader** step to **Read bar code for decision making**. 3. Configure a **Move Labware** step to move the source plate from **BR1** back to **P5**.

Table 4.1 Example of a Method Where Bar Codes are Used for Decision Making *(Continued)*

Step	Description	Actions
2	Move the destination plate to the Bar Code Reader ALP, read the bar code, then move the plate back to the original deck position.	**1.** Configure a **Move Labware** step to move the plate **Dest A** from **P4** to the Bar Code Reader ALP (**BR1**). **2.** Configure a **Bar Code Reader** step to **Read bar code for decision making**. **3.** Configure a **Move Labware** step to move the destination plate from the **BR1** back to **P4**.
3	Configure an **If** step to evaluate the bar codes. In this method, the source and destination plates must have the same base bar code; for example, 1000. All destination plates must end with _A; for example 1000_A. When the bar codes match, a **Transfer** sub step within the **If** step transfers liquid from the source plate to the destination plate. When the bar codes do not match, A **Pause** sub step stops the method and displays a message prompt to users	**1.** Configure an **If** step with the VBScript expression: **Properties("P5").Barcode = Properties("P4").Barcode & "_A"**. (refer to the *Biomek Software User's Manual*, Section 18.7, *If Step*). **2.** Under the **Then** substep, insert a **Transfer** step and configure as desired (refer to the *Biomek Software User's Manual*, *Configuring Transfer and Combine Steps*). **3.** Under the **Else** substep, insert a **Pause** step configured to pause the instrument for an indefinite period of time and display a message prompt (refer to the *Biomek Software User's Manual*, *Pausing the Whole System and Displaying a Message*).

Validating Methods When Read Bar Codes for Decision Making is Selected

Reading bar codes for decision making creates a dependent operation based on the results of the bar codes read. Since bar codes are not read during the validation process during method building, the process will stop because the software does not know which operation to validate next.

To ensure validation completes satisfactorily, the **Bar Code Reader** step provides the option to enter a value that is substituted in place of actual bar codes during validation.

To configure a substitute value used during validation:

---

1 In **Use. . . for method validation**, enter a substitute bar code value to be used during method validation; for example, **ABCD**.

2 In an **If** step, enter a VBScript expression that checks for the substitute bar code; for example:

- **= (Labware("BR1").Properties.Barcode = "ABCD")** checks for an exact match to **ABCD**.
- **= (Left (Labware("BR1").Properties.Barcode,3) = "ABC")** checks for any barcode beginning with **ABC**. In this expression, **Left** instructs the software to begin the match from the first (leftmost) character in the substitute bar code; "**3**" instructs the software to look at only the first three characters in the substitute barcode.

NOTE An **If** step has two branches: **Then** and **Else**. Because both example expressions used in this section result in "true," only the substeps in the **Then** branch are validated. To validate the substeps in the **Else** branch, enter an expression, such as **= (Labware("BR1").Properties.Barcode = "WXYZ")**, that results in "false," then perform a second validation run.

Removing the Bar Code Reader ALP

WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING

Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

To remove the Bar Code Reader ALP, complete the following:

1 Power down the Biomek instrument before removing the Bar Code Reader ALP.

2 Disconnect the interface cable from the back of the PC attached to the Biomek system.

3 Disconnect the power line of the split cable from a wall outlet.

4 Detach the split cable from the cable extending from the back of the Bar Code Reader unit.

5 Remove any labware from the Bar Code Reader ALP, being careful not to spill any residual liquid.

6 Loosen the thumbscrews on the base of the ALP.

7 Lift the Bar Code Reader ALP in an upward motion to clear the locating pins from the locating holes on the deck.

Storage

Return the Bar Code Reader ALP to the original packing materials, and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Bar Code Reader ALP to air-dry before returning it to the original packing materials.

Troubleshooting

Do not attempt to repair the Bar Code Reader ALP without first contacting a Beckman Coulter Service Engineer.

Table 4.2 Troubleshooting the Bar Code Reader ALP

If...	Then...
The Bar Code Reader ALP is not functioning correctly.	Make sure the power and communication cables are attached to the Bar Code Reader ALP properly.

CHAPTER 5

Bar Code Reader-Handheld

Overview

The handheld Bar Code Reader reads bar code labels applied to labware. The Bar Code Reader is not installed on the deck of the Biomek. It is powered through the automation controller.

The following bar codes are supported by the Bar Code Reader:

- Code 39
- Codabar (US and Japan)
- Code 93
- Code 128
- EAN-8/JAN-8
- EAN-13/JAN-13
- Interleaved 2 of 5
- UPC-A
- UPC-E

The sections in this chapter include:

Installing the Handheld Bar Code Reader

WARNING

Risk of personal injury. Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

Use a USB-connected Bar Code Reader. To install the Bar Code Reader, plug the Reader into the USB port of the automation controller.

NOTE Using keyboard wedges or a PS2 to USB adapter to connect older bar code scanners requiring a PS2 port have not been tested.

Applying Labels to Labware

Refer to CHAPTER 4, *Applying Labels to Labware* for recommendations on applying bar code labels.

Using the Bar Code Reader

To use the Bar Code Reader while running a method:

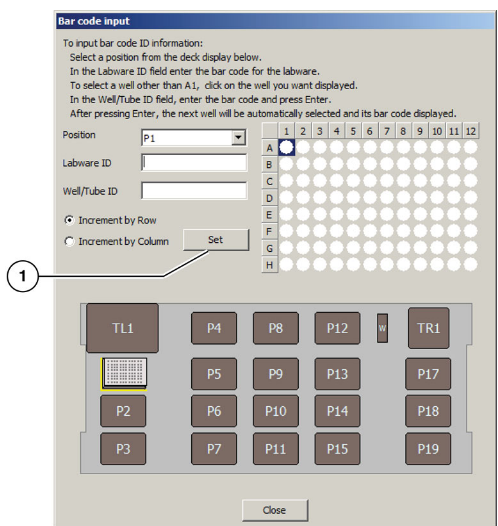
1 Check **Pause for bar code input?** in the Instrument Setup when setting up your method.

2 Start your method.

3 Click OK when the deck configuration window appears.

4 The **Bar Code Input** window appears.

Figure 5.1 Bar Code Input Window



1. Set Button

5 Click on the desired labware.

6 Click on either the **Labware ID** or **Well/Tube ID.**

7 Aim the reader at the bar code and activate the bar code reader.

⚠ WARNING

Risk of personal injury. Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

8 The bar code will populate the **Labware ID** or **Well/Tube ID**.

9 Click **Set** (Figure 5.1)

To Use the Bar Code Reader prior to running a method:

1 Go to the **Instrument Setup** step.

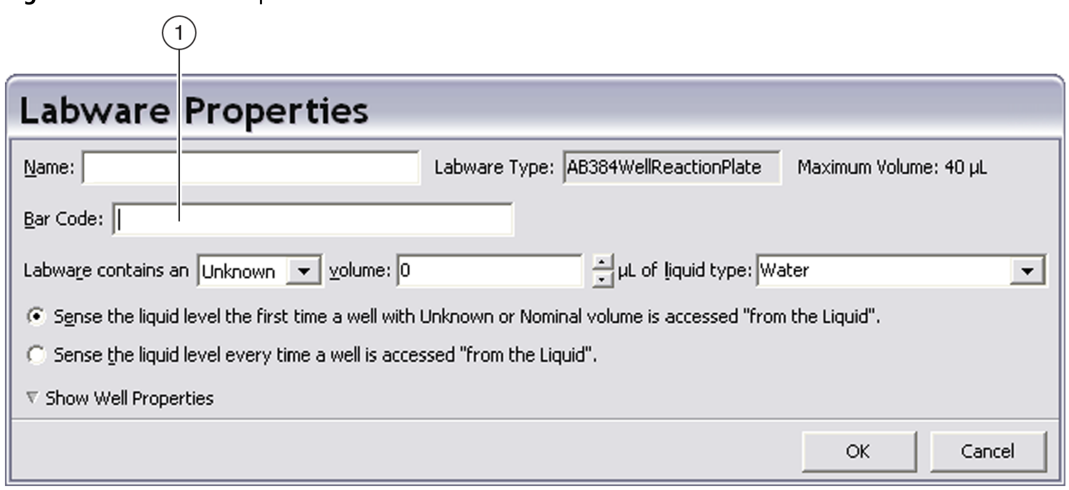
2 Double click on the desired labware.

OR

Right click on the desired labware and select **Properties.** Labware Properties window opens.

3 Click in the **Bar Code** field.

Figure 5.2 Labware Properties



1. Bar Code field

4 Aim at the bar code and activate the Bar Code Reader.

WARNING

Risk of personal injury. Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

5 The bar code will populate the bar code field.

Removing the Handheld Bar Code Reader

WARNING

Risk of personal injury. Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

To remove the Bar Code Reader, disconnect the reader from the automation controller.

Storage

Return the handheld Bar Code Reader to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Troubleshooting

Do not attempt to repair the handheld Bar Code Reader without first contacting your Beckman Coulter Representative.

Table 5.1 Troubleshooting Bar Code Reader Hand-Held

If...	Then...
The Bar Code Reader is not functioning correctly	Make sure the cable is attached to the automation controller properly.
Frequent bar code errors or misreads	Check the bar code labels to make sure they are straight and unobstructed.

CHAPTER 6

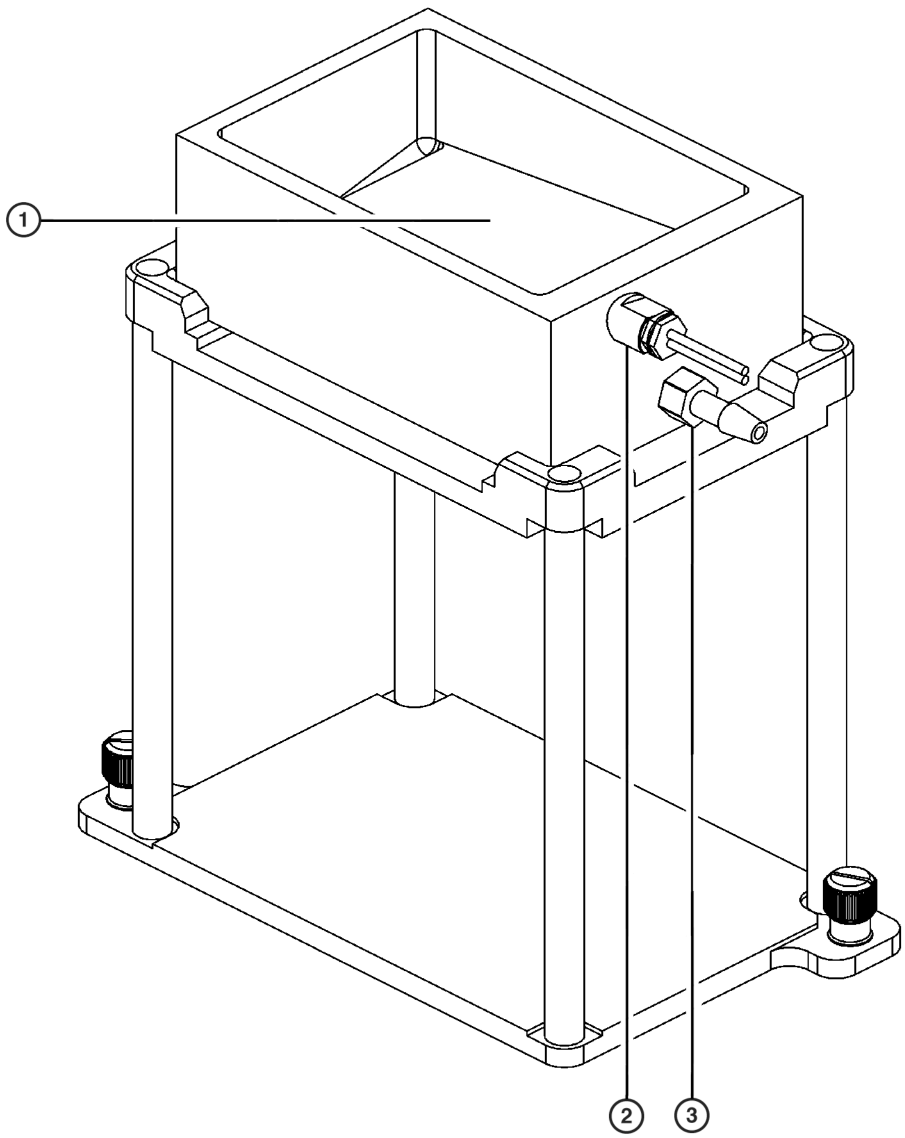
Drainable/Refillable Reservoir ALP

Overview

The Drainable/Refillable Reservoir ALP is an active ALP featuring a reservoir that can be drained and refilled automatically using steps in a Biomek Software method or manually using **Advanced Manual Control** (Figure 6.1). The ALP includes the reservoir, which may be placed in any standard position on the Biomek instrument deck, and the Automatic Reservoir Controller, which sits off deck. The controller houses the peristaltic pump head and connections between the ALP and the Biomek instrument.

The sections in this chapter include:

Figure 6.1 Drainable/Refillable Reservoir ALP Mounted on a 1x1 Passive ALP



1. **Sensor Window** — (inside reservoir chamber; not visible in this view).
2. **Sensor**
3. **Inlet/Outlet Fitting**

Installing the Drainable/Refillable Reservoir ALP

Installing the Drainable/Refillable Reservoir ALP includes:

- *Installing the Drainable/Refillable Reservoir on the Deck*
- *Setting up the Automatic Reservoir Controller*

Installing the Drainable/Refillable Reservoir on the Deck

A reservoir stand is not included with the ALP. The reservoir may be placed on a standard passive ALP, such as a 1 x 1, in any standard deck position. The reservoir has no specified left and right orientation, which allows it to be positioned facing either direction.

To install the reservoir on the deck:

WARNING

Turn off power to the Biomek instrument before mounting any ALP.

1. Turn off power to the Biomek instrument.

2. Place the reservoir on an existing passive ALP in any standard deck position.

3. When placed on a high-density 4 x 3 passive ALP, the reservoir must occupy one of the outside positions to allow space for the tubing and sensor leads to be routed off the deck.

4. Attach the tubing to the inlet/outlet fitting on the reservoir (Figure 6.1).

5. Route the tubing and sensor leads off the deck through one of the access holes in the back of the instrument.
   - **FX** — The tubing may also be routed between the light curtain and deck along the front of the instrument. Be sure the tubing does not interfere with the light curtain or the movement of a Biomek FX bridge.

6. Place the Automatic Reservoir Controller at an off-deck location near the ALP.

CAUTION

Do not place the Automatic Reservoir Controller or the supply container on the Biomek instrument deck.

7 Place the supply container at an off-deck location near the controller, in an accessible position lower than the Biomek instrument height.

Setting up the Automatic Reservoir Controller

The Automatic Reservoir Controller houses the peristaltic pump head, sensor amplifier, and connections between the ALP and Biomek instrument.

Setting up the Automatic Reservoir Controller includes:

- *Mounting the Peristaltic Pump Head and Routing the Tubing*
- *Connecting the CAN Communications Cables and Sensor Leads*
- *Calibrating the Sensor Amplifier Sensitivity*

Mounting the Peristaltic Pump Head and Routing the Tubing

The pump head must be installed on the controller before routing the tubing. No tools are required to mount the pump head.

To mount the pump head and route the tubing:

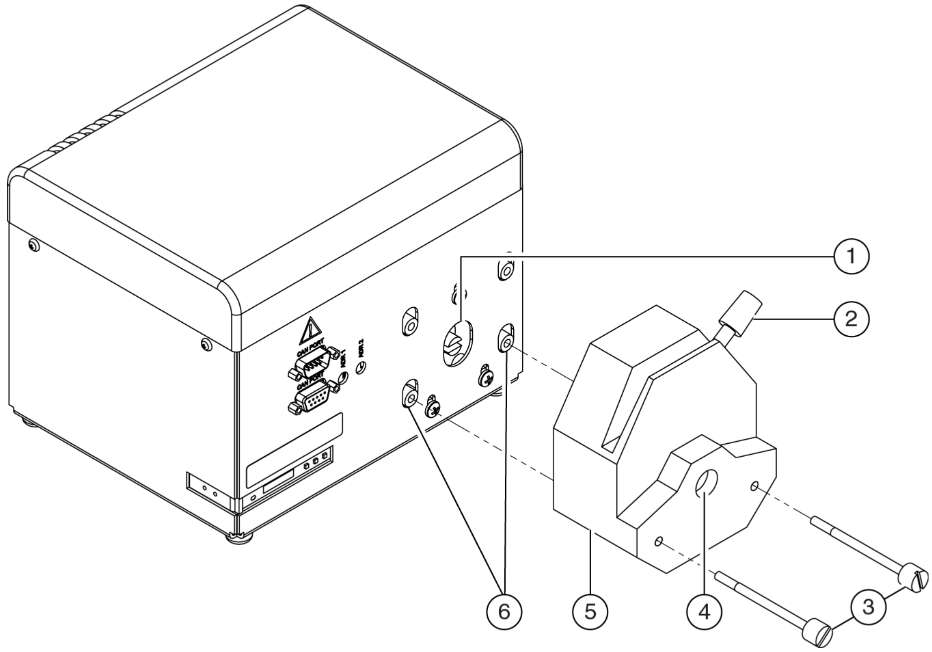
WARNING

Turn off the pump drive and disconnect the CAN cables before installing or removing the pump head or tubing.

1 Place the controller on the back side so that the ports and mounting holes are facing upward.

2 Insert the thumbscews into the pump head (Figure 6.2). The thumbscrews protrude from the back of the pump head.

Figure 6.2 Mounting the Peristaltic Pump Head on the Controller



1. **Motor Shaft**
2. **Locking Lever**
3. **Thumbscrews**
4. **Pump Rotor**
5. **Pump Head**
6. **Mounting Holes**

3 Align the thumbscrews with the mounting holes on the controller.

4 Turn the thumbscrews until the threads catch in the mounting holes, but do not tighten them further.

5 Push the locking lever to the left to open the pump, and rotate the rotor slowly in either direction until it aligns with the notch in the motor shaft. The pump head rests flush against the controller when the pump rotor and motor shaft are properly aligned.

NOTE Refer to the pump head manufacturer's instructions for more information.

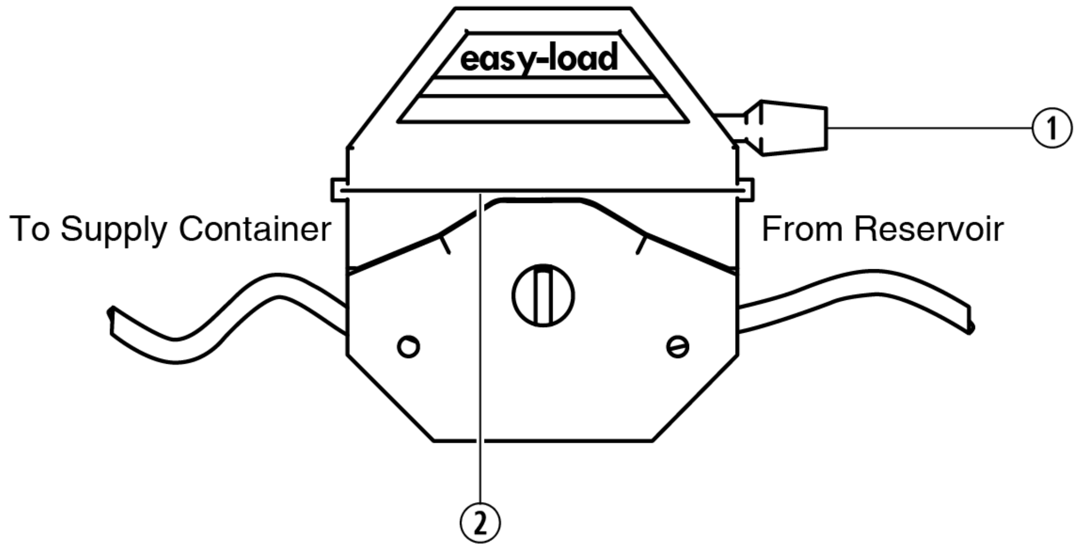
6 Tighten the thumbscrews until the pump head is firmly attached to the controller.

7 Place the controller back on the base.

8 Push the locking lever to the left to open the pump, if necessary.

9 Route the tubing so that it runs right to left from the reservoir to the supply container (Figure 6.3).

Figure 6.3 Tubing Routed Correctly Through Pump Head



1. Locking lever in closed position.
2. **Tubing Retainers**

10 Push the locking lever to the right to lock the pump head closed (Figure 6.3).

11 If necessary, adjust the tubing retainers by pushing them into the pump head body slightly, and then down until firmly in contact with the tubing.

NOTE Refer to the pump manufacturer's instructions for more information.

12 Attach the free end of the tubing to the fitting on the container.

Connecting the CAN Communications Cables and Sensor Leads

The Drainable/Refillable Reservoir ALP uses a CAN communications connection to communicate with and draw power from the Biomek instrument. The sensor leads from the reservoir connect to the transmitter and receiver ports on the sensor amplifier.

WARNING

Turn off power to the Biomek instrument before connecting CAN communication cables.

1 Turn off power to the Biomek instrument.

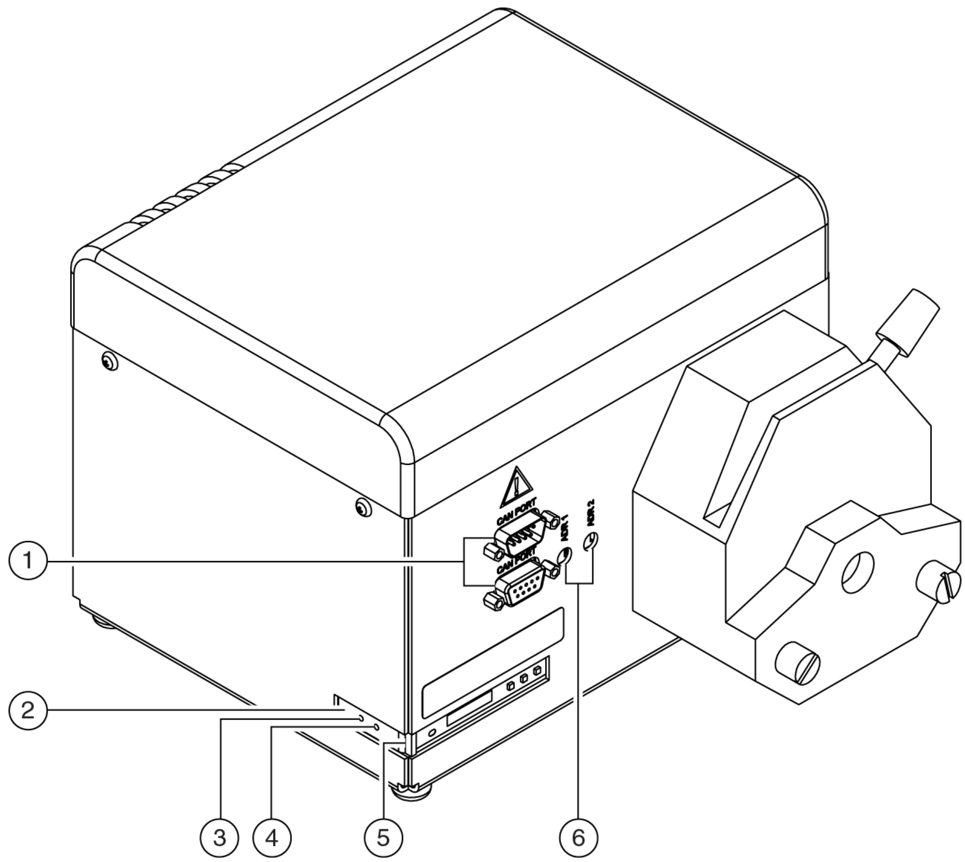
2 Plug one end of the CAN communications cable into either of the two connectors labeled "CAN PORT" on the controller (Figure 6.4).

NOTE When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

CAUTION

A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

Figure 6.4 Automatic Reservoir Controller Ports



1. **CAN Ports**
2. **Sensor Amplifier**
3. **Amplifier Receiver Port**
4. **Amplifier Transmitter Port**
5. **Lock-down Lever**
6. **Address Switches**

3 Verify the ADR1 address switch is set to 1.

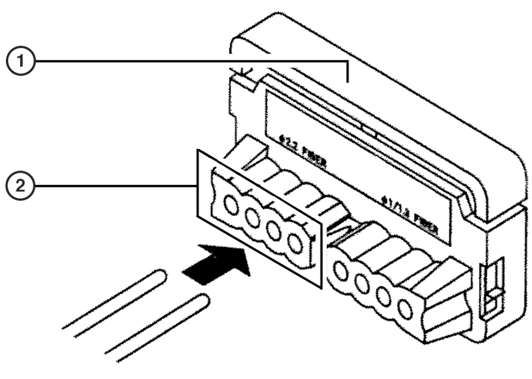
4 Set ADR2 to a unique address between zero (0) and F, if multiple Drainable/Refillable Reservoir ALPs are on the deck.

NOTE ADR2 is set to a default address of zero (0). If only one Drainable/Refillable Reservoir ALP is on the deck, leave the setting at zero (0).

5 Connect the other end of the CAN cable to a CAN port on the Biomek instrument or another active ALP to create a chain.

6 Insert both sensor leads about 1/2" (13 mm) into the 2.2 mm holes in the supplied fiber cutter (Figure 6.5).

Figure 6.5 Fiber Cutter

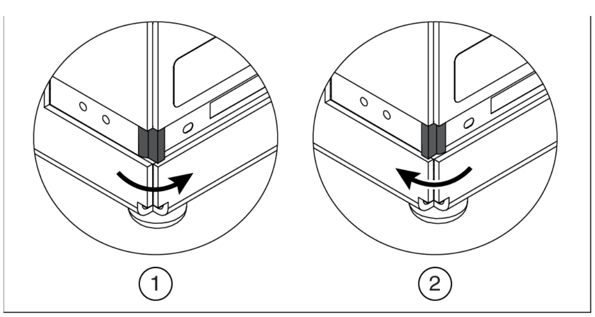


1. Press down to cut leads.
2. **2.2 mm Holes**

7 Press down on the top of the cutter to cut the leads simultaneously.

8 On the controller, flip open the lock-down lever (Figure 6.6) located at the corner of the sensor amplifier. This lever is used to secure the sensor leads to the inside of the amplifier receiver and transmitter ports.

Figure 6.6 Lock Down Lever Open/Close



1. Open (release leads) position
2. Close (secure leads) position

9 Insert the leads into the ports about 1/4-inch, and flip the lock-down lever (Figure 6.6) located at the corner of the sensor amplifier to secure the leads.

10 Turn on power to the Biomek instrument.

Calibrating the Sensor Amplifier Sensitivity

The sensitivity of the sensor amplifier must be calibrated before the Drainable/Refillable Reservoir can be used in a method. Calibrating the sensitivity of the sensor amplifier is recommended each time a different type of liquid is used in the reservoir and anytime the draining and refilling process is not working correctly.

NOTE The Biomek instrument must be turned on to supply power to the ALP during calibration.

To calibrate the sensitivity:

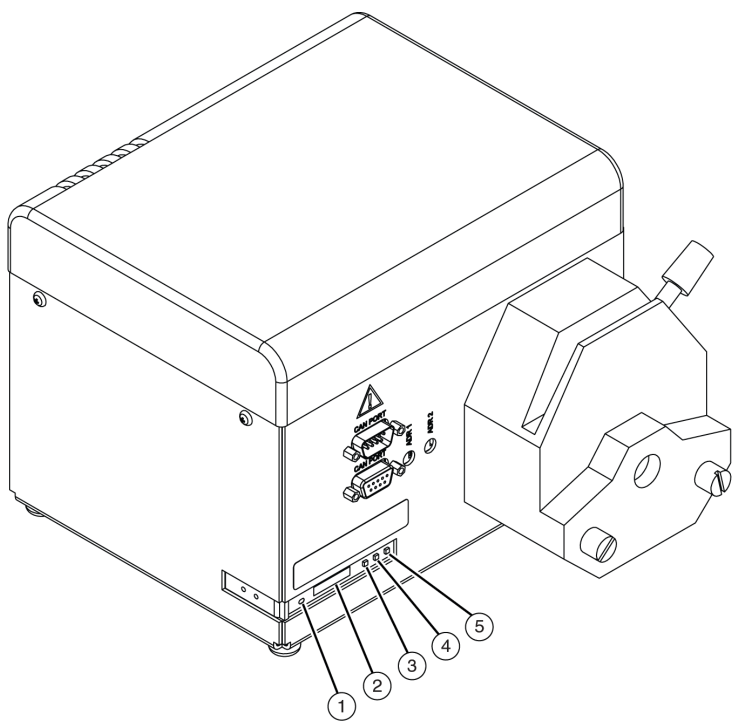
---

1 On the controller, locate the amplifier sensitivity display and the adjustment buttons (Figure 6.7). Use the down button to lower the sensitivity threshold value (shown as green numbers) to the lowest possible value.

⚠ CAUTION

Do not push the "Mode" button. Doing so can modify the sensor configuration which will then require a service call to Beckman Field Services.

Figure 6.7 Calibrating the Sensor Amplifier Sensitivity



1. **Sensitivity Indicator LED**
2. **Amplifier Sensitivity Display**
3. **Mode Button**
4. **Up Button** (Sensitivity Threshold)
5. **Down Button** (Sensitivity Threshold)

---

2 Manually fill the reservoir with the desired liquid until the liquid level covers at least half of the reservoir sensor window.

3 Use the up and down buttons to slowly raise the value of the sensitivity threshold until the sensitive indicator LED (Figure 6.7) turns on (i.e., lights up). Immediately stop using the buttons when the LED turns on.

NOTE If the LED does not turn on, make sure the sensor leads are connected to the correct ports on the amplifier (refer to *Connecting the CAN Communications Cables and Sensor Leads*).

4 Manually drain the reservoir and observe if the indicator LED turns off.

5 If the indicator LED turned off, manually fill the reservoir again. If the LED turns on when the liquid level covers at least half the sensor window, the sensitivity calibration is complete.

OR

If the indicator LED did not turn off when the reservoir was drained, repeat the steps in this section again.

Framing Instructions

Frame the passive ALP the reservoir occupies according to the instructions in the appropriate hardware manual. Biomek Software treats the reservoir as a piece of labware, and does not require additional framing.

Using the Drainable/Refillable Reservoir ALP in a Method

To use the Drainable/Refillable Reservoir ALP in a method, first it must be added to the list of installed devices in **Hardware Setup** (refer to CHAPTER 1, *Installing an ALP in Hardware Setup*). Once added to the list, no additional configuration is required in **Hardware Setup**.

CAUTION

Prior to running a method, make sure there is enough fluid for the method in the container.

Using the Drainable/Refillable Reservoir ALP in a method includes:

- *Configuring an Instrument Setup Step for a Drainable/Refillable Reservoir ALP*
- *Configuring a Device Action Step for a Drainable/Refillable Reservoir ALP*

Configuring an Instrument Setup Step for a Drainable/Refillable Reservoir ALP

In a method using a Drainable/Refillable Reservoir ALP, an **Instrument Setup** step located at the start of the method is necessary for:

- *Adding a Drainable/Refillable Reservoir to the Deck*
- *Configuring Labware Properties for a Drainable/Refillable Reservoir*

Adding a Drainable/Refillable Reservoir to the Deck

To add a Drainable/Refillable Reservoir to the deck:

---

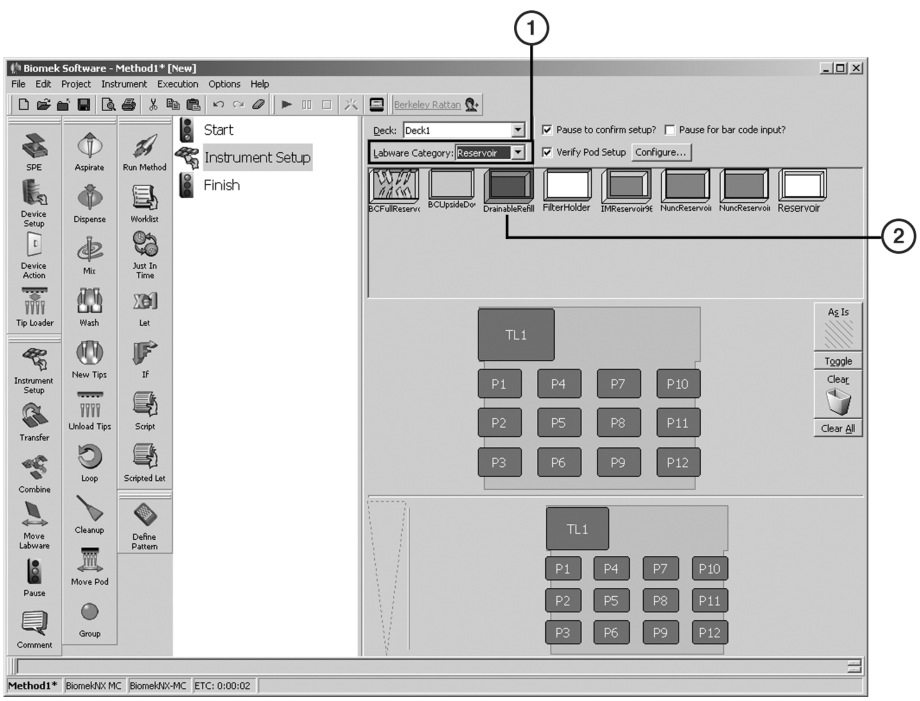
1 Insert an **Instrument Setup** step at the start of the method.

OR

Select the first **Instrument Setup** step found in the method. The **Instrument Setup** step configuration appears (Figure 6.8).

NOTE The first **Instrument Setup** step must be located before any pod movement in a method for obstacle avoidance.

Figure 6.8 Configuring an Instrument Setup Step for a Drainable/Refillable Reservoir



1. **Labware Category** — used to filter labware types to display only labware in the selected category.
2. **DrainableRefillableReservoir Labware Type**

---

2 In **Labware Category**, choose **Reservoir** to display labware in the **Reservoir** category only.

3 Drag a **DrainableRefillableReservoir** labware type onto an available standard position.

NOTE The reservoir should only be mounted on the outside positions of a 4x3 High-Density Passive ALP; the two inner positions do not provide adequate space to correctly route the tubing and sensor leads.

Configuring Labware Properties for a Drainable/Refillable Reservoir

The Drainable/Refillable Reservoir is a piece of labware and may have parameters configured using **Labware Properties**.

To configure **Labware Properties**:

1 Double-click the **DrainableRefillableReservoir** labware type.

OR

Right-click on the **DrainableRefillableReservoir** labware type and choose **Properties** from the menu. **Labware Properties** appears (Figure 6.9).

Figure 6.9 Labware Properties for a Drainable/Refillable Reservoir

2 In **Name**, enter a name for the reservoir.

NOTE When a deck is populated by numerous pieces of labware, naming labware is recommended. Names should be descriptive of the contents of the labware or the work being accomplished during the method. Naming labware in a meaningful fashion may reduce confusion. Names given to pieces of labware may be entered as variables in other step configurations within the method.

3 In **Device**, choose the appropriate **DrainableRefillableReservoir** installed in **Hardware Setup**.

4 Choose **OK** to close **Labware Properties** and save changes.

OR

Choose **Cancel** to close **Labware Properties** without saving changes.

Configuring a Device Action Step for a Drainable/Refillable Reservoir ALP

The ALP is controlled and operating through the **Device Action** step in Biomek Software (refer to the Biomek Software User's Manual, Section 23.6.1.3, Configuring the Device Action Step for a

Drainable/Refillable Reservoir ALP (FX, NX only)). Filling, draining, and configuring the sensor state are all configured using a **Device Action** step in a method.

Controlling the Drainable/Refillable Reservoir ALP Outside a Method

To control the Drainable/Refillable Reservoir ALP outside a method, use **Advanced Manual Control** for:

- *Filling the Reservoir*
- *Draining the Reservoir*
- *Checking the Sensor State*

NOTE **Manual Control** is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the **Stop**  or **Snap Continuation**  button (refer to the Biomek Software User's Manual, Chapter 26.11.2, Snapping a Continuation) before accessing **Manual Control.**

Filling the Reservoir

Use **Advanced Manual Control** to fill the reservoir to the maximum level.

To fill the reservoir:

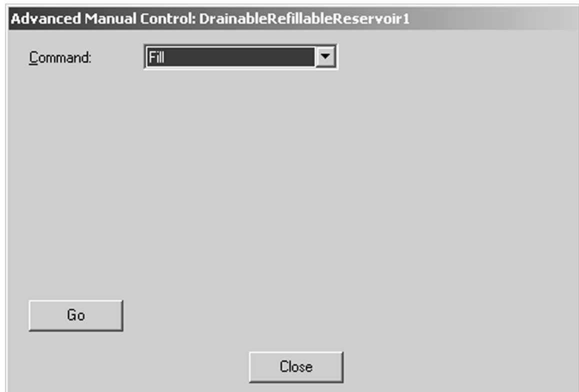
1. Choose **Instrument > Manual Control**. **Manual Control** appears.

2. Choose **Advanced Controls.** A list of the installed pod and devices appears.

3. Select the desired **DrainableRefillableReservoir**. **Advanced Manual Control** for the selected ALP appears.

4. In **Command**, choose **Fill** (Figure 6.10).

Figure 6.10 Advanced Manual Control for a Drainable/Refillable Reservoir ALP with Fill Selected



5 Choose **Go**. The reservoir fills to the maximum level allowed by the sensor.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Draining the Reservoir

Use **Advanced Manual Control** to drain the contents of the reservoir back into the supply container.

To drain a Drainable/Refillable Reservoir ALP:

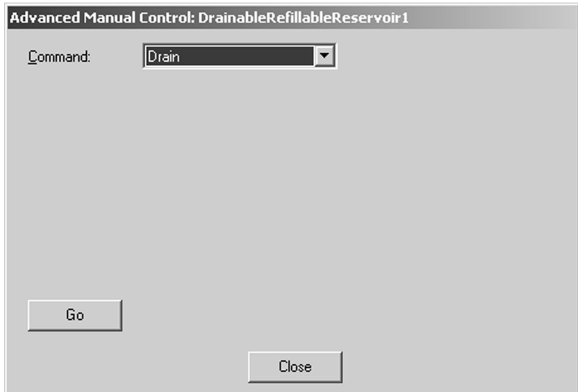
1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**. A list of the installed pod and devices appears.

3 Select the desired **DrainableRefillableReservoir**. **Advanced Manual Control** for the selected ALP appears.

4 In **Command**, choose **Drain** (Figure 6.11).

Figure 6.11 Advanced Manual Control for a Drainable/Refillable Reservoir ALP with Drain Selected



5 Choose **Go**. The liquid in the reservoir drains back into the supply container.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

NOTE When air bubbles form at the end of the tubing in the supply container, the reservoir and tubing are free of liquid.

Checking the Sensor State

Use **Advanced Manual Control** to check the sensor state. Checking the sensor state allows method runs to proceed when the liquid level in the reservoir is sufficient.

To check the sensor state:

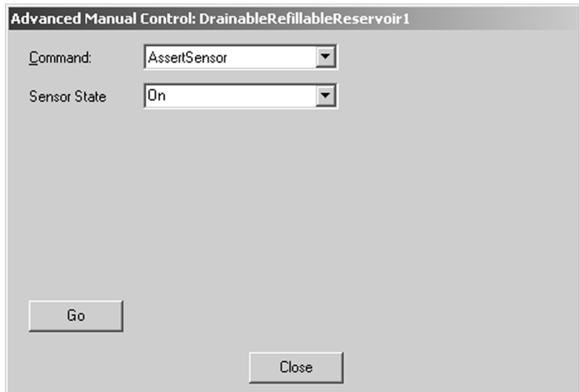
1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**. A list of the installed pod and devices appears.

3 Select the desired **DrainableRefillableReservoir**. **Advanced Manual Control** for the selected ALP appears.

4 In **Command**, choose **AssertSensor**. **Sensor State** appears (Figure 6.12).

Figure 6.12 Advanced Manual Control for a Drainable/Refillable Reservoir ALP with AssertSensor Selected



5 In **Sensor State**, choose:

- **On** — allows the method run to proceed when sufficient liquid is detected in the reservoir.
- **Off** — allows the method run to proceed when liquid is not detected in the reservoir.

6 Choose **Go**. The sensor state is configured.

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

Removing the Drainable/Refillable Reservoir ALP From the Deck

WARNING

The Drainable/Refillable Reservoir ALP may be contaminated from method solutions. Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

WARNING

SPILL HAZARD

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the Biomek instrument. Clean up any spills immediately according to the procedures defined by the laboratory safety officer.

To remove the Drainable/Refillable Reservoir ALP:

1. Drain the reservoir, if necessary (refer to *Draining the Reservoir*)
2. Turn off power to the Biomek instrument.
3. On the controller, push the pump head locking lever to the left to open it.
4. Remove the tubing from the pump head.
5. Disconnect the CAN cable(s) from the CAN port(s).
6. Flip the lock-down lever located at the corner of the sensor amplifier to release the sensor leads, then disconnect the leads from the amplifier.

7 Loosen the thumbscrews fastening the pump head to the controller, and gently remove the pump head.

NOTE The pump head needs to be removed only if the ALP will be stored in the original packaging.

8 On the reservoir, disconnect the tubing from the inlet/outlet fitting.

9 Remove the reservoir from the deck.

10 Decontaminate and clean the reservoir following procedures outlined by the laboratory safety officer.

Storage

To store the Drainable/Refillable Reservoir ALP:

1 Remove the ALP from the deck (refer to *Removing the Drainable/Refillable Reservoir ALP From the Deck*).

NOTE The ALP should be allowed to air dry before it is repacked for storage.

2 Return the ALP to its original packing materials and store in a dry, dust-free, environmentally controlled area.

Preventive Maintenance

WARNING

The Drainable/Refillable Reservoir ALP may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

The ALP requires minimal maintenance. Observe the following guidelines:

- Do not overflow the reservoir.
- Drain any solutions from the reservoir when not in use and follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

  NOTE Refer to *Draining the Reservoir* for more information about draining the reservoir.

- Periodically inspect the tubing for wear and stress fractures.
- Periodically inspect the tubing connections for leakage.
- Replace tubing when required.

NOTE For more information about recommended maintenance procedures and intervals for the peristaltic pump and tubing, refer to the user manuals provided by the manufacturers.

Troubleshooting

Do not attempt to repair the Drainable/Refillable Reservoir ALP without first contacting a Beckman Coulter Service Engineer.

Table 6.1 Troubleshooting the Drainable/Refillable Reservoir ALP

If...	Then...
The ALP is not operating correctly.	Check the CAN connections on the controller (refer to *Connecting the CAN Communications Cables and Sensor Leads*).
The sensitivity indicator LED is not turning on when sufficient liquid is present in the reservoir.	Calibrate the amplifier sensitivity with the desired liquid in the reservoir (refer to *Calibrating the Sensor Amplifier Sensitivity*). Make sure the sensor leads are connected to the correct amplifier ports. The lead with the larger dots printed along the length of the lead connects to the transmitter port; the lead with smaller dots connects to the receiver port (refer to *Connecting the CAN Communications Cables and Sensor Leads*).
Repeated attempts to calibrate the amplifier sensitivity fail.	Contact Beckman Coulter Technical Support.
The reservoir is not filling and draining correctly.	Reverse direction of the tubing through the pump head. The tubing must run left to right through the pump head from the container to the reservoir. Make sure there are no kinks in the tubing. Make sure the pump head is properly closed on the tubing. Make sure the fitting on the container that supplies the reservoir is in contact with the liquid.

CHAPTER 7

Fly-By Bar Code Reader

Overview

WARNING

CLASS II LASER PRODUCT THIS PRODUCT CONFORMS TO APPLICABLE REQUIREMENTS OF 21 CFR 1040 AT THE DATE OF MANUFACTURE.

CAUTION

Do not attempt to install or remove the Fly-By Bar Code Reader; it must be installed or removed by a Beckman Coulter Service Engineer.

The Fly-By Bar Code Reader (Figure 7.1) scans bar code labels applied to one short side of the labware. It is powered through an external power supply and is mounted to either lateral side of a Biomek FX^P or NX^P deck. There are eight possible positions on which to mount the Fly-By Bar Code Reader with four on the left and four on the right side of either Biomek deck.

The gripper can bring labware or a stack of up to four pieces of labware to the Fly-By Bar Code Reader where an initial read or a confirmatory check before and/or after pipetting can be made. Using other Biomek steps, such as an If step, the scanning of bar codes can be used to send labware to one branch of a method or another dependent on whether the bar code read matches the initial read or not.

Using the **Fly-By Read** step, the gripper can remove the lid on a microplate and place it on a S**wap Space**; bring the microplate to the Fly-By Bar Code Reader where the bar code is read; bring the microplate back to its original position or another position, and then, if desired, replace the lid from the Swap Space back on the microplate. The **Fly-By Log** step can be configured to log results from the reads.

NOTE Reservoirs are not restricted for use with the Fly-By Bar Code Reader; however, they are not recommended as liquid may spill onto the deck as they are brought to the Fly-By Bar Code Reader.

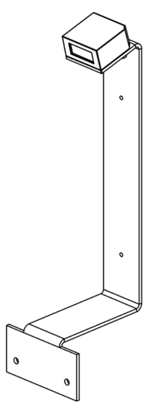
The Fly-By Bar Code Reader is a MS-3 Microscan Scanner, capable of supporting the following bar code types:

- Code 39
- Code 128
- Code 93
- UPCA
- UPCE
- EAN
- Codabar
- Interleaved 2 of 5

Using the Fly-By Bar Reader on a Biomek FX^P or NX^P Laboratory Automation Workstation includes:

- *Properly Applying Bar Code Labels to Labware*
- *Framing the Fly-By Bar Code Reader*
- *Using the Fly-By Bar Code Reader with Biomek Software*

Figure 7.1 Fly By Bar Code Reader for Biomek NX^P Instrument



NOTE Figure 1 shows the Fly-By Bar Code Reader with the bracket for a Biomek NX^P instrument; however, an alternate bracket is used for the Biomek FX^P instrument.

Properly Applying Bar Code Labels to Labware

WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING

If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads may occur.

WARNING

If a label is applied by any means other than a Print & Apply device, an increase in bad reads or no reads may occur.

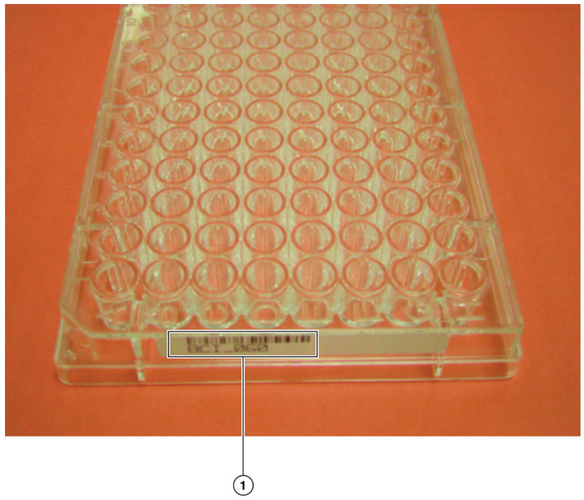
Since a stack of microplates may be held by the gripper in front of the Fly-By Bar Code Reader for bar code reading, it is important that each label on a microplate that will be used for framing or in a stack be positioned at the top and in the middle of the short end of a microplate. Proper placement of bar code labels ensures the bar code on each microplate in a stack is read correctly.

To ensure labels are placed at the top and in the middle of a microplate, the use of an automated bar code application instrument, such as the Print & Apply, is recommended.

NOTE Bar code labels are not required to be placed at the top side of any microplate that will not be used for framing or in stacks.

Figure 7.2 shows an example of a microplate with the correct positioning of the bar code label for microplates used for framing or in stacks.

Figure 7.2 Bar Code Reader- Label placed at the top and in the middle of the short side on a 96-well microplate



1. **Bar code label placed at the top and in the middle of the short side on a 96-well microplate.**

Framing the Fly-By Bar Code Reader

CAUTION

Framing a Fly-By Bar Code Reader sets the correct position for the current deck only; it does not change framing information for other decks. If a different deck is used, the Fly-By Bar Code Reader must be reframed for that deck before it is used in a method.

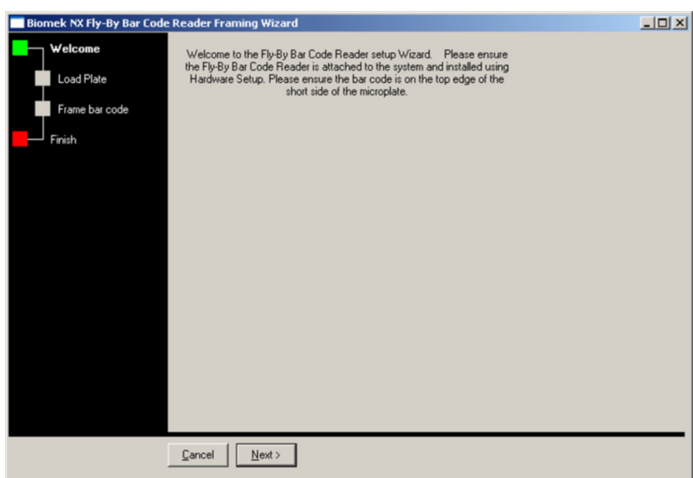
While a Beckman Coulter Service Engineer initially frames the Fly-By Bar Code Reader during installation, it may be necessary to reframe the deck if it is reconfigured.

To frame the Fly-By Bar Code Reader:

1 Place a bar code labeled microplate on a previously framed position.

2 From **Position Properties**, choose **Manual Teach**. **Biomek NX^P Fly-By Bar Code Reader Framing Wizard - Welcome** appears (Figure 7.3).

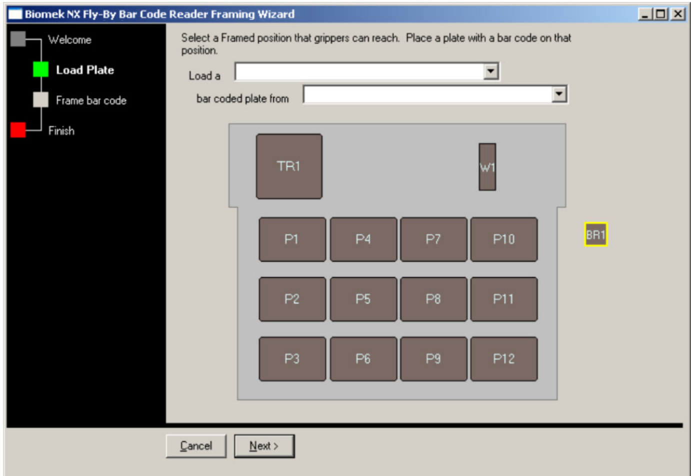
Figure 7.3 Biomek NX^P Fly-By Bar Code Reader Framing Wizard - Welcome



NOTE When framing a Biomek FX^P instrument, the **Biomek** FX^P **Fly-By Bar Code Reader Framing Wizard** appears.

3 Choose **Next**. **Biomek NX^P Fly-By Bar Code Reader Framing Wizard - Load Plate** appears (Figure 7.4).

Figure 7.4 Biomek NX^P Fly-By Bar Code Reader - Load Plate



NOTE When framing a Biomek FX^P instrument, the **Biomek** FX^P **Fly-By Bar Code Reader Framing Wizard** appears.

---

4 In **Load a**, choose the labware type placed on the framed position in step 1.

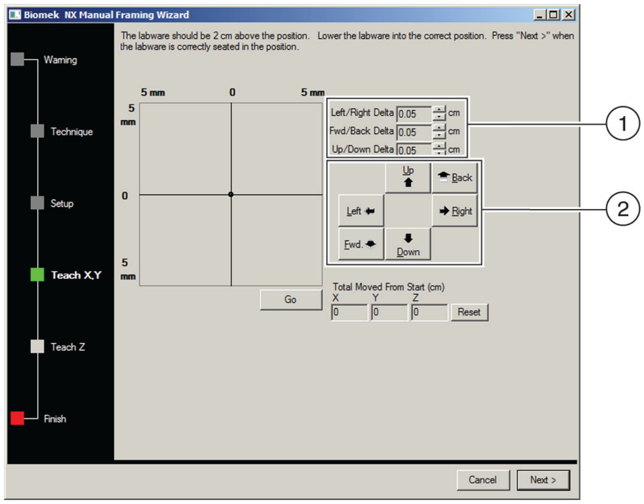
---

5 In **bar coded plate from**, choose the framed position on which the microplate was placed in step 1.

---

6 Choose **Next. Biomek NX^P Fly-By Bar Code Reader Framing Wizard -Frame bar code** appears (Figure 7.5).

Figure 7.5 Biomek NX^{P} Fly-By Bar Code Reader Framing Wizard - Frame Bar code



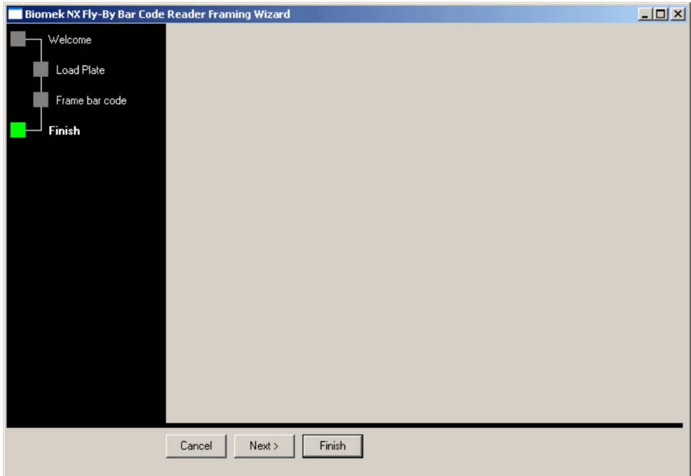
1. **Delta Value — The magnitude of change applied to the gripper each time a directional button is selected.**
2. Directional Buttons — The directional buttons move the labware in front of the Fly-By Bar Code Reader by the amount shown in **Delta** with each press of a button.

NOTE When framing a Biomek FX^{P} instrument, the Biomek FX^{P} Fly-By Bar Code Reader Framing Wizard appears.

7 Using the instructions in *Using the Delta Value and Directional Buttons*, move the labware in front of the Fly-By Bar Code Reader until The **Barcode is Reading at** reaches at least 90%.

8 After ensuring the Barcode is Reading at reaches at least 90%, choose **Next. Biomek NX^{P} Fly-By Bar Code Reader Framing Wizard - Finish** appears (Figure 7.6).

Figure 7.6 Biomek NX^{P} Fly-By Bar Code Reader Framing Wizard - Finish



NOTE When framing a Biomek FX^{P} instrument, the **Biomek FX^{P} Fly-By Bar Code Reader Framing Wizard** appears.

9 Choose **Finish** to close **Biomek NX^{P} Fly-By Bar Code Reader Framing Wizard** and allow the gripper to move the labware back to the original position.

Using the Delta Value and Directional Buttons

The microplate can be positioned manually using the delta values and directional buttons to align it with the position being framed (Figure 7.5). Pressing one of the directional buttons moves the gripper in that direction by the distance specified in **Delta**. Use the directional buttons and delta values to place the microplate in front of the Fly-By Bar Code Reader.

To use the delta value and directional buttons to position the microplate:

1. In **Delta**, select the magnitude of change applied to the gripper each time a directional button is selected (Figure 7.5). The default **Delta** value is 0.05 cm.

   NOTE If the microplate is a considerable distance from the Fly-By Bar Code Reader, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the microplate is almost to the desired location, reduce the **Delta** value to fine tune the position (minimum setting is 0.005 cm).

2. Select the **directional button** representing the motion required to physically move the microplate into the appropriate position in front of the Fly-By Bar Code Reader.

   NOTE Each time a directional button is selected, the gripper and microplate move the distance specified in **Delta** in the indicated direction.

   NOTE The microplate can be physically positioned over the position being framed using:

   - the directional buttons in **Manual Teach**.
   - the directional keys on the keyboard.
   - the directional keys on the numeric keypad.

   The directional buttons displayed in **Manual Teach** correspond to the keys on the numeric keypad. More specifically, **Fwd** corresponds to the '**1**' on the numeric keypad, while **Down** is found on the '**2**', **Left** is found on the '**4**', **Right** on '**6**', **Up** on '**8**', and **Back** on '**9**'.

Using the Fly-By Bar Code Reader with Biomek Software

⚠ WARNING

When using Home All Axes with a Fly-By Bar Code Reader on the deck, make sure the pod is not near the front, back, or side of the instrument.

⚠ WARNING

Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

⚠ WARNING

Always have the laser module access cover, located on the Fly-By Bar Code Reader, in place when operating or troubleshooting the laser module.

Using the Fly-By Bar Code Reader with Biomek Software includes:

- *Configuring the Default Error Handling in Hardware Setup*
- *Configuring the Fly-By Bar Code Reader to Read Labels in a Biomek Method*
- *Logging Reads from the Fly-By Bar Code Reader*

Configuring the Default Error Handling in Hardware Setup

Configuring the default error handling settings for the Fly-By Bar Reader is done in **Hardware Setup**. The Beckman Coulter Service Engineer initially configures the default error handling for the Fly-By Bar Code Reader during installation; however, these settings may be changed if desired.

NOTE **Hardware Setup** tells Biomek Software which devices, pods, and heads are installed and ready to use in methods. This information is established by installing, configuring, and removing devices in **Hardware Setup**.

NOTE For more information about adding, configuring, and removing devices in **Hardware Setup**, refer to the specific hardware manual for the instrument.

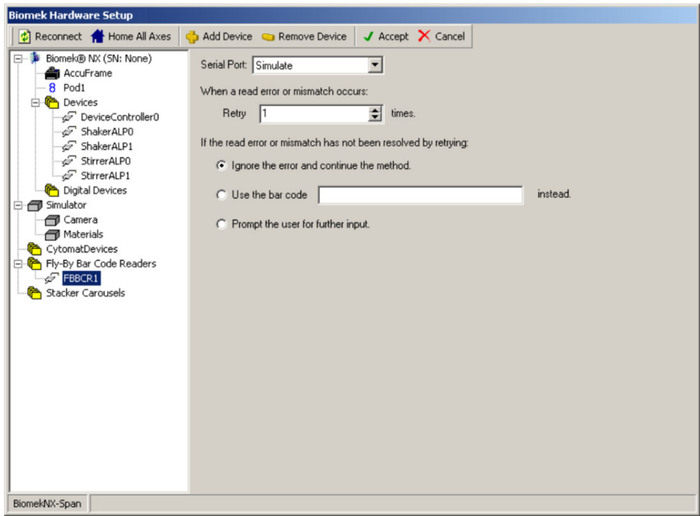
To change the default error handling in **Hardware Setup**:

NOTE The **Serial Port** is set during installation. Do not change this value.

1. From the **Instrument menu**, choose **Hardware Setup**. **Hardware Setup** appears.

2. In the left pane of **Hardware Setup**, select the appropriate **Fly-By Bar Code Reader** from the list of installed devices. The right pane displays the configuration area (Figure 7.7).

Figure 7.7 Hardware Setup — configuring a Fly-By Bar Code Reader



3 In **When a read error or mismatch occurs: Retry**, enter the number of times the bar code reader should try to retry reading the bar code.

NOTE The acceptable range for retries is between 0 and 10.

4 In **If the read error or mismatch has not been resolved by retrying**, choose one of the following options:

- **Ignore the error and continue the method.** — to continue the method after the number of times to retry has not resolved the error or mismatch.
- **Use the bar code... instead.** — to use another bar code
- **Prompt the user for further input.** — when this option is chosen, a prompt displays after the number of times to retry has not resolved the error or mismatch (refer to *Prompt the User for Further Input Option*).

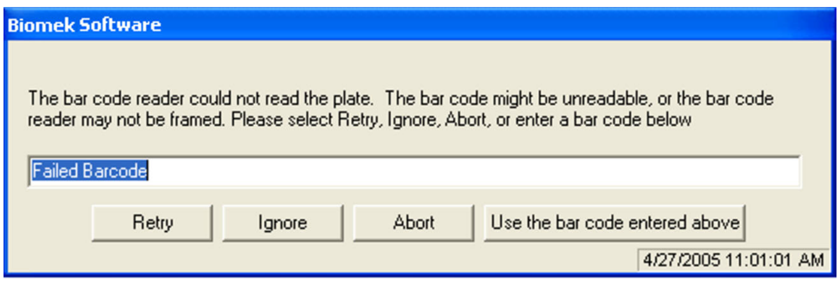
Prompt the User for Further Input Option

The **Prompt the user for further input** option can be set as a default in **Hardware Setup** or configured in the **Fly-By Read** step for a specific confirmatory read. When this option is selected, one of two prompts (Figure 7.8 and Figure 7.9) displays after the number of times to retry has not resolved the error or mismatch. If a bar code cannot be read because of instances such as a corrupted bar code label or an improperly framed bar code reader, Figure 7.8 appears. If the bar code read does not match the expected bar code, Figure 7.9 appears.

If a **Fly-By Logging** step has been configured, the action selected from the prompt is recorded in the log (refer to *Logging Reads from the Fly-By Bar Code Reader*).

Bar Code Cannot Be Read

Figure 7.8 Prompt to choose actions when Fly-By Bar Code Reader could not read the bar code

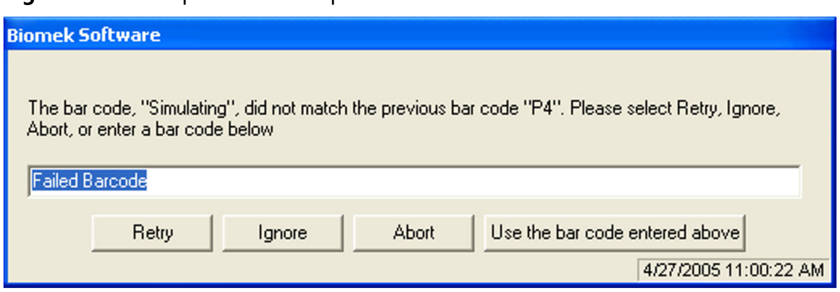


When the prompt is displayed, choose one of the following options:

- **Retry** — the Fly-By Bar Code Reader retries to read the bar code.
- **Ignore** — the method continues without the error resolved.
- **Abort** — the method stops.
- **Use the bar code entered above** — the bar code entered above is used instead of the initial bar code entered in **Labware Properties**.

Bar Code Does Not Match

Figure 7.9 Prompt to choose options bar code does not match



When the prompt is displayed, choose one of the following options:

- **Retry** — the Fly-By Bar Code Reader retries to read the bar code.

- **Ignore** — the method continues without the error resolved.
- **Abort** — the method stops.
- **Use the bar code entered above** — the bar code entered above is used instead of the initial bar code entered in **Labware Properties**.

Configuring the Fly-By Bar Code Reader to Read Labels in a Biomek Method

To configure the Fly-By Bar Code Reader to read bar codes in a Biomek method, the **Fly-By Read** step must be configured. The **Fly-By Read** step may be used to initially enter bar codes for decision making in a Biomek method using an **If** step, (refer to *Using the Fly-By Read Step for Decision Making in a Biomek Method*) or as a confirmatory read to ensure the correct labware has been selected.

An understanding of the situations in which bar codes are confirmed is necessary. A bar code entered in **Labware Properties** in an **Instrument Setup** step is considered the initial read and must match subsequent reads in the **Fly-By Read** step to be confirmed. However, if a bar code is not entered in **Labware Properties** and is configured to be read in a **Fly-By Read** step, the bar code read in the **Fly-By-Read step** becomes the initial read and is logged as confirmed. Subsequent reads on the same bar code must then match the initial read to be confirmed.

Since the gripper can remove a lid from labware and place it on another position before bringing labware to the Fly-By Bar Code Reader, a **Swap Space** must be configured in the **Instrument Setup** step. A **Swap Space** designates a position for lid placement while the bar code is read.

NOTE Refer to the Biomek Software User's Manual for more information on configuring the **Instrument Setup** step or **Labware Properties**.

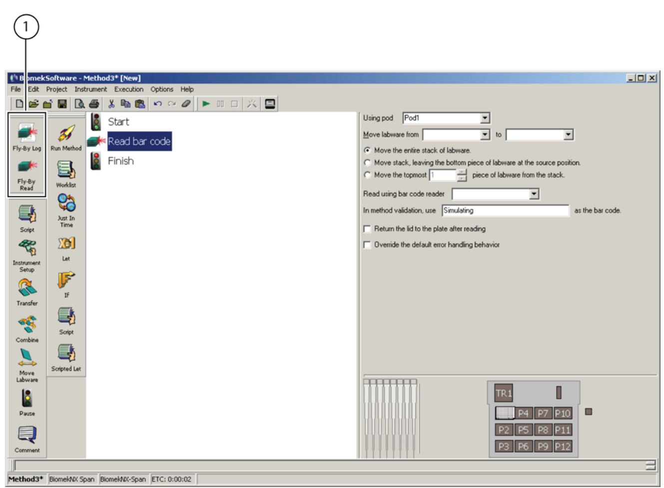
The **Fly-By Bar Code Reader** step palette (Figure 7.10) automatically appears on the method editor when the software for the Fly-By Bar Code Reader is installed.

To configure the Fly-By Bar Code Reader to read bar codes:

---

1 Insert a **Fly-By Read** step into the method view. The **Fly-By Read step** configuration appears (Figure 7.10).

Figure 7.10 Fly-By Read step configuration



1. **Fly By Bar Code Reader Step Palette**

2 From **Using pod**, choose the pod to move the labware to the Fly-By Bar Code Reader.

3 In **Move labware from**, select the original deck position for the labware from the Current Deck display. This instructs the gripper to move labware from a specific deck position in preparation for leaving it at a final destination.

4 In **to**, select the final deck position for the labware from the Current Deck display. This instructs the gripper to move the labware to a final deck position.

5 Select the desired option for moving stacked labware:

NOTE The gripper can move up to four plates at one time.

- **Move the entire stack of labware** — moves all labware in the stack; this option should be selected when moving a single unstacked piece of labware.
- **Move stack, leaving the bottom piece of labware at the source position** — moves all labware in the stack except for the bottom piece.

  NOTE Selecting **Move stack**, leaving the bottom piece of labware at the source position when the source deck position contains only one piece of labware results in an error.

- **Move the topmost... piece of labware from the stack** — moves only the specified number of labware from the top of the stack.

  NOTE Refer to the Biomek Software User's Manual, Biomek Stacking Rules for information on using stack of labware.

6 From **Read using the bar code reader**, choose the Fly-By Bar Code Reader to read the bar code.

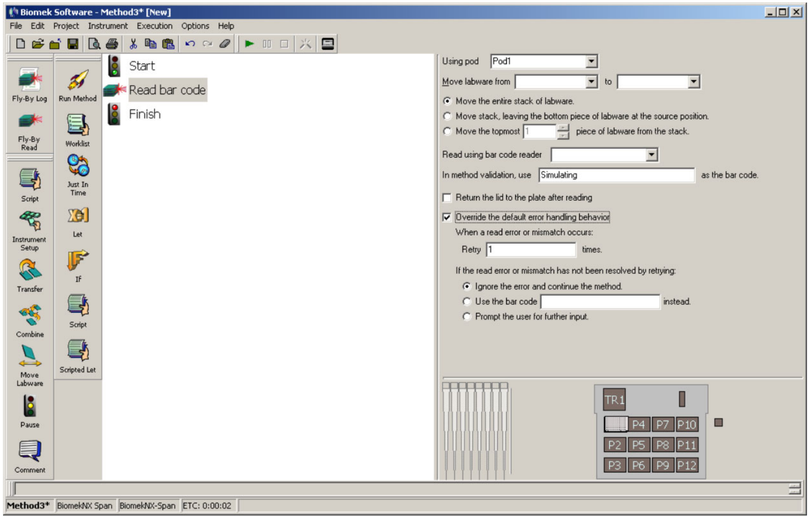
7 From **In method validation, use... as the bar code**, use the default **Simulating** to allow Biomek Software to validate the method.

NOTE A value must be entered since a bar code is not actually read during validation. Without a value, the software cannot validate the next operation. The entered value is only used for method validation and not used during method execution.

8 If desired, check **Return the lid to the plate after reading**.

9 To override the default error handling configured in **Hardware Setup** (refer to *Configuring the Default Error Handling in Hardware Setup*), check **Override the default error handling behavior**. Figure 7.11 appears.

Figure 7.11 Fly-By Read step configuration with Override the default error handling behavior checked



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10 In **When a read error or mismatch occurs: Retry**, enter the number of times the bar code reader should try to retry reading the bar code.

NOTE The acceptable range for retries is between 0 and 10.

---

11 If the read error or mismatch has not been resolved by retrying, choose one of the following

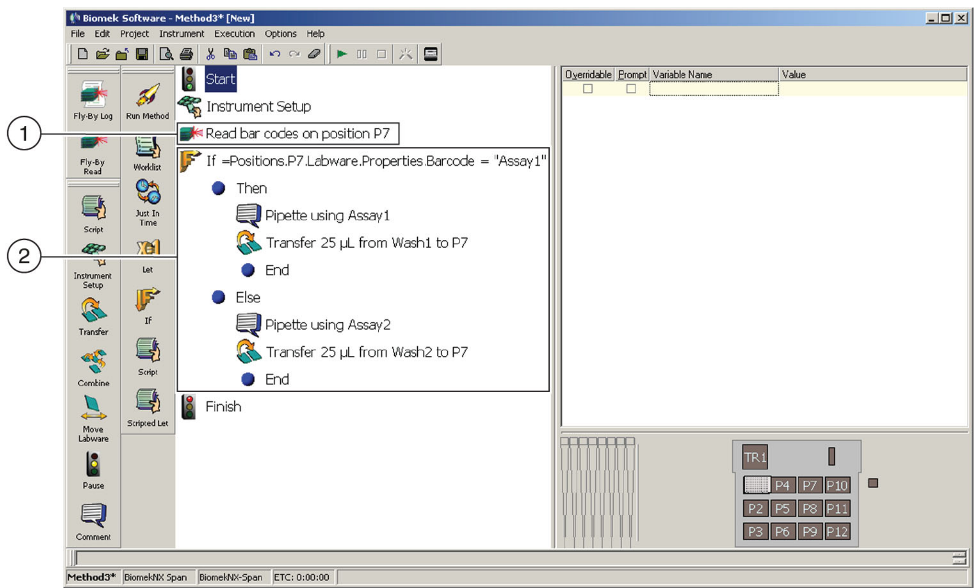
- **Ignore the error and continue the method.** — when this option is chosen, if the bar code has not been read, the method continues after the number of times to retry has been exhausted. If the bar code has been read, the mismatch is ignored, the new bar code read is accepted, and the method continues after the number of times to retry has been exhausted.
- **Use the bar code... instead.** — to use another bar code.
- **Prompt the user for further input.** — when this option is chosen, a prompt displays after the number of times to retry has been exhausted (refer to *Prompt the User for Further Input Option*).

Using the Fly-By Read Step for Decision Making in a Biomek Method

The **Fly-By Read** step may be used for decision making in a Biomek method. For example, a method may be configured using an **If** step and a **Fly-By Read** (Figure 7.12).

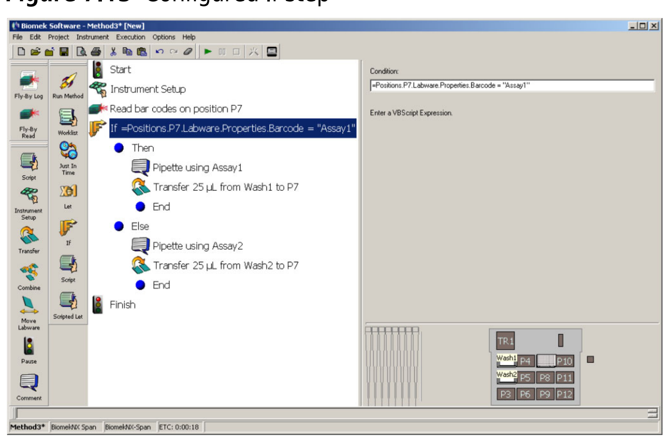
Then, depending on the read results and the **If** step configuration (Figure 7.13), a microplate is sent to one pipetting operation or the other. Refer to the *Biomek Software User's Manual, If Step* for more information on configuring the **If** step.

Figure 7.12 If step inserted in the method



1. **Fly By Read Step**
2. If step — Depending on results from the **Fly-By Read** step, microplates may be sent to one pipetting operation or the other.

Figure 7.13 Configured If step



Logging Reads from the Fly-By Bar Code Reader

Reads from the Fly-By Bar Code Reader can be logged to a special log file (Figure 7.14) that records:

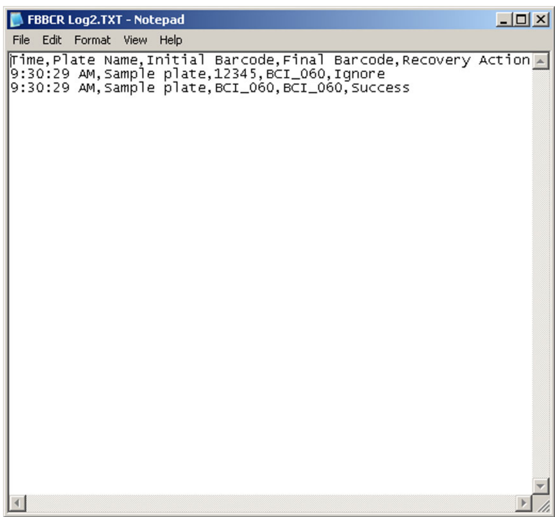
- **Time** — time when the bar code was read.
- **Plate Name** — name of the labware specified in Labware Properties.
- **Initial Bar Code** — bar code specified in Labware Properties.

  NOTE The bar code is not specified in **Labware Properties**, the first bar code read by the Fly-By Bar Code Reader is the **Initial Bar Code**.

- **Final Bar Code** — bar code read by the Fly-By Bar Code Reader.
- **Recovery Action** — action taken when an error or mismatch occurred. When no error or mismatch has occurred, **Success** is logged.

  NOTE The **Recovery Action** occurs automatically if the user has preconfigured the action in the **Fly-By Read** step or **Hardware Setup**. User intervention is required if **Prompt the user for further action** has been configured (refer to *Prompt the User for Further Input Option*).

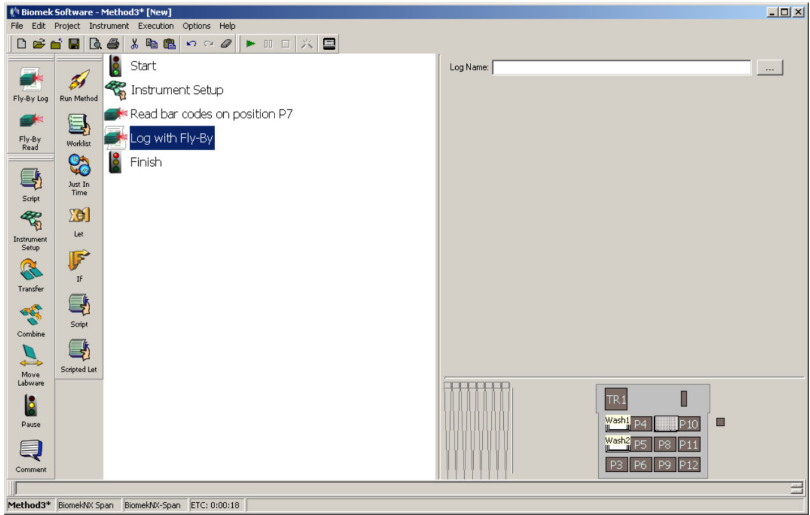
Figure 7.14 Example of a log file from Fly-By Bar Code Reader



To log confirmatory reads from the Fly-By Bar Code Reader:

1 Insert a **Fly-By Log** step into the method view. The **Fly-By Log** step configuration appears (Figure 7.15).

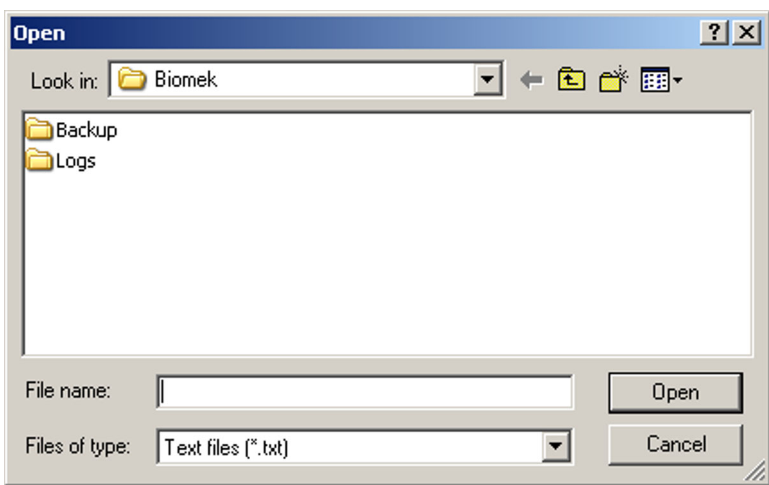
Figure 7.15 Fly-By Logging step configuration



2 Enter a descriptive **Log Name** for the log.

3 Use the browse button to save the new log file to **Biomek Logs** (Figure 7.16).

Figure 7.16 Open to save the log to the Biomek Logs



Specifications

Table 7.1 System Specifications

Item	Description
Environment	Indoor use only
Power Requirements	US: 100–240VAC @ 6 amps max Europe: 200-240VAC, 50Hz
Dimensions:	4.0” (L) x 2.0” (W) x 10.5” (H) 10.16 cm (L) x 5.08 cm (W) x 26.67 cm (H)
Weight	2 lbs., including power cords (.91 kg)
Ambient Operating Temperature	5-30°C (41-86°F)
Humidity Restrictions	<85% (non-condensing) @ 30°C (86°F)
Altitude Restrictions	up to 2000m (6562ft)
Installation Category	Category II
Pollution Degree	2
Communications to Host	RS-232 port

CHAPTER 8

Half-Position Disposal ALP (NX-S8 only)

Overview

The Half-Position Disposal ALP provides a means to dispose of tips during a method. When the slide is attached, it can be used to dispose of tips, tip boxes, and labware during a method. Because this ALP only takes a half position, a Span-8 Wash ALP may be placed on the other half position to conserve space on the Biomek NX deck.

The Half-Position Disposal ALP is used by the Span-8 Pod on the Biomek NX deck in one of two ways:

- Half-Position Disposal ALP — The disposed tips are placed into a waste receptacle positioned inside the ALP base.

  OR

- Half-Position Disposal ALP with Slide — A slide that extends beyond the edge of the Biomek deck is inserted into the ALP. Tips, tip boxes, and labware placed inside the ALP slide down into a receptacle placed below.

  NOTE Labware that hangs below the gripper, such as an SPE filter plate or a tip box lid, cannot be placed inside the ALP.

NOTE The Half-Position Disposal ALP is shipped so that either of the two options above can be assembled and used.

The information in this chapter includes mounting the ALP to the deck, framing, removing the ALP from the deck, storing, and preventive maintenance for the following:

- Half-Position Disposal ALP (refer to *Half-Position Disposal ALP*)
- Half-Position Disposal ALP with Slide (refer to *Half-Position Disposal ALP with Slide*)

Half-Position Disposal ALP

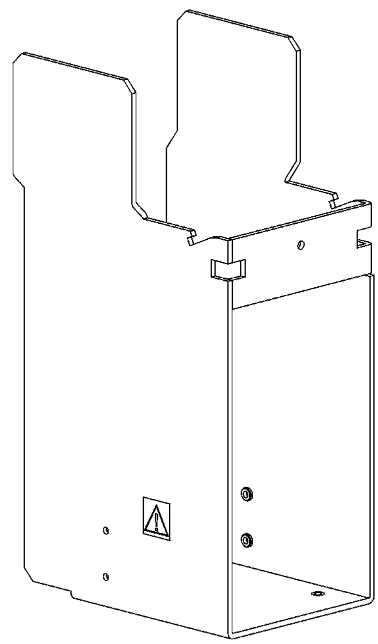
WARNING

When using the Half-Position Disposal ALP, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Half-Position Disposal ALP is used as a self-contained waste receptacle (without the slide), a waste bag is mounted inside the ALP (Figure 8.1). Because this ALP only takes a half position, a Span-8 Wash ALP may be placed on the other half position to conserve space on the Biomek deck.

NOTE The Half-Position Disposal ALP is used only for collecting shucked tips.

Figure 8.1 Half-Position Disposal ALP



Mounting a Half-Position Disposal ALP

CAUTION

The Half-Position Disposal ALP must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Half-Position Disposal ALP can be mounted on half of a standard deck position in the outside columns of the Biomek NX deck. Refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck, to learn how to configure the deck and where to place the ALP on the Biomek NX deck. The Half-Position Disposal ALP is referred to as **HalfTipTrashLeft** or **HalfTipTrashRight** in the **Deck Editor**.

The following conditions should be noted before choosing a deck position:

- If the ALP is placed in the first or second row from the front, the gripper cannot grip labware on or off an adjacent ALP from the front or behind.
- If the ALP is placed in the third row from the front, the gripper can grip from behind the ALP, but not from the front.
- If the ALP is placed in the back row, it can grip only from the front.

To mount a Half-Position Disposal ALP to the deck:

1 Choose a deck position in the outside column of the deck, then slip the locating pins on the bottom of the ALP into the locating holes of the desired deck position.

2 Fasten the ALP to the deck using the thumbscrews on the bottom of the ALP.

3 Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.

WARNING

Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Half-Position Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

4 Smooth out the bag to allow items to drop directly to the bottom of the bag.

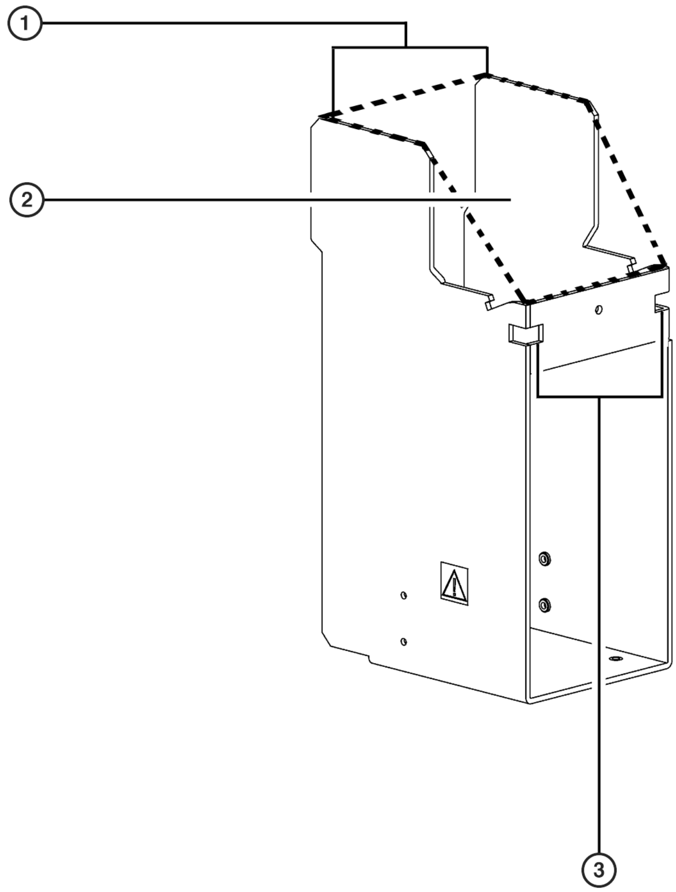
5 To hold the bag in place, stretch the rubber band over the top of ALP and use the notches to position it in the location shown in Figure 8.2. An opening like the one in Figure 8.2 should be created.

CAUTION

Make sure the bag is tight to tops of the flanges. The gripper tool must have enough room to move over the ALP.

6 Ensure the bag is tight to the tops of the flanges (Figure 8.2).

Figure 8.2 Half-Position Disposal ALP Rubber Band Placement

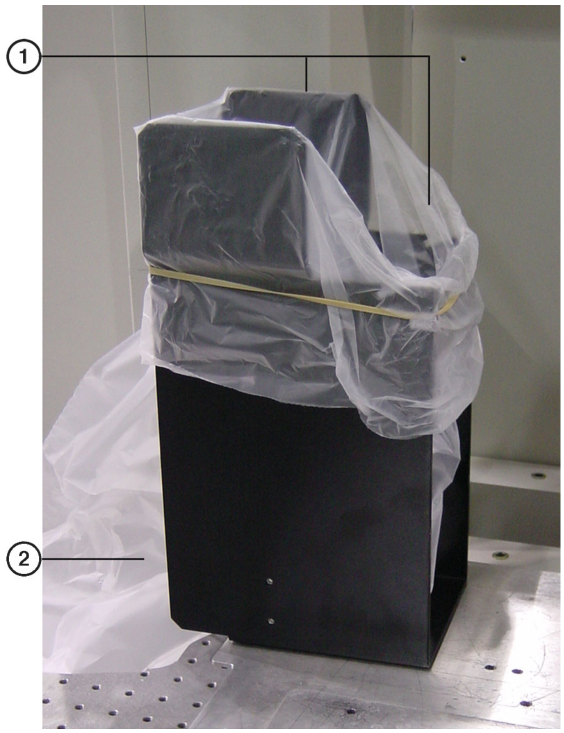


1. **Tops of Flanges**
2. **Bag Placement** — to create an opening for the disposed items, place the bag inside the bagging extension using the dashed lines as a guide.
3. **Rubber Band Placement** — position the rubber band so it is secured using the notches.

---

7 Pull the bag through the Half-Position Disposal ALP so the opening looks like the photo in Figure 8.3.

Figure 8.3 Half-Position Disposal ALP with Correct Bag Placement



1. **Correct Opening for Disposed Tips**
2. Pull the bag through the ALP to create the correct opening for disposed tips.

Removing a Half-Position Disposal ALP

⚠ WARNING

The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

⚠ CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ CAUTION

SPILL HAZARD.

To remove the Half-Position Disposal ALP:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the laboratory safety officer.
3. Loosen the thumbscrews on the base of the ALP.
4. Lift the ALP straight up from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

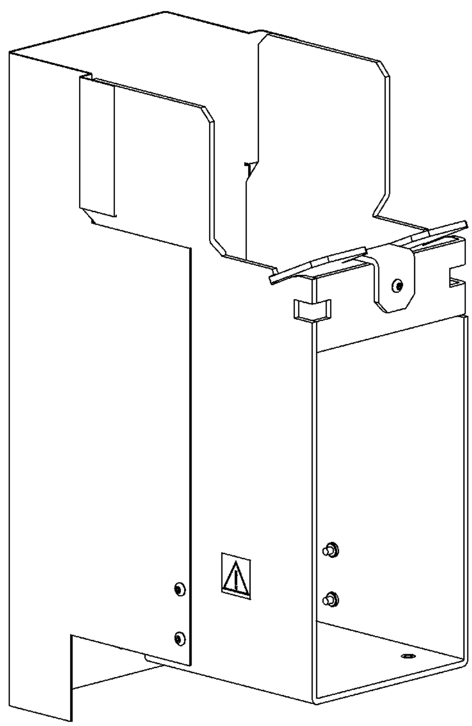
Half-Position Disposal ALP with Slide

When the Half-Position Disposal ALP is used with the slide, it extends off the edge of the deck. The slide is directed through the gap between the deck and Plexiglas shield. A trash receptacle is placed on the floor at the end of the slide to catch the waste. The ALP can be used on half of a standard deck position and is particularly effective when lab space is at a premium.

The Half-Position Disposal ALP with Slide allows the disposal of as many used tips as the trash receptacle is capable of holding. The Span-8 Pod can drop disposable tips directly into this ALP with the slide. Labware that hangs below the gripper, such as an SPE filter, cannot be placed inside the ALP.

NOTE Tips may stick to the slide, which could cause tips or labware to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

Figure 8.4 Span-8 Disposal ALP with Slide



Mounting the Half-Position Disposal ALP with Slide to the Deck

⚠ **CAUTION**

The Half-Position Disposal ALP with Slide must be mounted in the left or right outside columns of the Biomek NX deck to avoid collisions.

⚠ **CAUTION**

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Half-Position Disposal ALP can be mounted on half of a standard deck position in the outside columns of the Biomek NX deck. Refer to the Biomek Software User's Manual, Chapter 6, Preparing and Managing the Deck, to learn how to configure the deck and where to place the ALP on the Biomek NX deck. The Half-Position Disposal ALP with Slide is referred to as **HalfTrashLeft** or **HalfTrashRight** in the **Deck Editor**.

The following conditions should be noted before choosing a deck position:

- If the ALP is placed in the first or second row from the front, the gripper cannot grip labware on or off an adjacent ALP from the front or behind.
- If the ALP is placed in the third row from the front, the gripper can grip from behind the ALP, but not from the front.
- If the ALP is placed in the back row, it can grip only from the front.

The bottom panels on the instrument must be removed before mounting the Half-Position Disposal ALP with Slide to the deck (refer to *Removing a Bottom Panel*).

Removing a Bottom Panel

After choosing an appropriate deck position, the panel that is adjacent to the chosen position must be removed to allow the slide to be directed through the gap between the deck and Plexiglas shield.

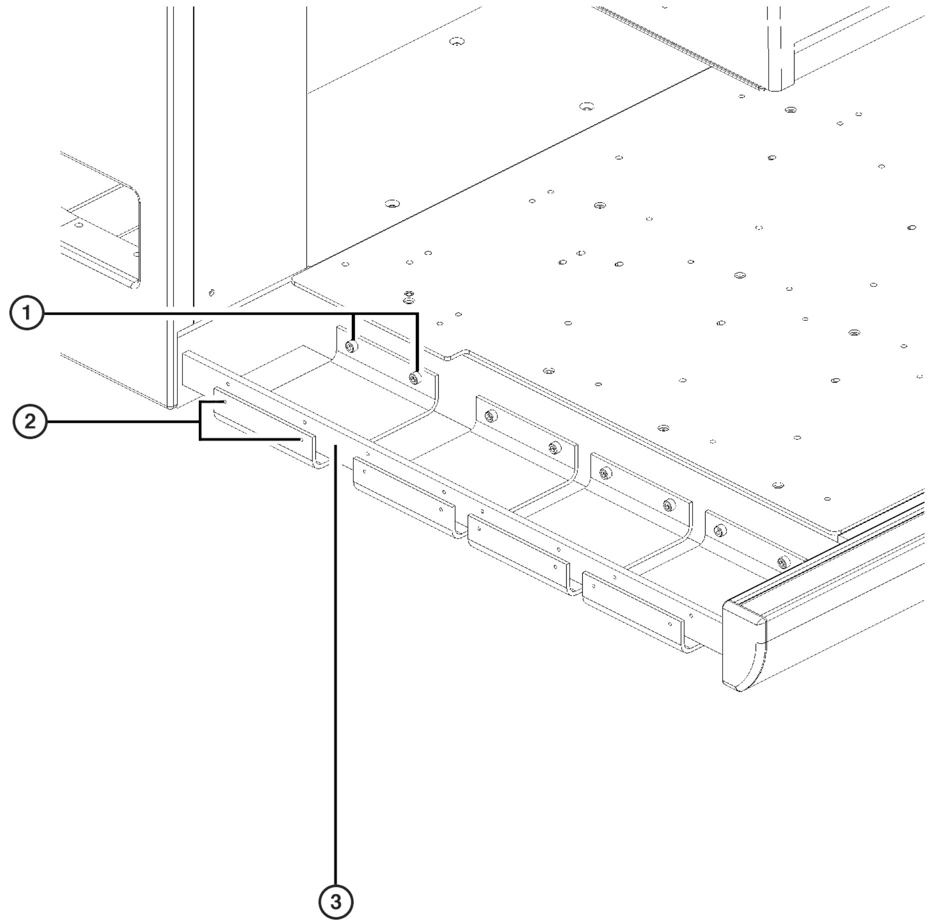
To remove a bottom panel:

1. Remove the two screws that attach the bottom panel to the instrument base (Figure 8.5).

2. While holding the loosen panel, remove the two screws that attach it to the side bracket where the Plexiglas shields are also attached (Figure 8.5).

3. Store the removed panel in a dry, dust-free, environmentally-controlled area.

Figure 8.5 Removing Bottom Panels



1. **Screws That Attach Bottom Panel to Instrument Base**
2. **Screws That Attach Bottom Panel to Side Bracket**
3. **Side Bracket**

Mounting the ALP to the Deck

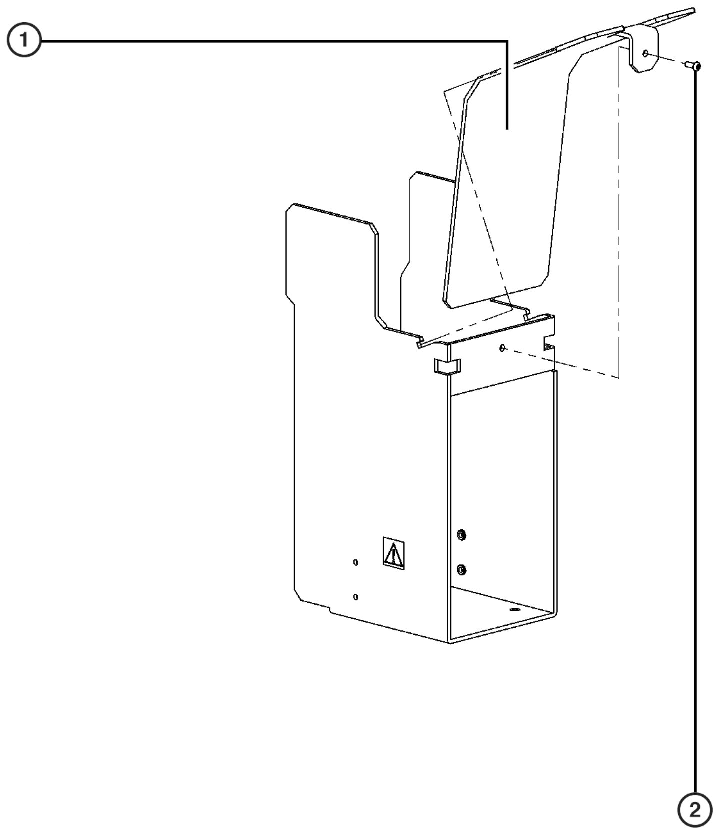
To mount a Half-Position Disposal ALP with Slide:

1 Attach the slide to the ALP by lowering the into the grooves in the ALP.

2 Insert the grounding screw through the tab on the back of the slide and into the threaded hole in the ALP.

NOTE This screw is necessary for proper ESD grounding of the ALP and to position the slide.

Figure 8.6 Adding the Slide to the Half-Position Disposal ALP



1. **Slide**
2. **Grounding Screw**

---

3 Attach the slide to the ALP using the supplied grounding screw.

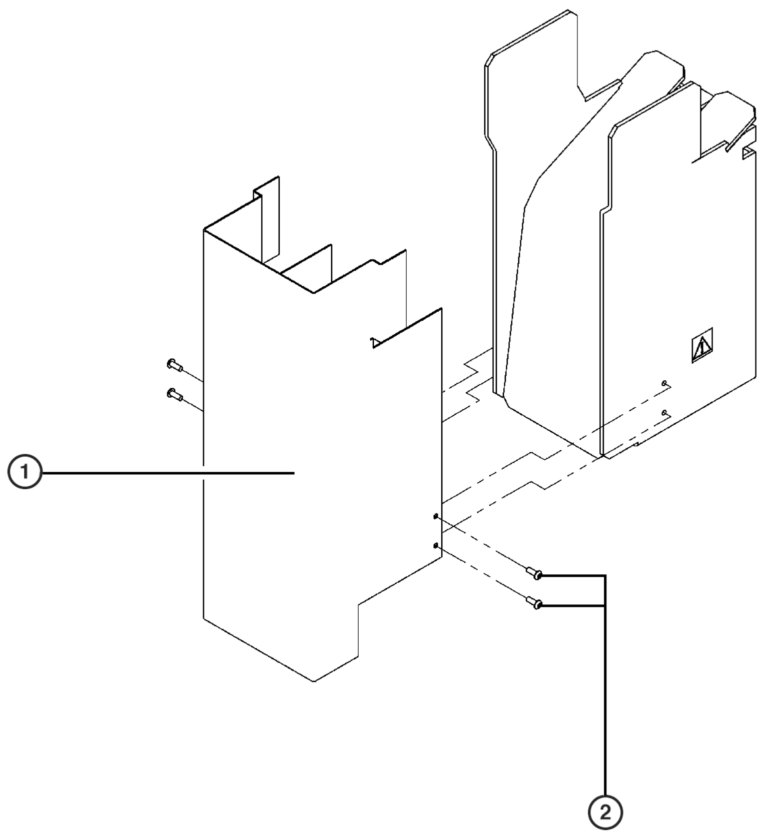
---

4 Position the disposal chute by lining up the holes in the chute with the threaded holes in the ALP (Figure 8.7).

---

5 Attach the disposal chute to the ALP using the four screws supplied (Figure 8.7).

Figure 8.7 Adding the Chute to Half-Position Disposal ALP



1. **Disposal Chute**
2. **Screws to Attach Chute to the ALP**

6 Choose the desired position and remove the bottom shield that is adjacent to the position so the trash can fall through to the receptacle.

7 Place the ALP in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.

8 Slip the locating pins on the bottom of the ALP into the locating holes on the deck.

9 Place a trash receptacle at the end of the disposal chute to catch disposed items.

10 Look down through the disposal chute, or drop a test item into the ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

Removing a Half-Position Disposal ALP with Slide ALP

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Half-Position Disposal ALP with Slide:

1. Verify that no labware remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.

2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.

3. Remove the grounding screw from the slide.

4. Lift the slide from the base.

5. Loosen the thumbscrew on the base of the ALP.

6. Lift the ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

7. To detach the chute, remove the four screws attaching the chute to the ALP and remove the chute.

Framing Instructions

Framing the Half-Position Disposal ALP occurs when the deck is framed with the **Shift Deck** command according to the instructions in the (refer to the Biomek® NX and NX^P Laboratory Automation Workstations Span-8 Pod User’s Manual, Chapter 4, Framing Instructions). It is not necessary to individually frame the Half-Position Disposal ALP.

Storage

Return the Half-Position Disposal ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the ALP to air-dry before returning it to its original packing materials.

Preventive Maintenance

WARNING

The Half-Position Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Half-Position Disposal ALP with a soft cloth.

CHAPTER 9

HDR Pin Drying ALP and Reservoirs (FX only)

Overview

The HDR Pin Drying ALP (Figure 9.1), an active ALP, and reservoirs (refer to *Reservoirs*) are part of a system for washing and drying pins on the HDR Tool Body between transfers in a method. Pins are washed using a "dunk and dry" approach.

The HDR Tool Body immerses the pins in one or more reservoirs of wash solutions, such as bleach, ethanol, or DMSO. Reservoirs may be static or circulating. The location and liquid type in each reservoir is configured in the Biomek Software using the **Instrument Setup** step (refer to the *Biomek Software User's Manual*, Chapter 16, *Instrument Setup Step*).

After washing the pins in the reservoir(s), the HDR Tool Body moves above the HDR Pin Drying ALP to dry the pins by fan. The HDR Pin Drying ALP must be configured in **Hardware Setup** and placed on the deck in the **Deck Editor**.

The HDR Pin Drying ALP includes components such as an adaptor plate, fan and guards, and collar (refer to *Components of the HDR Pin Drying ALP*).

The reservoirs that may be used with the HDR Pin Drying ALP include static (refer to *Static Reservoirs*) and circulating reservoirs (refer to *Circulating Reservoirs*).

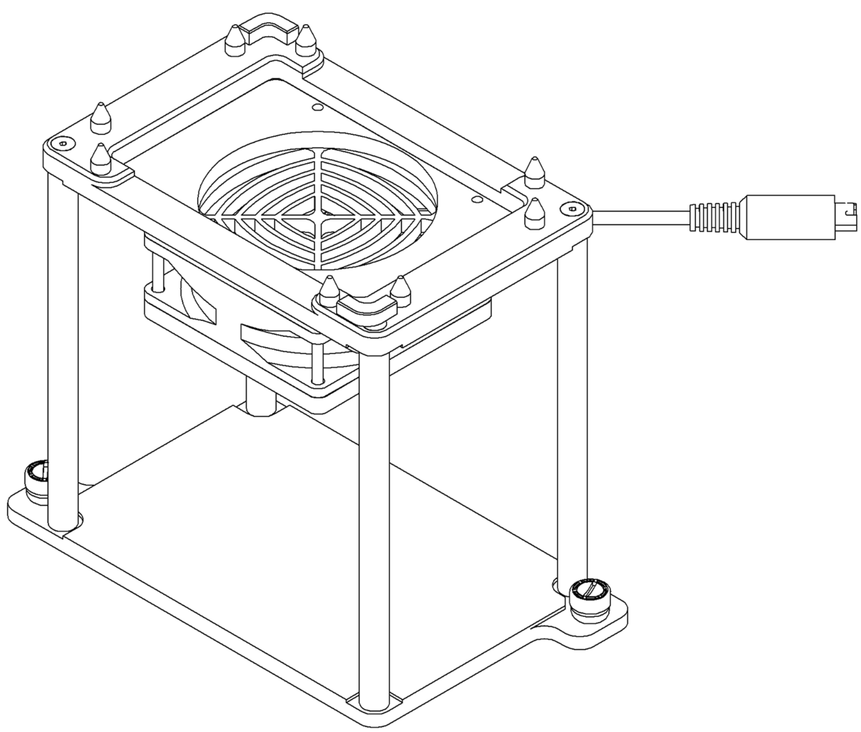
The sections in this chapter include:

- *Installing the HDR Pin Drying ALP and Reservoirs*
- *Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup*
- *Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software*
- *Framing Instructions*
- *Using the HDR Pin Drying ALP and Reservoirs in a Method*
- *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*
- *Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck*
- *Preventive Maintenance for the HDR Pin Drying ALP and Circulating Reservoir*
- *Troubleshooting the HDR Pin Drying ALP and Circulating Reservoir*

HDR Pin Drying ALP

The HDR Pin Drying ALP (Figure 9.1) is an active ALP that dries pins on the HDR Tool Body during a method. A fan provides airflow sufficient to quickly dry pins after washing in one or more reservoirs. Fan guards are installed on both sides of the fan to prevent airflow from affecting operation on other ALPs and for safety. The fan is operated by a Device Controller (refer to APPENDIX A, *Device Controller*).

Figure 9.1 HDR Pin Drying ALP



Components of the HDR Pin Drying ALP

The HDR Pin Drying ALP comes in a pre-assembled kit with the following components:

- 1 x 1 Passive ALP — a standard passive ALP with one position.
- adaptor plate — plate mounted to the 1 x 1 Passive ALP that allows the fan and fan guard to be fastened to the ALP.
- fan — active component that provides airflow to dry pins.

⚠ WARNING

Do not stick objects through the fan guards.

- two (2) fan guards — located directly above and below the fan, these prevent airflow from affecting operation on other ALPs and provide safety.
- HDR Pin Drying ALP collar — reservoir stand placed on the labware positioner of the HDR Pin Drying ALP to direct air from the fan upwards for better drying results.

NOTE The HDR Pin Drying ALP collar is not pre-assembled.

If desired, the adaptor plate, fan, and fan guards can be removed from the 1 x 1 Passive ALP and mounted onto another ALP with an open-centered position, such as a 4 x 3 High Density ALP (refer to *Removing and Installing the Fan Adaptor Plate, Fan, and Fan Guards*).

NOTE When the HDR Pin Drying ALP is not used for drying pins in a method, it may be used as a passive ALP position by removing the collar from the labware position. Labware can be placed on the HDR Pin Drying ALP by a lab technician, the ORCA® robot, or the Biomek FX gripper when the HDR Pin Drying ALP is used as a passive ALP position.

Reservoirs

Reservoirs are used to wash pins before the HDR Tool Body moves to the HDR Pin Drying ALP. The HDR Tool Body dips the pins into one or more reservoirs to rinse residue from the pins.

There are two types of reservoirs that may be used with the HDR Pin Drying ALP:

- static reservoir — labware placed on the deck to hold wash solutions for the duration of the method (refer to *Static Reservoirs*).
- circulating reservoir — labware placed on the deck with inlet and outlet connections to circulate wash solutions through the labware during the method (refer to *Circulating Reservoirs*).

Static Reservoirs

A specially designed, chemically resistant static reservoir is used to store wash solutions such as bleach, ethanol, or DMSO. The static reservoir may be placed in any standard deck position and is not gripperable by the Orca robot or the gripper on the Multichannel Pod. Wash solutions stored in a static reservoir are used throughout the method unless changed manually.

NOTE When using static reservoirs as part of the HDR Cleaning System, select the **Biomek2000HDRStaticWashReservoir** (PN 609443, made of PVC) or **BiomekFXHDRStaticWashReservoir** (PN 719890, made of polypropylene), depending on the reservoir used, in the **Instrument Setup** step when placing labware on the deck. Refer to the *Biomek Software User's Manual*, Chapter 16, *Instrument Setup Step*, for more information on the **Instrument Setup** step.

Preventive Maintenance for Static Reservoirs

To ensure optimum operation, perform the following maintenance procedures on the static reservoirs, as necessary:

- Follow the appropriate decontamination procedures outlined by the laboratory safety officer.
- Empty any cleaning solutions from the static reservoir(s) when not in use and rinse the reservoir(s) thoroughly as outlined by the laboratory safety officer.
- Make sure the reservoir is dry before storing.

Circulating Reservoirs

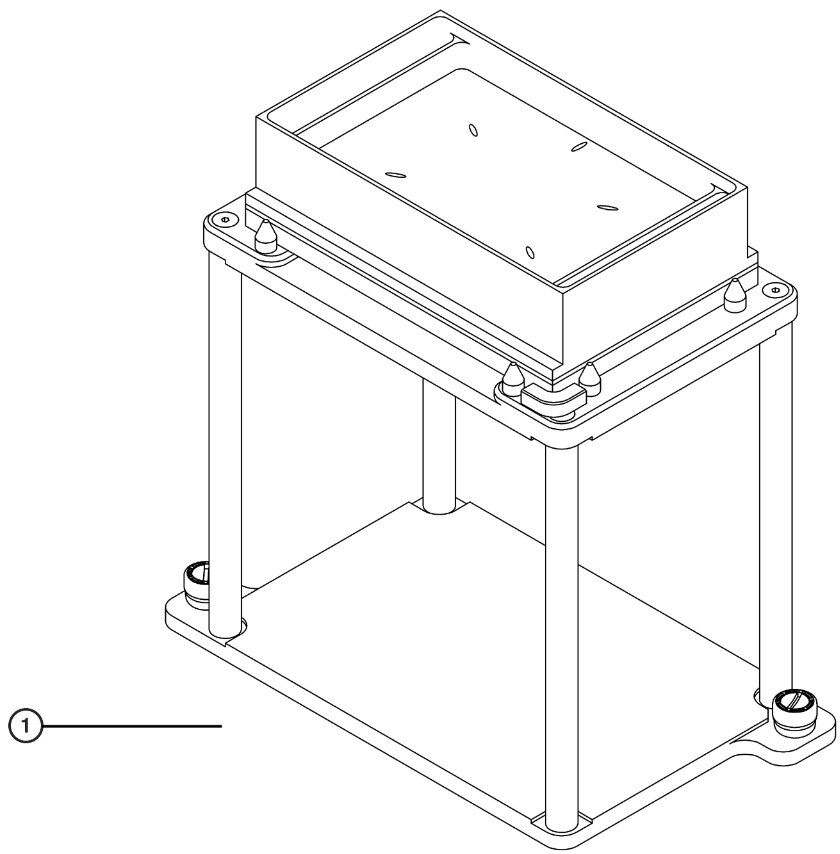
A circulating reservoir option is provided as an alternative to using the static reservoirs. A circulating reservoir (Figure 9.2) may be placed on any open-centered deck position, such as on a 1 x 1 Passive ALP or a 4 x 3 High Density ALP, and provides a flow of wash fluid from a supply container for pin washing.

The bottom of the circulating reservoir has two connections for flow in and out of the reservoir. A peristaltic pump, operated by a Device Controller, circulates wash fluid from the supply container through the reservoir to a waste container.

The circulating reservoir comes in a kit that includes:

- circulating reservoir labware
- supply container
- waste container
- peristaltic pump
- 12 feet of L35 Pharmed tubing
- 12 feet of L36 Pharmed tubing

Figure 9.2 Circulating Reservoir



1. Inlet and outlet ports (not pictured) are on bottom of reservoir (see Figure 9.4).

Installing the HDR Pin Drying ALP and Reservoirs

Installing the HDR Pin Drying ALP includes mounting the ALP to the deck and installing the fan adaptor plate, fan, and fan guards (refer to *Installing the HDR Pin Drying ALP*). Installing the circulating reservoir includes placing it on the deck and ensuring the tubing connections are correctly attached and routed (refer to *Installing the HDR Circulating Reservoir on the Deck*).

Installing the HDR Pin Drying ALP

When installed on a 1 x 1 Passive ALP, the HDR Pin Drying ALP can be physically mounted in any standard deck position.

NOTE When the fan is installed on a 4 x 3 ALP, refer to CHAPTER 11, *4 x 3 High-Density ALP* for mounting locations and instructions.

To mount the HDR Pin Drying ALP to the Biomek FX deck, complete the following:

CAUTION

Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

1. Turn off power to the Biomek instrument before mounting any ALP.

2. Position the HDR Pin Drying ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.

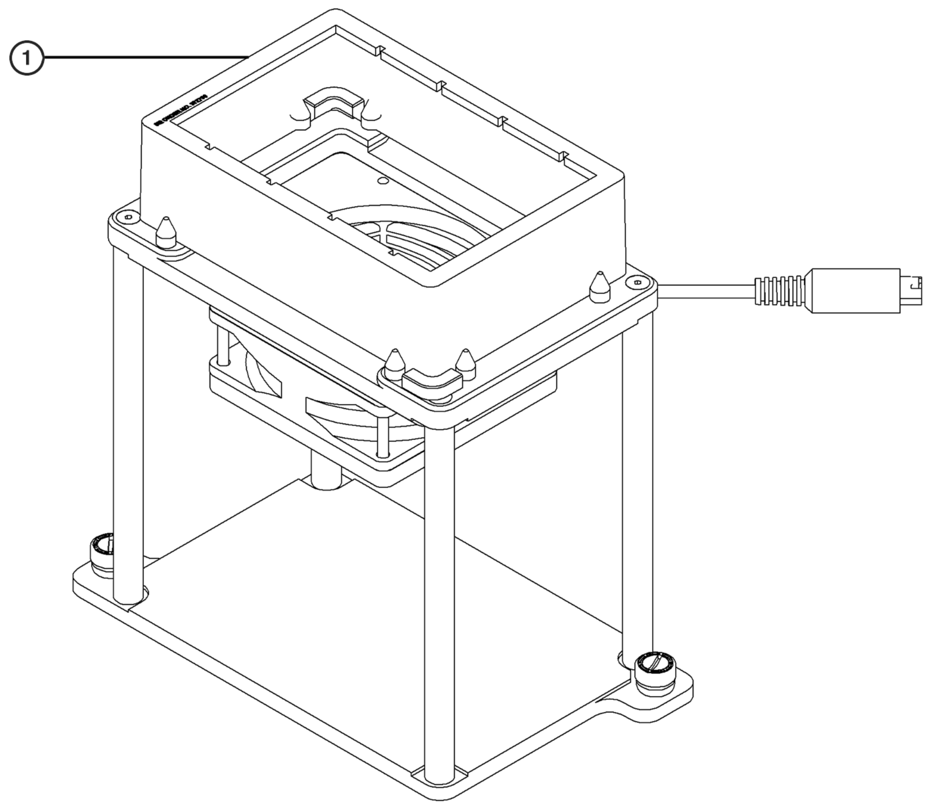
3. Fasten the HDR Pin Drying ALP to the deck using the thumbscrews on the base of the ALP.

4. Connect the HDR Pin Drying ALP to one of the low voltage digital outputs on the Device Controller (refer to APPENDIX A, *Connecting Digital Device Outputs*).

5. Place the HDR Pin Drying ALP collar in the labware position directly above the fan (Figure 9.3).

   NOTE Operating the HDR Pin Drying ALP without the collar in place allows the air from the fan to disperse and slows the drying rate of the pins.

Figure 9.3 HDR Pin Drying ALP and Collar



1. **Pin Drying ALP Collar**

Removing and Installing the Fan Adaptor Plate, Fan, and Fan Guards

The adaptor plate, fan, and fan guards on the HDR Pin Drying ALP may be removed as one unit and placed on any open-centered deck position on a 1 x 1 Passive ALP or 4 x 3 High Density ALP.

To remove the adaptor plate, fan, and fan guards from the ALP:

⚠ CAUTION

Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

1 Remove the ALP with the fan from the deck (refer to *Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck*).

2 Place the ALP upside down.

3 Remove the four (4) mounting screws from the adaptor plate.

4 Lift the adaptor plate, along with the fan and fan guards, and remove it from the ALP.

To install the adaptor plate, fan, and fan guards to another ALP or position:

1 Remove the ALP with the desired position from the deck, if necessary.

2 Place the ALP upside down.

3 Position the fan adaptor plate assembly on the desired position on the ALP.

4 Fasten the adaptor plate to the position by tightening the four (4) mounting screws.

5 Mount the ALP to the deck as described in the appropriate section of this manual.

⚠ CAUTION

Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

6 Place the HDR Pin Drying ALP collar in the labware position directly above the fan.

NOTE Operating the HDR Pin Drying ALP without the collar in place allows the air from the fan to disperse and reduces drying efficiency.

Connections

The HDR Pin Drying ALP requires a Device Controller to operate. Refer to APPENDIX A, *Device Controller*, for information on setting up a Device Controller.

NOTE The Device Controller must be turned on to provide power to attached devices. The green light on the Device Controller indicates that the Device Controller is on.

Installing the HDR Circulating Reservoir on the Deck

The HDR circulating reservoir may be placed on any open-centered deck position, such as on a 1 x 1 Passive ALP or a 4 x 3 High Density ALP.

To place a circulating reservoir on the deck:

WARNING

SPILL HAZARD.

WARNING

Do not kink the hoses.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

---

1. Place the circulating reservoir labware on the desired deck position.

   NOTE The circulating reservoir labware must be placed on an open-centered deck position to accommodate the inlet and outlet connections on the bottom of the reservoir.

   NOTE If adding multiple Circulating Reservoirs to the deck, it is recommended that all Circulating Reservoirs are placed in the same column, if possible.

---

2. Connect one end of the smaller (L35 Pharmed) tubing to the inlet quick disconnect fitting on the bottom of the reservoir (Figure 9.4).

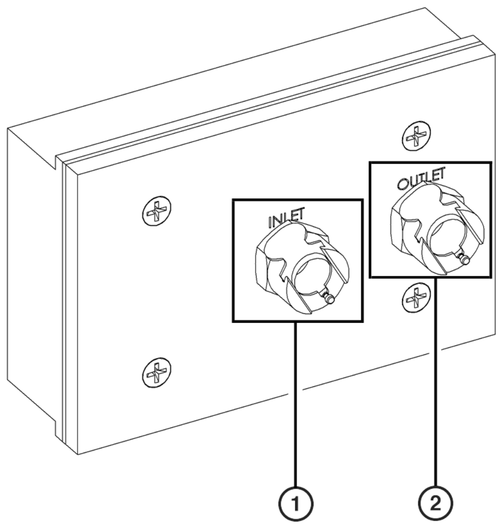
   NOTE The inlet quick disconnect fitting is located near the center of the reservoir.

---

3. Connect one end of the larger (L36 Pharmed) tubing to the outlet quick disconnect fitting on the bottom of the reservoir (Figure 9.4).

   NOTE The outlet quick disconnect fitting is located along the outer edge of the reservoir.

Figure 9.4 Quick Disconnect Fittings on the HDR Circulating Reservoir



1. **Inlet Quick Disconnect Fitting**
2. **Outlet Quick Disconnect Fitting**

4 Position the peristaltic pump at an off-deck location near the circulating reservoir.

5 Place the supply and waste containers in an off-deck position near the peristaltic pump.

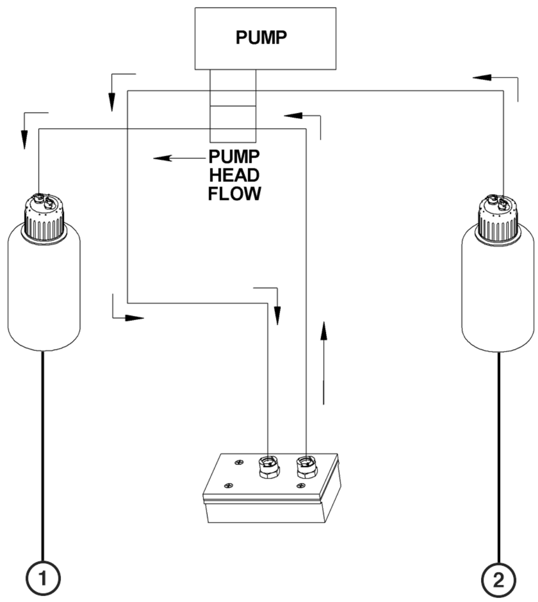
6 Fill the supply container with the desired wash fluid.

7 Run both the inlet and outlet tubing off the Biomek FX deck either through the access holes on the back of the instrument between the towers, or between the light curtain and the deck on the side of the Biomek FX.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek FX.

8 Run the inlet tubing through one of the pump heads from left to right (Figure 9.5).

Figure 9.5 Tubing Connections Between Circulating Reservoir and Pump



1. **Waste Container**
2. **Supply Container**

9 Insert the opposite end of the inlet tubing into the hole in the lid of the supply container and run the tubing to the bottom of the container.

NOTE Make sure the inlet tubing is in contact with liquid.

10 Run the outlet tubing through the other pump head from right to left (Figure 9.5).

11 Insert the opposite end of the outlet tubing into the hole in the lid of the waste container.

12 Connect the peristaltic pump to one of the high voltage outputs on the Device Controller (refer to APPENDIX A, *Connecting High-Voltage Devices*).

13 Connect the Device Controller to one of the CAN ports on the Biomek instrument (refer to APPENDIX A, *Installing a Device Controller*).

14 Turn on power to the Biomek FX instrument and Device Controller.

15 Turn on power to the peristaltic pump.

16 Starting at **0**, adjust the pump speed by turning the dial on the front of the pump clockwise until fluid fills the circulating reservoir and begins to spill over the inner edges (Figure 9.2).

NOTE If fluid spills over the outer edges, slow down the pump.

⚠ CAUTION

Do not overflow the reservoir.

Connections

The inlet tubing for the circulating reservoir is 0.31" inside diameter, while the outlet tubing is 0.38" inside diameter; however, both the inlet and outlet tubing fit a 3/8" barbed connection. When the tubing is connected, the outlet tubing must run through the peristaltic pump in the opposite direction to the inlet tubing and into the waste reservoir.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek FX instrument.

Operating the Circulating Reservoir

NOTE Prior to running a method, make sure there is enough wash fluid for the method in the supply container and that the waste container does not overflow during the method.

The circulating reservoir automatically turns off at the end of a method. A **Device Action** step may be used to turn the pump on or off at any time in a method (refer to *Configuring the Device Action Step for a Circulating Reservoir*). The **HDR Tool Cleaning** step turns the pump on prior to dipping the pins in the reservoir and off at a set time after leaving the reservoir (refer to *Using the HDR Pin Drying ALP and Reservoirs in a Method*). Once turned on, the pump remains on until turned off as a part of the **HDR Tool Cleaning** step, a **Device Action** step, or the end of the method.

NOTE The circulating reservoir can also be controlled using **Manual Control** in the Biomek FX software (refer to *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

If a Light Curtain violation occurs while the pump is powering on or off, the action is completed. The state of the pump does not change when the light curtain is violated or during a pause in a method.

Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup

Devices associated with the HDR Pin Drying ALP and circulating reservoirs must be configured in **Hardware Setup**. A Device Controller must also be installed in **Hardware Setup** to add digital devices to the system. Both the fan used in the HDR Pin Drying ALP and the wash pump used with the circulating reservoir are digital devices. A separate wash pump is required for each circulating reservoir. For example, if using three circulating reservoirs, a total of three wash pumps need to be added in **Hardware Setup** — one for each circulating reservoir.

NOTE Refer to APPENDIX A, *Device Controller*, for information on adding and configuring a Device Controller.

When digital devices, such as a fan or wash pump, are installed, they are displayed under **Digital Devices** in the left pane of **Hardware Setup**. Installed digital devices must also be configured to the proper Device Controller and proper channel on the Device Controller in **Hardware Setup**.

Installing Digital Devices for the HDR ALP and Circulating Reservoir

Installing Digital Devices may be accomplished in two ways.

1. In **Hardware Setup**, right-click **Digital Devices** or any device under **Digital Devices** and choose **Add Device** from the menu.

   NOTE **Fan**, **Simple** or **WashPump** are the available options.

2. Choose **Fan** to install a fan for the HDR Pin Drying ALP.

   OR

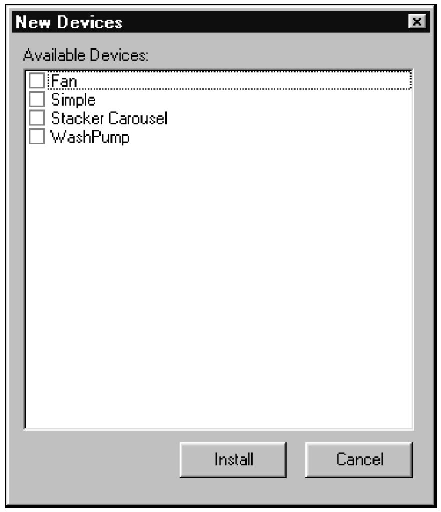
   Choose **WashPump** to install a wash pump for a circulating reservoir. The selected device is added to the list of installed devices under **Digital Devices** in the left pane.

   NOTE The first wash pump added to the system is named **WashPump1**, and second is named **WashPump2**, and so forth.

OR

1. Choose **Add Device** from the top of **Hardware Setup**. **New Devices** appears (Figure 9.6).

Figure 9.6 New Devices Displaying All Detected Devices



NOTE All the devices detected, but not installed, are available to add in **New Devices**.

NOTE Right-click on an available device and choose **Select All** to select all of the available devices or **Clear Selection** to disregard the selection.

2 Select the desired digital device(s) and choose **Install**. The device(s) selected are added to the list of installed devices under **Digital Devices** in the left pane.

NOTE The first wash pump added to the system is named **WashPump1**, the second is named **WashPump2**, and so forth.

NOTE In the left pane, an asterisk after a device indicates the device has been modified since the workspace was loaded. A blue question mark before an installed device indicates the device has not been fully configured.

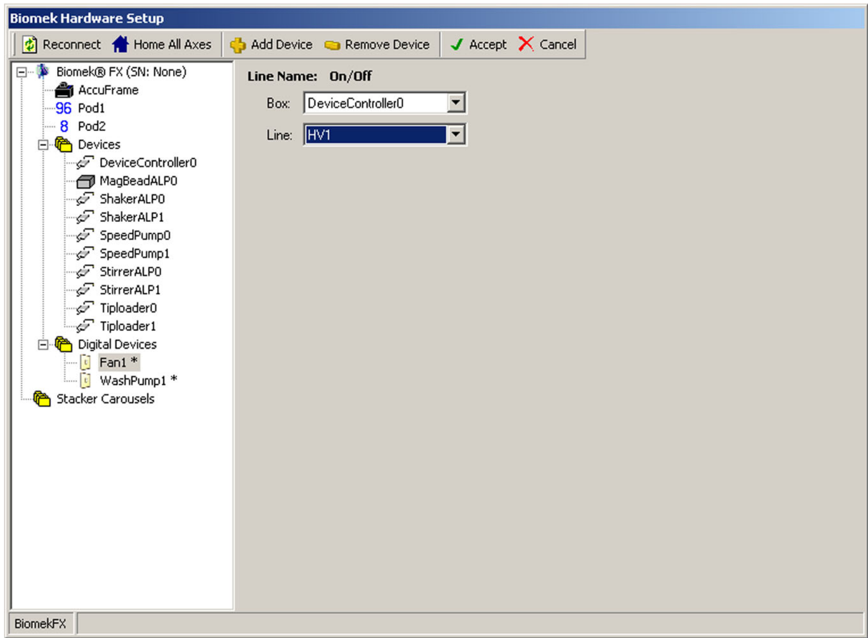
Configuring Digital Devices

Configure digital devices to make sure the correct Device Controller and high-voltage or digital output are selected.

NOTE Refer to APPENDIX A, *Device Controller*, for more information on configuring devices to the proper Device Controller and channel.

1 In **Hardware Setup**, select the desired digital device. The configuration for the selected device appears (Figure 9.7).

Figure 9.7 Hardware Setup Showing the Configuration for a Digital Device



2 In **Box**, select the Device Controller the device is connected to for power.

3 In **Line,** select the high-voltage or digital output to which the device is connected.

NOTE Use a digital output port for a **Fan** for the HDR Pin Drying ALP and a high-voltage port for a **Wash Pump** for the circulating reservoir.

NOTE When configuring digital devices, make sure a distinct line on a Device Controller is used for each digital device.

4 Repeat steps 1-3 to configure any remaining digital devices.

5 Choose **Accept**. **Hardware Setup** saves changes and closes.

NOTE **Accept** must be chosen after the digital device has been configured to allow **Hardware Setup** to accept the configuration changes. **Cancel** closes **Hardware Setup** without saving any changes.

Removing Digital Devices

Digital devices no longer on the Biomek FX deck can be removed.

NOTE If a device is removed from **Hardware Setup**, it may no longer be used when creating methods in the Biomek FX software.

To remove a device:

1. In **Hardware Setup**, right-click on the desired device under **Digital Devices**.

2. Choose **Remove Device**. The device is removed from the list of installed devices under **Digital Devices**.

OR

1. Select the desired device under **Digital Devices**.

2. Choose 

from the top of **Hardware Setup**. The device is removed from the list of installed devices under **Digital Devices**.

Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software

Biomek Software needs to know the location of the HDR Pin Drying ALP and any circulating reservoirs on the deck before they can be used in a method. The software representation of the instrument deck is configured in the **Deck Editor**.

NOTE For more information on the **Deck Editor**, refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*.

Adding an HDR Pin Drying ALP to the Deck

An HDR Pin Drying ALP is added to the deck in the appropriate locations using the **Deck Editor** and an **Instrument Setup** step. The fan must be associated with an open-centered deck position, such as on a 1 x 1 Passive ALP, to provide an air flow to dry the pins.

Then in the first **Instrument Setup** step in a method, the fan labware must be added to the deck in the appropriate deck position for obstacle avoidance.

The fan is activated by turning on the fan using a **Device Action** step in the method (refer to *Configuring the Device Action Step for the HDR Pin Drying ALP*) or **Advanced Manual Control** outside of a method (refer to *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

Associating a Fan with a Deck Position

To associate a fan with a deck position for an HDR Pin Drying ALP:

1 Choose **Instrument > Deck Editor**. The **Deck Editor** appears.

2 If necessary, drag and drop the **OneByOne** or **FourByThree** ALP from the ALP Types list to the desired location. The ALP appears and deck positions are named automatically.

3 Select the desired deck position on which to place the HDR Pin Drying ALP.

NOTE The selected deck position must have an open center.

4 Select 

.

OR

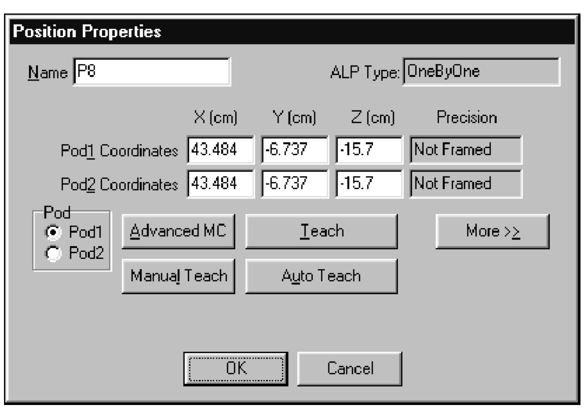
Double-click on the deck position.

OR

Right-click on the deck position and select **Properties** from the menu. **Position Properties** appears (Figure 9.8).

NOTE The deck position is highlighted with a pink line inside the ALP.

Figure 9.8 Position Properties for Deck Positions



5 Rename the deck position, if desired.

NOTE Names for deck positions must be alphanumeric with no spaces; the only non-alphanumeric character allowed is “_” (underscore). The first character must be a letter.

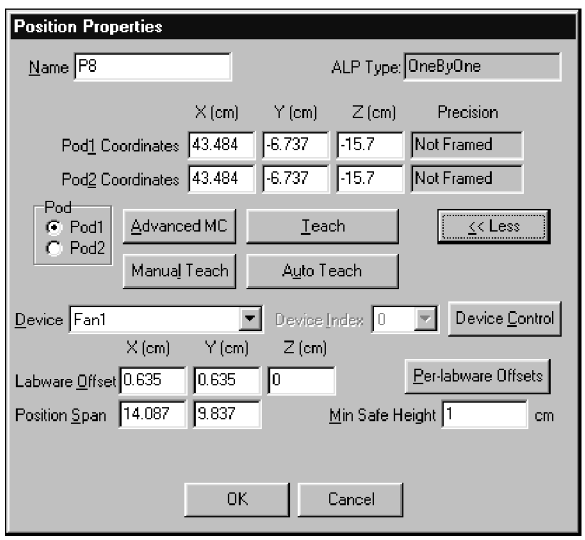
6 Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by framing the ALP.

NOTE ALPs are taught indirectly when positions are taught.

NOTE If a position is accessible by both pods in a dual-pod system, each pod must be framed to the position.

7 Select More >> to display the device association and labware offset options (Figure 9.9).

Figure 9.9 Expanded Position Properties for Deck Positions



8 In **Device**, choose the appropriate **Fan** to associate with the position.

9 If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to the *Biomek Software User’s Manual*, Chapter 6, *Changing Per-Labware Offsets*).

10 Adjust the **Min Safe Height**, if necessary. The **Min Safe Height** is the height at which the pod(s) move when moving to or passing over the specified ALP, and is predefined at a height that avoids collisions between the fan and the pod(s).

NOTE The **Labware Offsets** and **Position Span** are predefined in the software. Do not modify these properties.

11 Choose **OK** to save and close **Position Properties**. **Deck Editor** appears.

12 Choose **Save** to close the **Deck Editor**.

NOTE The deck must be framed (taught) using the framing tools after creating or modifying a deck (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 5, *Framing the Biomek® FX*).

Adding an HDR Pin Drying ALP in Instrument Setup

After associating the fan with the desired deck position, it is necessary to tell the software where the HDR Pin Drying ALP is placed on the deck in an **Instrument Setup** step for obstacle avoidance.

To add an HDR Pin Drying ALP to the deck:

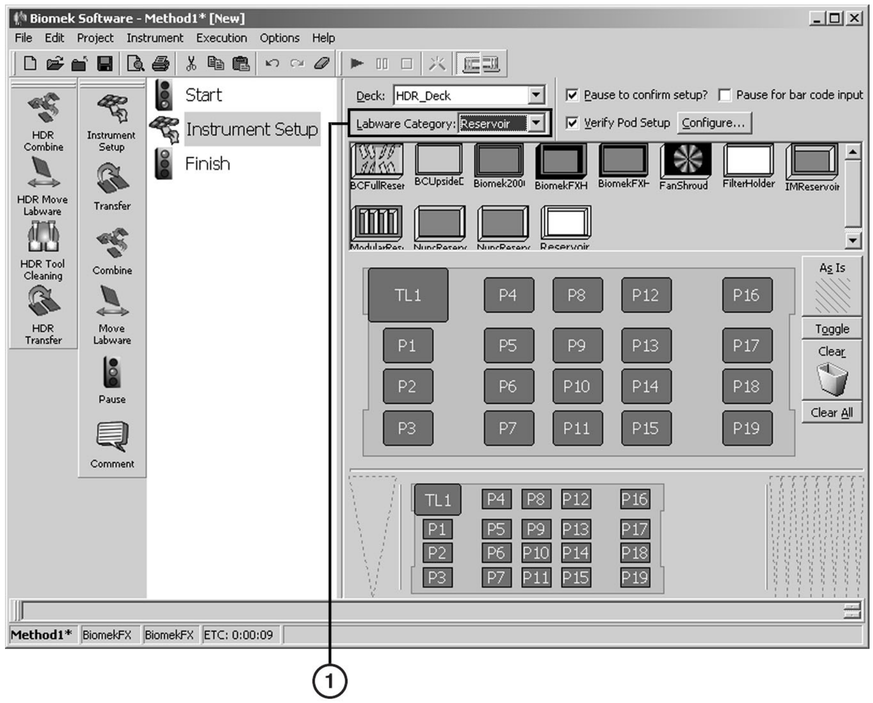
1 Insert an **Instrument Setup** step at the start of the method.

OR

Select the first **Instrument Setup** step found in the method. The **Instrument Setup** step configuration appears (Figure 9.10).

NOTE The first **Instrument Setup** step must be located before any pod movement for obstacle avoidance.

Figure 9.10 Instrument Setup Step Configuration



1. **Labware Category** — used to filter labware types to display only labware of a selected category.

2 Place the **FanShroud** labware type on the position(s) that are associated with a Fan in the **Deck Editor**.

NOTE Use **Labware Category** to filter the labware types to display only **Reservoirs** to locate the **Fan** labware type quickly.

Adding a Circulating Reservoir to the Deck

A circulating reservoir is added to the deck in the appropriate locations using the **Deck Editor** and an **Instrument Setup** step. The appropriate **WashPump** must be associated with an open-centered deck position, such as on a 1 x 1 Passive ALP, to provide the flow of wash fluid.

Then in the first **Instrument Setup** step in a method, the **BiomekFXHDRCirculatingWashReservoir** must be added to the deck in the appropriate deck position and configured with the wash fluid type for obstacle avoidance and pin washing considerations.

The circulating reservoir is activated by turning on the appropriate wash pump using a **Device Action** step in the method (refer to *Configuring the Device Action Step for a Circulating Reservoir*) or **Advanced Manual Control** outside of a method (refer to *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

Associating a Wash Pump with a Deck Position

To associate a **WashPump** with a deck position for a circulating reservoir:

1. Choose **Instrument > Deck Editor**. The **Deck Editor** appears.

2. If necessary, drag and drop the **OneByOne** or **FourByThree** ALP from the ALP Types list to the desired location. The ALP appears and deck positions are named automatically.

3. Select the desired deck position to place the circulating reservoir.

   NOTE The selected deck position must have an open center.

4. Select **Properties**.

   OR

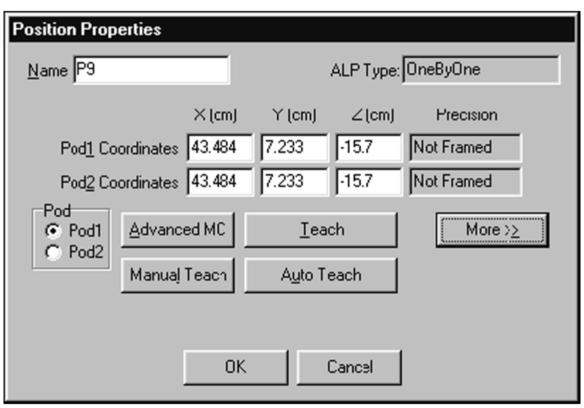
   Double-click on the deck position.

   OR

   Right-click on the deck position and select **Properties** from the menu. **Position Properties** appears (Figure 9.11).

   NOTE The deck position is highlighted with a pink line inside the ALP.

   Figure 9.11 Position Properties

5. Rename the deck position, if desired.

   NOTE Names for deck positions must be alphanumeric with no spaces; the only non-alphanumeric character allowed is "_" (underscore). The first character must be a letter.

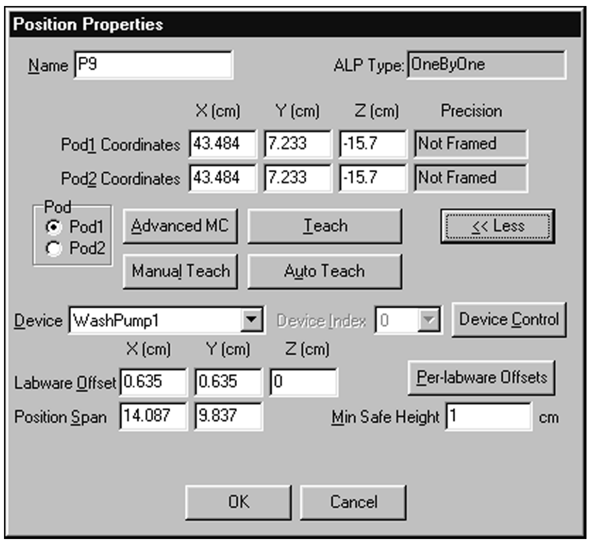
6 Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by teaching the ALP.

NOTE The circulating reservoir acts as a piece of labware. If the deck position holding the circulating reservoir has been properly framed, it is not necessary to reframe the position with the circulating reservoir in place. Prior to placing the circulating reservoir, any deck position that holds a circulating reservoir should be framed normally according to the framing procedure for that ALP.

7 Select 

to display the device association and labware offset options (Figure 9.12).

Figure 9.12 Expanded Position Properties for Deck Positions



8 In **Device**, choose the appropriate **WashPump** to associate with the position.

9 Adjust the **Min Safe Height**, if necessary. The **Min Safe Height** is the height at which the pod(s) move when moving to or passing over the specified ALP, and is predefined at a height that avoids collisions between the circulating reservoir and the pod(s).

NOTE The **Labware Offsets** and **Position Span** are predefined in the software. Do not modify these properties.

10 Choose **OK** to save and close **Position Properties. Deck Editor** appears.

11 Choose **Save** to close the **Deck Editor**.

NOTE The deck must be framed (taught) using the framing tools after creating or modifying a deck. Refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 5, *Framing the Biomek® FX*.

Adding a Circulating Reservoir in Instrument Setup

After associating the wash pump with the desired deck position, it is necessary to tell the software where the circulating reservoir is placed on the deck in an **Instrument Setup** step for obstacle avoidance.

To add a circulating reservoir to the deck:

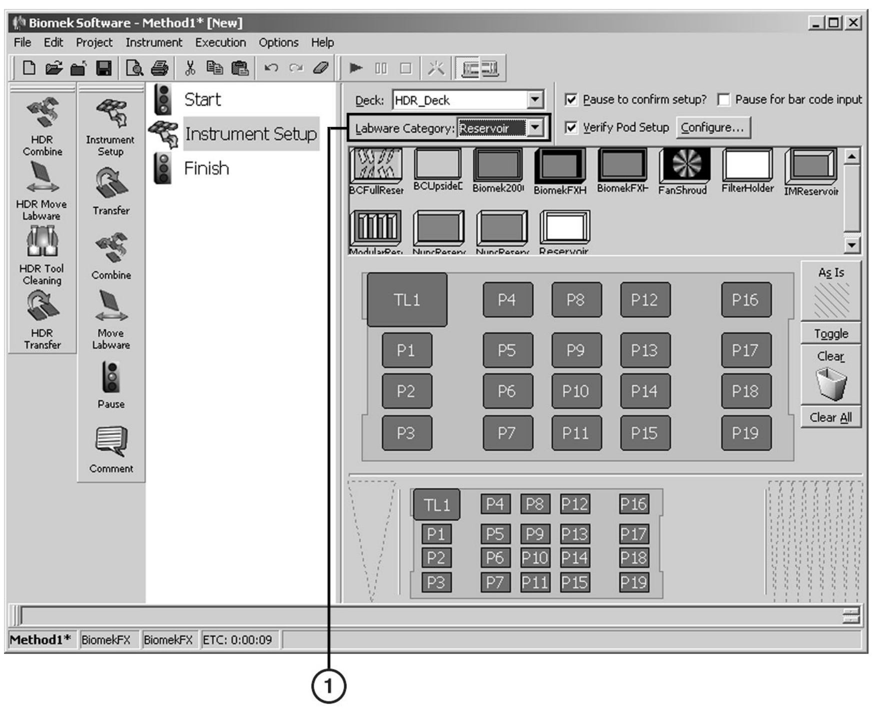
1 Insert an **Instrument Setup** step at the start of the method.

OR

Select the first **Instrument Setup** step found in the method. The **Instrument Setup** step configuration appears (Figure 9.13).

NOTE The first **Instrument Setup** step must be located before any pod movement for obstacle avoidance.

Figure 9.13 Instrument Setup Step Configuration



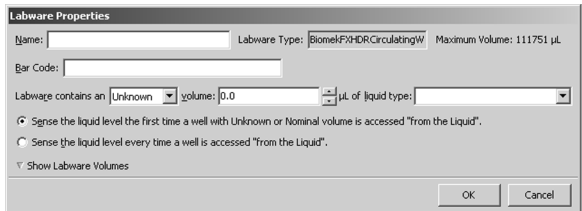
1. **Labware Category** — used to filter labware types to display only labware of a selected category.

2 Place the **BiomekFXHDRCirculatingWashReservoir** labware type on the position(s) that are associated with a **WashPump** in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 16, *Populating the Deck with Labware*).

NOTE Use **Labware Category** to filter the labware types to display only **Reservoirs** to quickly locate the **HDRCirculatingReservoir** labware type.

3 Double-click the **HDRCirculatingReservoir** labware type to configure the liquid type. **Labware Properties** appears (Figure 9.14).

Figure 9.14 Labware Properties



4 In **Name**, enter a name for the labware.

NOTE When a deck is populated by numerous pieces of labware, naming labware is recommended. Names should be descriptive of the contents of the labware or the work being accomplished during the method. Naming labware in a meaningful fashion may reduce confusion. Names given to pieces of labware may be entered as variables in other step configurations within the method.

5 In **Bar Code**, enter the bar code.

NOTE Use the bar code field to identify a specific plate in certain methods, such as plate replication. This field may be left blank.

6 Make a selection in **Labware contains**. Options are **Unknown**, **Nominal**, and **Known**.

NOTE For a Multichannel Pod, **Known Volume** should be supplied whenever possible. This information is used by many of the techniques supplied with the Biomek FX software when calculating the height to aspirate or dispense liquid. These techniques are specified to aspirate and dispense at certain offsets from the liquid level. If the volume is not supplied, the liquid level cannot be determined by the Multichannel Pod, and the aspirate and dispense heights must be specified in the pipetting steps.

NOTE A Span-8 Pod has the ability to detect the liquid level if LLS-capable tips are used.

If **Unknown** is selected, the liquid level is detected during method run if required by the technique, and the wells are assumed to be full when validating the method.

A selection of **Nominal** also detects the liquid level during method run, but the volume in the wells is assumed to be the entered value when validating the method.

If **Known** is selected, the liquid level is not detected during method run and the entered value is used during validation and method run.

7 Enter the **Volume**, if **Nominal** or **Known** volume is selected.

NOTE A value entered in **Volume** is assigned to each well on the selected labware.

8 Select the **Liquid Type** contained in the labware. The liquid type is useful information when the Biomek FX auto-selects a pipetting technique for any aspirate and dispense operations acted upon this piece of labware. The pipetting technique auto-selected to aspirate and dispense the liquid is selected based on the physical factors of the liquid, as well as the physical attributes of the labware. For more information on liquid types, (refer to the *Biomek Software User's Manual*, Chapter 9, *Understanding and Creating Liquid Types*).

9 Select **Sense the liquid level the first time a well with Unknown or Nominal volume is accessed "from the Liquid"** to have a Span-8 Pod use Liquid Level Sensing to determine the liquid level only the first time it accesses a well with an **Unknown** or **Nominal** volume from the liquid. Any instances in which the same well on the piece of labware is accessed, the liquid level is calculated internally based on the result of the earlier liquid level sense and the amount aspirated or dispensed to the well in previous steps.

OR

Select **Sense the liquid level every time a well is accessed "from the Liquid"** to have a Span-8 Pod use Liquid Level Sensing to determine the liquid level every time it accesses a well with an **Unknown** or **Nominal** volume from the liquid.

NOTE The liquid level sensing option is only important when using a dual pod system with a Span-8 Pod.

10 Choose **OK** to save **Labware Properties** and return to the **Instrument Setup** step configuration.

To turn the circulating reservoir(s) on or off, use a **Device Action** step to activate the desired wash pump (refer to *Configuring the Device Action Step for a Circulating Reservoir*).

Framing Instructions

Refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 5, *Framing the Biomek® FX*, for instructions on framing the HDR Pin Drying ALP.

NOTE The circulating reservoir acts as a piece of labware. If the deck position holding the circulating reservoir has been properly framed, it is not necessary to reframe the position with the circulating reservoir in place. Prior to placing the circulating reservoir, any deck position that holds a circulating reservoir should be framed normally according to the framing procedure for that ALP.

Using the HDR Pin Drying ALP and Reservoirs in a Method

The HDR Pin Drying ALP and reservoirs are operated in a method using the **HDR Tool Cleaning** step (refer to *Using the HDR Tool Cleaning Step*) and the **Device Action** step (refer to *Using the Device Action Step*). The HDR Pin Drying ALP automatically turns off at the end of a method.

The **HDR Tool Cleaning** step turns the fan on prior to drying the pins at the HDR Pin Drying ALP and off at a set time after leaving the HDR Pin Drying ALP. A **Device Action** step may be used to turn the fan on or off at any time in a method.

Once turned on, the fan remains on until turned off as a part of the **HDR Tool Cleaning** step, a **Device Action** step, or the end of the method.

NOTE Refer to the *Biomek Software User's Manual*, Chapter 20, *Using the HDR Step Palette (FX, 3000 only)* for information on using the **HDR Transfer**, **HDR Combine**, and **HDR Move Labware** steps in a method.

NOTE The HDR Pin Drying ALP can also be controlled using **Manual Control** in the Biomek Software (refer to *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

NOTE If a Light Curtain violation occurs while the fan is powering on or off, the action is completed. The state of the fan does not change when the light curtain is violated or during a pause in a method.

Using the HDR Tool Cleaning Step

The **HDR Tool Cleaning** step washes pins on the HDR Tool Body. The HDR Tool Cleaning step uses a "dunk and dry" methodology to wash pins by dipping the pins in one or more reservoirs with wash solutions and drying the pins at the HDR Pin Drying ALP.

The **HDR Tool Cleaning** step configuration is similar to that of the **HDR Transfer** or **HDR Combine** step. Instead of **Source** and **Destination** configurations, however, a series of wash operations — either dipping the pins into a wash reservoir or drying the pins at the HDR Pin Drying ALP — are configured. Cleaning operations are performed in the order they are configured.

The **HDR Tool Cleaning** Step Configuration includes specifying:

- Pod that performs the cleaning operations.
- Cleaning operation configuration(s).

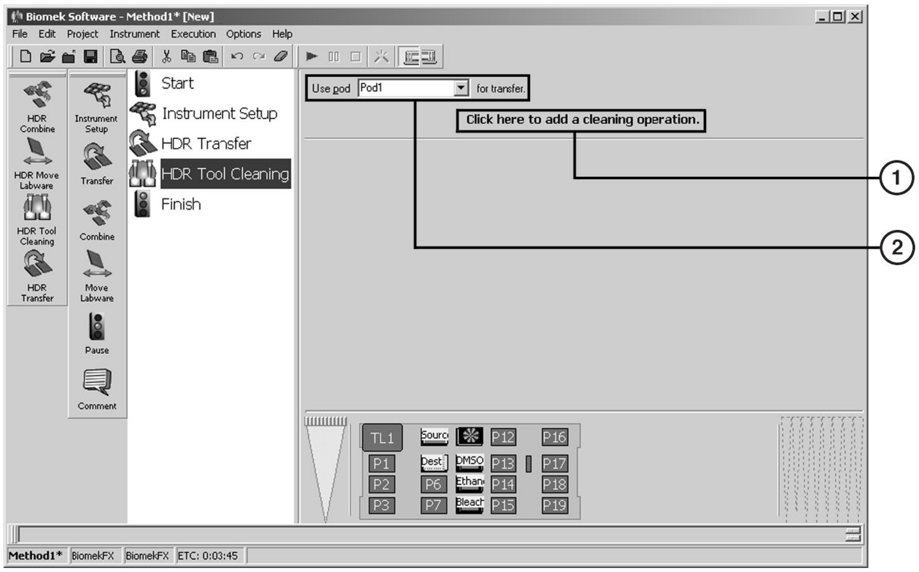
To configure an **HDR Tool Cleaning** step:

---

1 Insert an 

step into the Method View (Figure 9.15).

Figure 9.15 HDR Tool Cleaning Step Configuration



1. Click this button to add **Source Labware** and open the **Source Labware** configuration.
2. **Pod Selection**

2 In **Use Pod**, specify the pod with the HDR Tool Body used to perform the transfer operations.

3 Configure **Cleaning Operations** as described in *Configuring Cleaning Operations*.

Configuring Cleaning Operations

The **HDR Tool Cleaning** step is configured through a series of cleaning operations. There are two types of **Cleaning Operations**:

- Wash Operations — pins are dipped in wash solution in a reservoir, deep-well microplate, or other labware type (refer to *Configuring a Wash Operation*).
- Drying Operations — pins are air-dried by a fan at the HDR Drying ALP (refer to *Configuring a Drying Operation*).

As many **Cleaning Operations** as desired can be configured in the **HDR Tool Cleaning** step.

NOTE **Cleaning Operations** are performed in the order they appear in the step configuration.

Configuring a Wash Operation

A **Wash** operation dips pins in a piece of labware a specified number of times for a specified length of time.

NOTE Usually a reservoir is used as wash labware, but pins can be dipped in any labware type.

To configure a wash operation for the **HDR Tool Cleaning** step:

⚠ CAUTION

Do not attempt to access a 96-Channel or 384-Channel Tip Wash ALP with a Multichannel Pod equipped with an HDR Tool Body. The gripper may crash and damage the pod, HDR Tool Body, or Tip Wash ALP.

⚠ CAUTION

Do not access labware positioned on a 1 x 5 Passive ALP with the HDR Tool Body. The gripper may crash with the ALP.

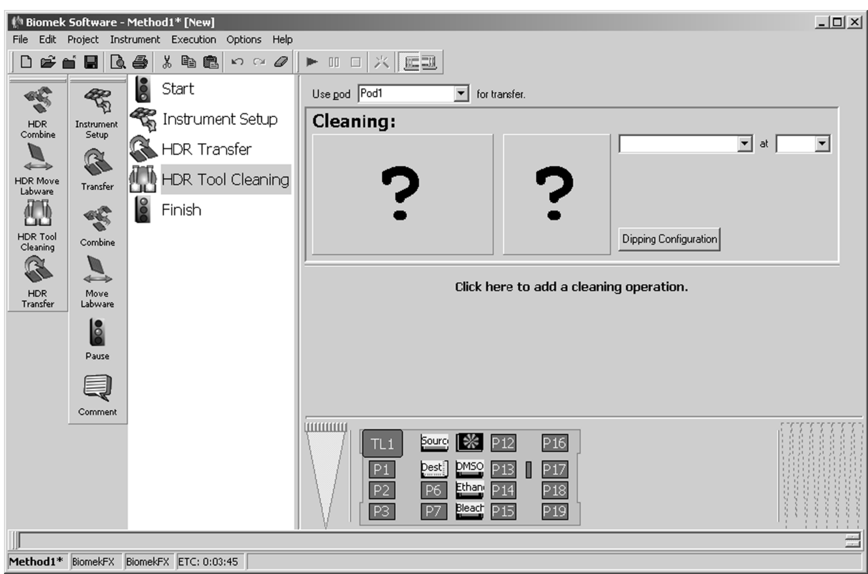
⚠ CAUTION

Do not access labware on a Stirring ALP with the HDR Tool Body. The magnetic stirrer may bend the pins or interfere with the liquid transfer performance of the pins.

---

1 Select **Click here to add a cleaning/drying operation** (Figure 9.15). The **Cleaning Operation** configuration appears.

Figure 9.16 HDR Tool Cleaning Step — New Cleaning Operation Configuration



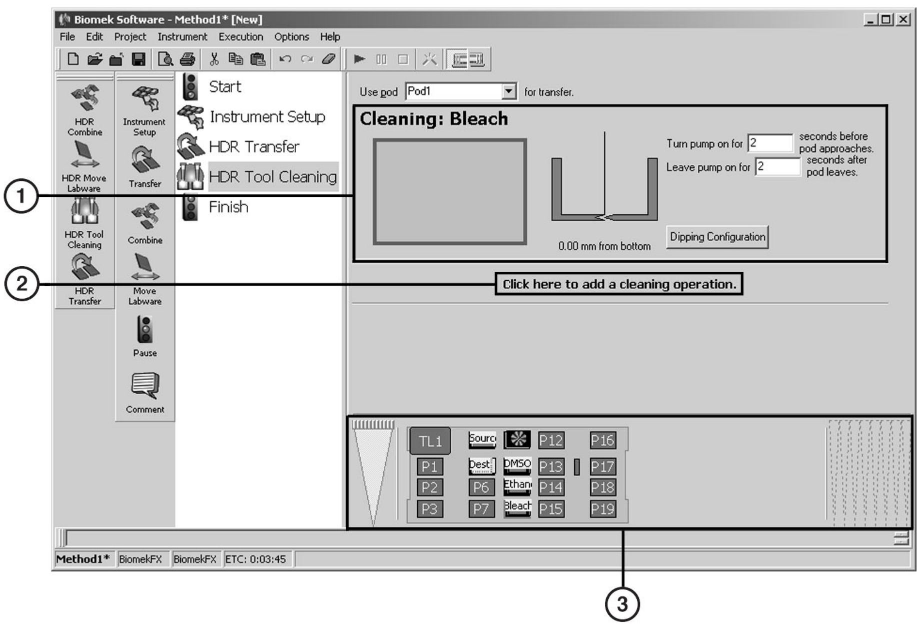
2 Click on the piece of labware with the desired wash solution in the Current Deck Display. Information for that piece of labware is entered automatically into the **Cleaning Operation** configuration (Figure 9.15).

OR

Select a **Cleaning** Labware type (Figure 9.15).

NOTE Subsequent labware selections modify the active **Cleaning Operation** configuration. To configure additional **Cleaning Operations**, select **Click here to add a cleaning/drying operation**, or select outside a cleaning operation configuration, and then select another piece of labware from the Current Deck Display. If an incorrect piece of labware is selected, right-click on the labware title and select **Delete** on the menu that appears.

Figure 9.17 HDR Tool Cleaning Step — Configuration for a Wash Operation



1. **Cleaning Operation** — configuration for washing with a circulating reservoir.
2. **Additional Cleaning Operations** — continue adding **Cleaning Operations** by clicking this button, or by selecting more labware in the Current Deck Display.
3. **Current Deck Display** — displays the status of the deck upon completion of the previous step. Also useful for labware selection.

3 If the **Cleaning** labware selected is a static reservoir or microplate, verify the labware type and deck position of the labware.

NOTE A bright yellow outline appears in the Current Deck Display around the labware designated for a **Cleaning** Operation.

OR

If the **Cleaning** labware selected is a circulating reservoir (Figure 9.15):

- In **Turn pump on for**, enter the length of time in seconds to turn the wash pump on before the HDR Tool Body moves to the circulating reservoir.

  NOTE The default value for **Turn pump on for** is **2** seconds.

- In **Leave pump on for**, enter the length of time in seconds to leave the wash pump on after the HDR Tool Body moves away from the circulating reservoir.

  NOTE The default value for **Leave pump on for** is **2** seconds.

- Select **Run pump during wash operation** to leave the pump running continuously during the wash operation, if desired.

---

4 To specify the quadrants of a microplate to access, double-click the source labware in the step configuration to zoom in on the labware.

NOTE To call up a menu for **Zoom** and a **Specify Selection as Text** option, right-click on the labware.

Specify Selection as Text allows selection of quadrants as targets for aspirate and dispense operations. **Specify Selection as Text** may also be used to enter variables or expressions (refer to the *Biomek Software User's Manual*, Chapter 14, *Using Variables and Expressions in a Method*).

NOTE **Specify Selection as Text** is not applicable for 96-well microplates, reservoirs, or 384-well microplates accessed by a 384-pin plate.

---

5 Select the desired quadrant(s) on the zoomed-in graphic of the labware.

NOTE Selecting any well automatically selects all wells in that quadrant.

NOTE To select multiple quadrants, click and drag over the desired quadrants or hold down **Ctrl** or **Shift** and select the desired quadrants.

---

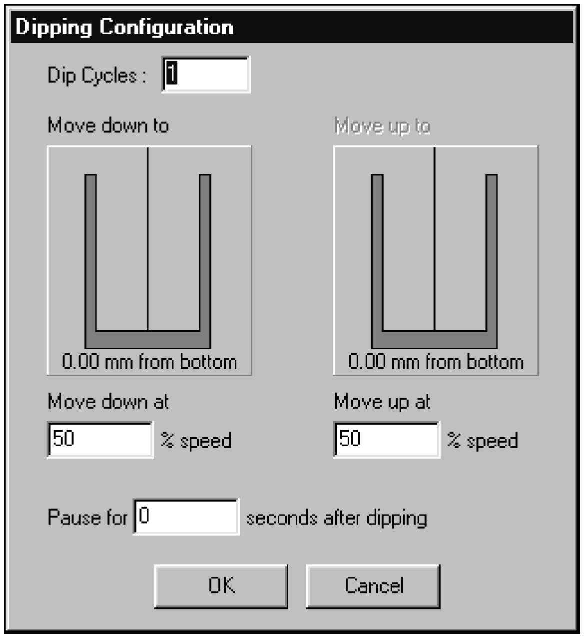
6 Choose **Zoom Out** to return to the step configuration screen.

---

7 Choose **Dipping Configuration** to configure the wash operation. **Dipping Configuration** appears (Figure 9.18).

NOTE The **Dipping Configuration** is similar to a pipetting technique. It specifies the method in which pins are washed.

Figure 9.18 Dipping Configuration



8 In **Dip Cycles**, enter the number of times the pins should descend into the wells.

NOTE For **Dip Cycles** greater than **1**, **Move up to** must be configured.

9 In **Move down to**, specify the height the pins descend to for each dipping cycle.

NOTE By default, **Move down to** is measured **from bottom** of the well. To measure **from top** of the well or **from liquid**, right click the graphic of the pin in the well and make the desired selection from the menu.

NOTE The **Move down to** height can go as much as 2 mm below the bottom of the well as long as the pod can descend that far. Descending below the bottom of the well potentially corrects for any slight imperfections in the labware or ALP heights and can be done safely because the pin push plate is in a floating position, allowing the pins to move up and down freely without resistance. To specify a height below the bottom of the well, right-click the graphic of the pin in the well and select **Custom Height**. Enter a negative value in **Custom Height** to move the pins below the bottom of the well.

10 In **Move down at**, enter the speed of the descent of the HDR Tool Body as a percentage of the maximum speed of the pod.

11 In **Move up to**, specify the height the pins ascend to between each dipping cycle.

NOTE If **Dip Cycles** is set to **1**, **Move up to** is disabled.

NOTE By default, **Move up to** is measured **from bottom** of the well. To measure **from top** of the well or **from liquid**, right click the graphic of the pin in the well and make the desired selection from the menu.

12 In **Move up at**, enter the speed at which the HDR Tool Body moves up as a percentage of the maximum speed of the pod.

13 In **Pause for**, enter the length of time the pod pauses at the down position for each **Dip Cycle** to wash pins.

14 Choose **OK** to save the **Dipping Configuration** and return to the source labware configuration.

15 Leave the height as is to use the settings for the **Move down to** height specified in the **Dipping Configuration**.

OR

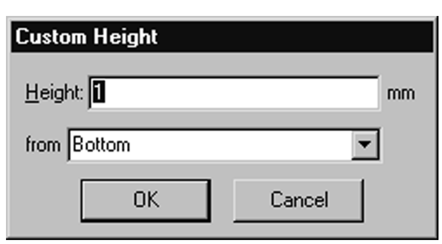
Set the aspirate height manually using one of the following methods:

- Position the cursor over the graphic of a pin inside a well. Click and drag the graphic up or down. The pin moves with the cursor, and the height displayed below the graphic is adjusted as the graphic is manipulated.

  NOTE The cursor changes to  when positioned over the graphic.

- Selecting the graphic of a pin inside a well, and use the ↑ and ↓ keys. The textual representation of the height, which is displayed below the graphic, adjusts in 0.1 millimeter (mm) increments.
- Right-click on the graphic of a pin inside a well, and a menu appears. Select **Custom Height**, and **Custom Height** appears (Figure 9.19). Insert the **Height** in millimeters (mm) and, in **from**, select a reference point from the drop-down list. Choose **OK**.

Figure 9.19 Custom Height Prompt



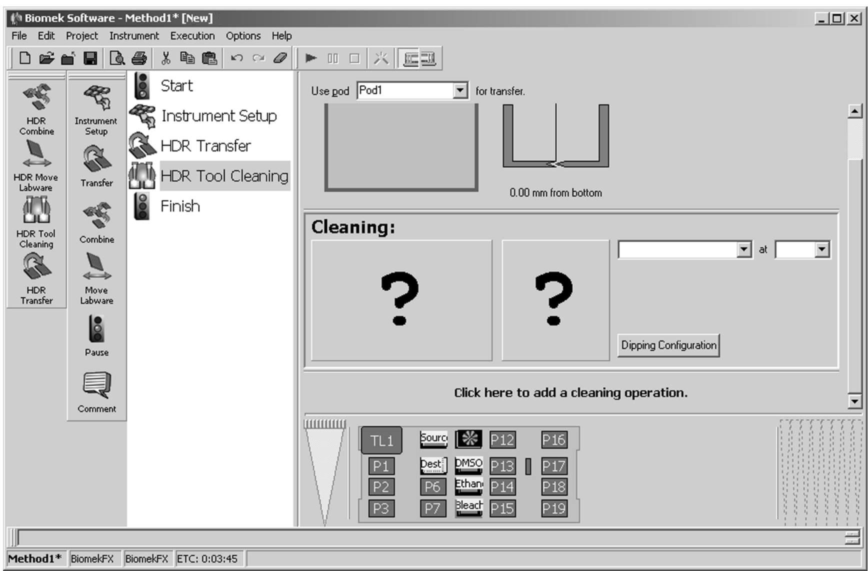
16 Configure additional **Cleaning Operations** following the procedures in Sections, *Configuring a Wash Operation* and *Configuring a Drying Operation*.

Configuring a Drying Operation

To configure a drying operation for the **HDR Tool Cleaning** step:

1 Select **Click here to add a cleaning/drying operation.** The **Cleaning Operation** configuration appears (Figure 9.20).

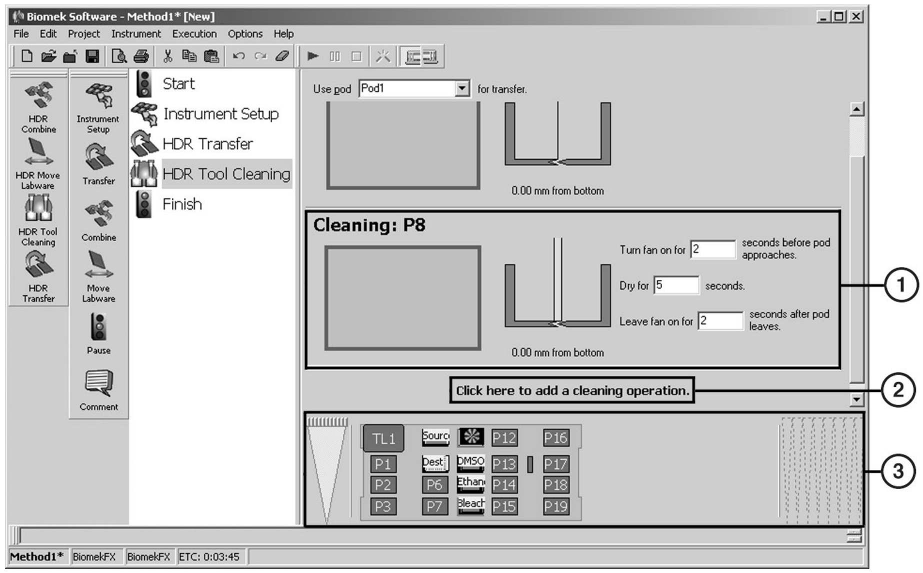
Figure 9.20 HDR Tool Cleaning Step — New Cleaning Operation Configuration



2 Click on the HDR Pin Drying ALP in the Current Deck Display. Information for the fan is entered automatically into the **Cleaning Operation** configuration.

NOTE Subsequent labware selections modify the active **Cleaning Operation** configuration. To configure additional **Cleaning Operations**, select **Click here to add a cleaning/drying operation,** or select outside a cleaning operation configuration, and then select another piece of labware from the Current Deck Display. If an incorrect piece of labware is selected, right-click on the labware title and select **Delete** on the menu that appears.

Figure 9.21 HDR Tool Cleaning Step — Configuration for a Drying Operation



1. **Cleaning Operation** — configuration for drying
2. **Additional Cleaning Operations** — continue adding **Cleaning Operations** by clicking this button, or by selecting more labware in the Current Deck Display.
3. **Current Deck Display** — displays the status of the deck upon completion of the previous step. Also useful for labware selection.

3 In **Turn fan on for**, enter the length of time in seconds to turn the fan on before the HDR Tool Body moves to the HDR Pin Drying ALP.

NOTE The default value for **Turn fan on for** is **2** seconds.

4 In **Dry for**, enter the length of time in seconds to keep the HDR Tool Body at the HDR Pin Drying ALP to dry.

NOTE The default value for **Dry for** is **5** seconds.

5 In **Leave fan on for**, enter the length of time in seconds to leave the fan on after the HDR Tool Body moves away from the HDR Pin Drying ALP.

NOTE The default value for **Leave fan on for** is **2** seconds.

6 Leave the pin height as is to use the default setting.

OR

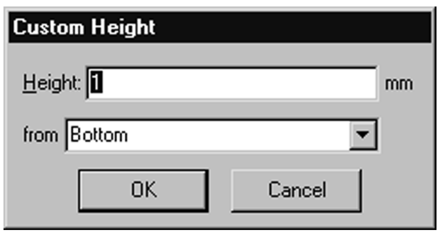
Set the pin height manually using one of the following methods:

- Position the cursor over the graphic of a pin inside a well. Click and drag the graphic up or down. The pin moves with the cursor, and the height displayed below the graphic is adjusted as the graphic is manipulated.

  NOTE The cursor changes to  when positioned over the graphic.

- Selecting the graphic of a pin inside a well, and use the ↑ and ↓ keys. The textual representation of the height, which is displayed below the graphic, adjusts in 0.1 millimeter (mm) increments.
- Right-click on the graphic of a pin inside a well, and a menu appears. Select **Custom Height**, and **Custom Height** appears (Figure 9.22). Insert the **Height** in millimeters (mm) and, in **from**, select a reference point from the drop-down list. Choose **OK**.

Figure 9.22 Custom Height Prompt



7 Configure additional **Cleaning Operations** following the procedures in Sections, *Configuring a Wash Operation* and *Configuring a Drying Operation*.

Using the Device Action Step

The **Device Action** step can be used to configure the actions of the HDR Cleaning System on the deck during a method, such as turning the fan in the HDR Drying ALP on and off or turning wash pumps for the circulating reservoir(s) on and off.

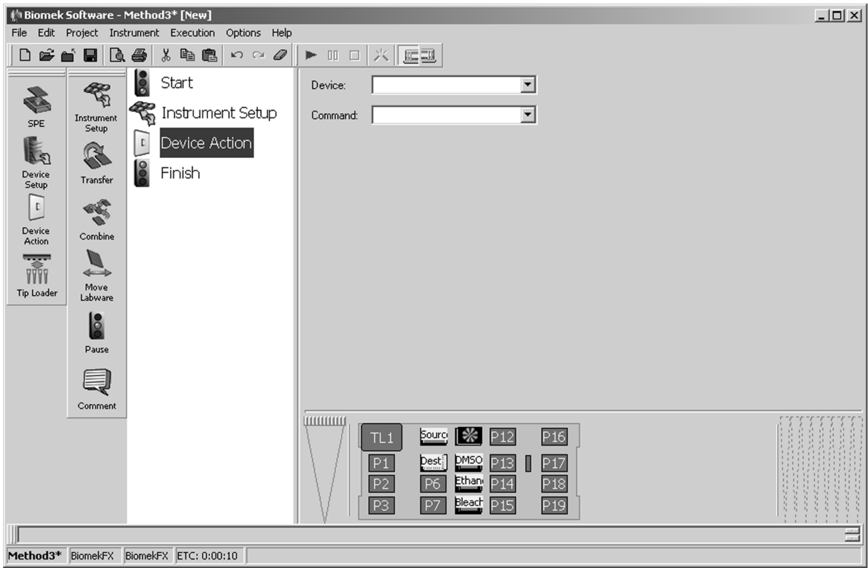
NOTE An HDR Pin Drying ALP and/or circulating reservoir must be configured in **Hardware Setup** (refer to *Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup*) and placed on the deck in the **Deck Editor** (refer to *Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software*) prior to using the **Device Action** step to operate components of the HDR Cleaning System.

Insert a 

step into the **Method View** (Figure 9.23).

NOTE The **Device Action** step is located on the Devices Step Palette. Refer to the *Biomek Software User's Manual*, Chapter 23, *Displaying the Devices Step Palette*, to display the Devices Step Palette.

Figure 9.23 Device Action Step



Configuring the Device Action Step for a Circulating Reservoir

To configure the **Device Action** step for a Circulating Reservoir (Figure 9.24):

1 Insert a **Device Action** step into the Method View.

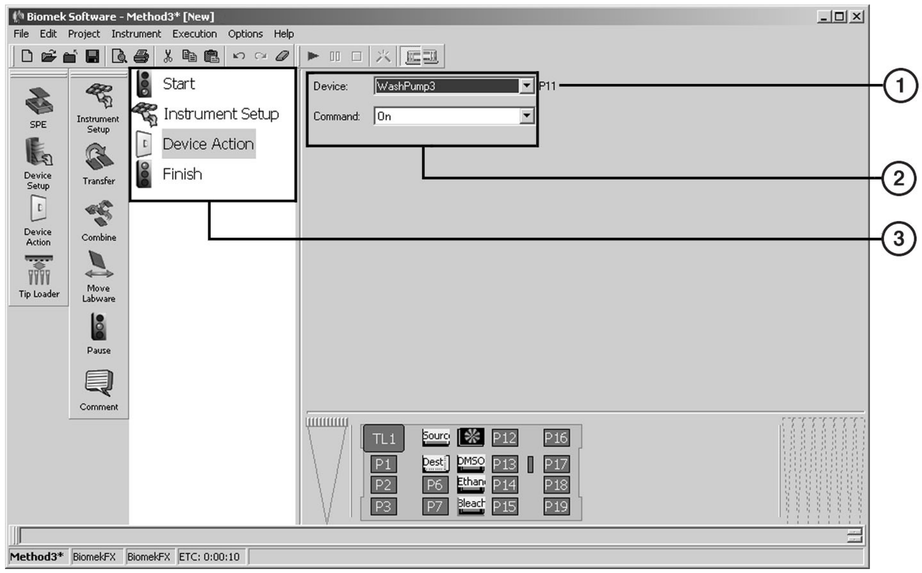
2 In **Device**, select the **WashPump** performing the required operation.

OR

Click on the desired circulating reservoir in the Current Deck Display to select it. The configuration for the Wash Pump appears (Figure 9.24).

NOTE The deck position has a blue border in the Current Deck Display.

Figure 9.24 Device Action Step for the Circulating Reservoir



1. **Deck Position** — indicates the location of the device performing the action on the deck.
2. **Device Action Step Configuration** — the **Device Action** step configuration specifies an operation performed on a wash station ALP.
3. **Method View** — the **Device Action** caption indicates the device and its status.

3 In **Command**, indicate the desired state for the Wash Pump: **On** or **Off**.

NOTE The Wash Pump automatically stops when the **Finish** step is executed.

Configuring the Device Action Step for the HDR Pin Drying ALP

To configure the **Device Action** step for the HDR Pin Drying ALP (Figure 9.24):

1 Insert a **Device Action** step into the Method View.

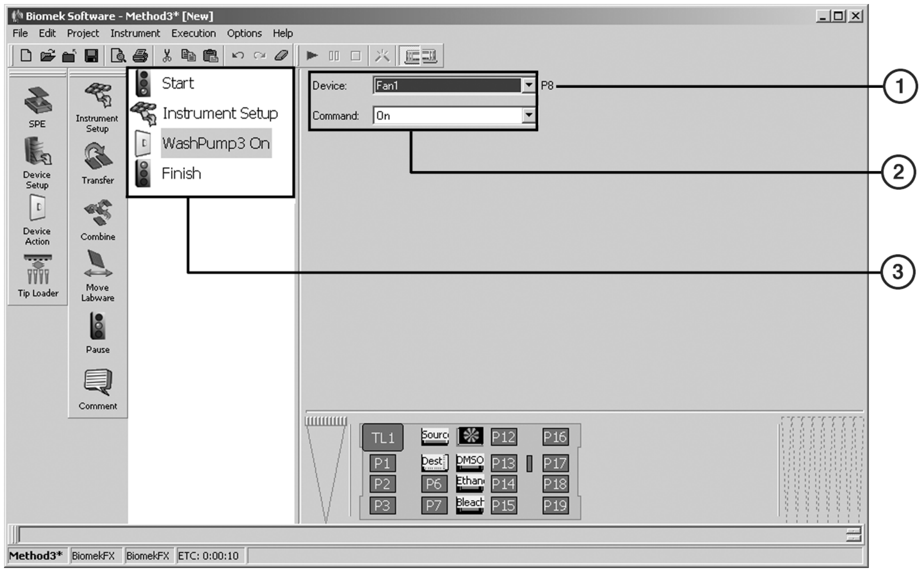
2 In **Device**, select the **Fan** performing the required operation.

OR

Click on the HDR Pin Drying ALP in the Current Deck Display to select it. The configuration for the HDR Pin Drying ALP appears (Figure 9.24).

NOTE The deck position has a blue border in the Current Deck Display.

Figure 9.25 Device Action Step for the Fan



1. **Deck Position** — indicates the location of the device performing the action on the deck.
2. **Device Action Step Configuration** — the **Device Action** step configuration specifies an operation performed on a wash station ALP.
3. **Method View** — the **Device Action** caption indicates the device and its status.

3 In **Command**, indicate the desired state for the fan on the HDR Pin Drying ALP: **On** or **Off**.

NOTE The fan automatically stops when the **Finish** step is executed.

Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method

The HDR Pin Drying ALP and circulating reservoir are both controlled by a Device Controller. Use **Advanced Manual Control** for a selected Device Controller to:

- Turn the output channels on or off manually.
- Monitor input channels.

When opened, **Advanced Manual Control** for a selected Device Controller displays which channels are on and which channels are off.

To manually control Device Controller channels:

1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**. A list of all the devices installed on the Biomek FX instrument appears.

3 Select the desired **Device Controller**. **Advanced Manual Control** for the selected Device Controller appears (Figure 9.26).

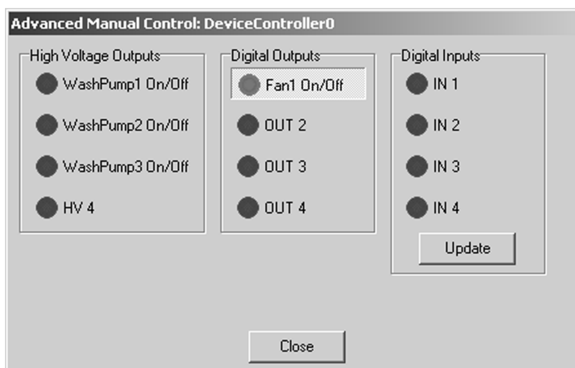
4 To toggle the HDR Drying ALP fan on or off, click the desired **Fan On/Off** button (Figure 9.26).

OR

To toggle the wash pump for the circulating reservoir on or off, click the desired **WashPump On/Off** button (Figure 9.26).

NOTE Channels that are on are highlighted with a bright green color.

Figure 9.26 **Advanced Manual Control** for a Device Controller with Fan On



5 When adjustment of channels has been completed as desired, choose **Close**.

NOTE Choose **Update** to view which digital inputs are on or off.

6 Choose **Exit** to close **Manual Control**.

Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck

Removing the HDR Pin Drying ALP

The HDR Pin Drying ALP can be used as a standard deck position when not in use during a method.

To remove the HDR Pin Drying ALP from the deck:

CAUTION

Turn off power to the Biomek FX instrument and the Device Controller before attaching or removing any active ALP.

1. Turn off power to the Biomek FX instrument and Device Controller before removing any ALP.
2. Unplug the fan from the Device Controller.
3. Loosen the thumbscrews on the base of the HDR Pin Drying ALP.
4. Lift the unit in an upward motion to clear the locating pins from the locating holes on the deck.

Removing the Circulating Reservoir

The circulating reservoir needs to be carefully dismantled prior to removing it from the deck. To dismantle and remove the circulating reservoir from the deck:

WARNING

SPILL HAZARD

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

1. Remove the outlet tubing from the peristaltic pump head.
2. Run the peristaltic pump in reverse until the reservoir is sufficiently drained.
3. Replace the outlet tubing in the peristaltic pump head.
4. Remove the inlet tubing from the peristaltic pump head.
5. Run the peristaltic pump forward to empty excess fluid in the bottom of the reservoir.
6. Detach the inlet and outlet tubing from the circulating reservoir.
7. Drain and dispose of excess liquid in the inlet and outlet tubing according to procedures outlined by the laboratory safety officer.
8. Remove the circulating reservoir labware from the deck.
9. Dispose of waste fluid in the waste container as described by the laboratory safety officer.

Storing the HDR Pin Drying ALP and Circulating Reservoir

Storing the HDR Pin Drying ALP

Return the HDR Pin Drying ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE The HDR Pin Drying ALP can be used as a standard 1 x 1 Passive ALP when not in use during a method.

Storing the Circulating Reservoir

Return the circulating reservoir and its accessories to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the circulating reservoir to air dry before returning it to the original packing materials.

Preventive Maintenance for the HDR Pin Drying ALP and Circulating Reservoir

Preventive Maintenance for the HDR Pin Drying ALP

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Preventive Maintenance for the Circulating Reservoir

To ensure optimum operation, perform the following maintenance procedures as necessary:

- Follow the appropriate decontamination procedures outlined by the laboratory safety officer.
- Do not overflow the reservoir.
- Empty any cleaning solutions from the reservoirs when not in use and rinse them thoroughly as outlined by the laboratory safety officer.
- Make sure the reservoir is dry before storing.

Troubleshooting the HDR Pin Drying ALP and Circulating Reservoir

Troubleshooting the HDR Pin Drying ALP

Do not attempt to repair the HDR Pin Drying ALP without first contacting a Beckman Coulter Service Engineer.

Table 9.1 Troubleshooting the HDR Pin Drying ALP

If...	Then...
The HDR Pin Drying ALP is not functioning correctly.	Make sure the Device Controller is properly connected to the fan and the Biomek FX instrument.

Troubleshooting the Circulating Reservoir

Do not attempt to repair the circulating reservoir without first contacting a Beckman Coulter Service Engineer.

Table 9.2 Troubleshooting the Circulating Reservoir

If...	Then...
The circulating reservoir is not functioning correctly.	Make sure the circulating reservoir, peristaltic pump, and Device Controller are all properly connected to the Biomek FX instrument.
The circulating reservoir is not filling.	Make sure that the tubing is properly attached to the circulating reservoir and pump and there are no kinks in the line. Make sure the inlet tubing is in contact with the wash solution.

CHAPTER 10

Heating and Cooling ALP

Overview

The Heating and Cooling ALP (Figure 10.1) is an active ALP that heats or cools a reservoir, microplate, or other standard labware. It is connected to an external refrigeration and/or heating device using nylon fittings attached to a hose which circulates cold or hot water through the Heating and Cooling ALP.

This ALP is created using a Standard 1 x 1 Passive ALP, a heating and cooling unit, and a user-supplied circulating bath.

NOTE The Heating and Cooling ALP is usually dedicated to a deck position since it cannot be turned on and off via Biomek Software and must be controlled from the circulating bath.

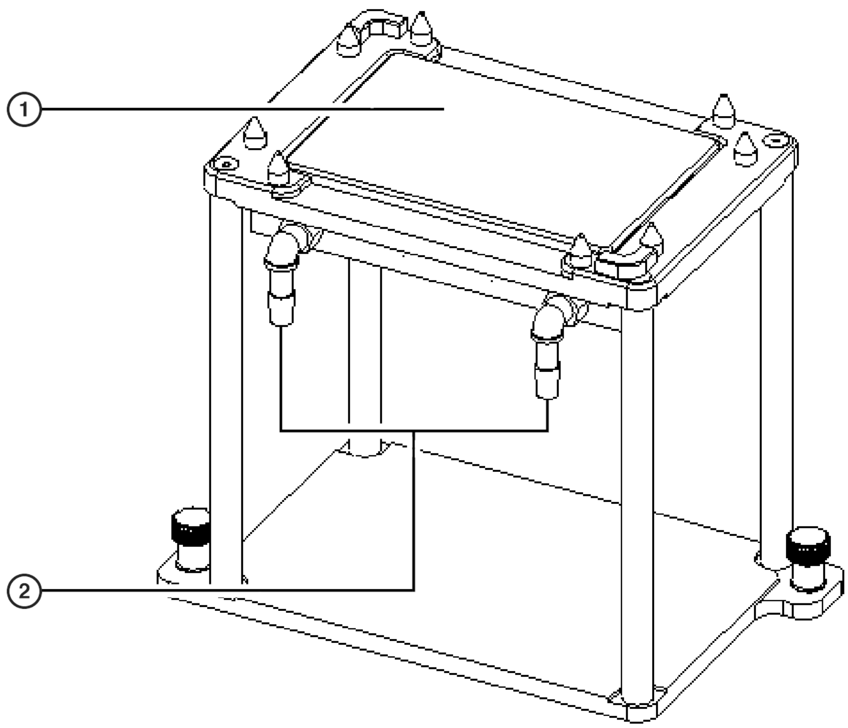
The sections in this chapter include:

- *Installing the Heating and Cooling ALP*
- *Framing Instructions*
- *Removing the Heating and Cooling ALP*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

⚠ WARNING

The Heating and Cooling ALP can reach extremely high temperatures. Allow the Heating and Cooling ALP to cool before removing it from the deck.

Figure 10.1 Heating and Cooling ALP — Top View



1. Heating & cooling unit mounted to an ALP stand
2. In/out hose fittings

Installing the Heating and Cooling ALP

Installing the Heating and Cooling ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

Mounting the Heating and Cooling ALP to the Deck

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To install the Heating and Cooling ALP:

1 Turn a 1 x 1 Standard Passive ALP upside down and mount the heating & cooling unit (Figure 10.2) to the underside of the ALP stand using the four screws provided (Figure 10.3).

2 Position the Heating and Cooling ALP on the deck so the locating pins on the bottom of the ALP slip into locating holes on the deck.

3 Attach the Heating and Cooling ALP to the deck using the thumbscrews on the base of the ALP.

4 Attach the in and out hoses to the fittings (Figure 10.1).

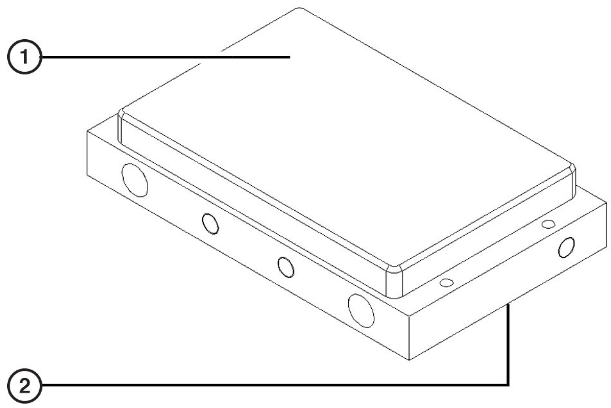
NOTE The hoses can be attached to either fitting, since the fluid circulation in the Heating and Cooling ALP is not directionally specific.

NOTE Make sure the hose routing does not interfere with the operation of the Biomek instrument.

5 Follow the manufacturer's instructions for hooking up the circulating bath (refer to *Circulator Bath Specifications*).

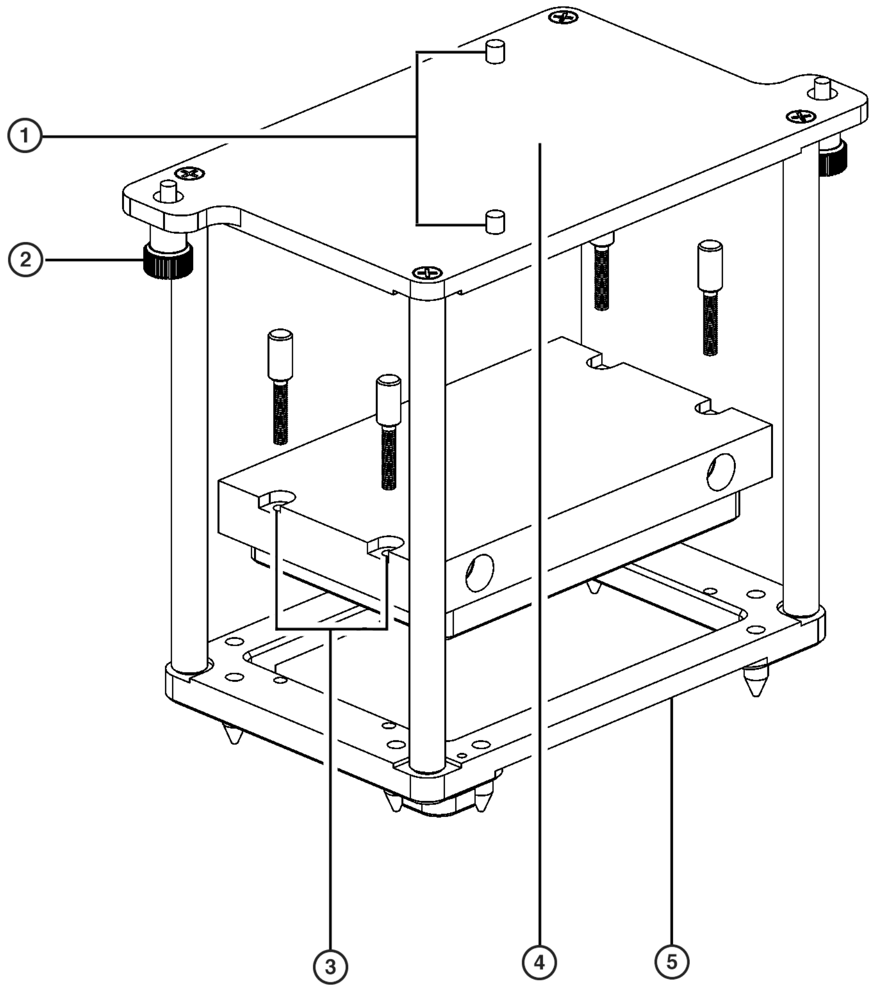
6 Apply power to the circulating bath.

Figure 10.2 Heating & Cooling Unit



1. **Top of Heating and Cooling ALP**
2. **Bottom of Heating and Cooling ALP**

Figure 10.3 Heating and Cooling Unit Mounting — Bottom View



1. **Locating Pins**
2. **Thumbscrew**
3. **Screw Placement**
4. **Bottom of 1 x 1 ALP**
5. **Top of 1 x 1 Standard Passive ALP**

Circulator Bath Specifications

The user-supplied circulator bath which heats or cools water to a specified temperature to heat or cool the heating & cooling unit on top of the Heating and Cooling ALP requires minimum specifications (Table 10.1).

While the obtainable temperature range is dependent on the particular bath used; the nominal temperature range for the Biomek heating & cooling unit is 4° C to 25° C.

Table 10.1 Minimum Specifications for a Circulator Bath

Capacity	Specification
Temperature Range	4° C (min) to 25° C (max)
Flow	7 to 15 Liters per minute
Reservoir	6 Liters
Heating	1,000 W
Cooling	120 W at zero (0)°C

NOTE The temperature difference of approximately 5° to 15° C between the circulator bath and the heating & cooling unit should be considered when choosing a circulator bath.

Framing Instructions

Frame the Heating and Cooling ALP according to the instructions in the specific manual for the instrument.

Removing the Heating and Cooling ALP

CAUTION

Do not detach the hoses over the Biomek deck. Immediately wipe up any spills with a soft cloth.

To remove the Heating and Cooling ALP:

1. Power down the circulating bath.
2. Loosen the mounting screws.
3. Remove the ALP from the deck.
4. Remove the hoses over a sink or reservoir container.

Storage

Return the Heating and Cooling ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Heating and Cooling ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Lime deposits may be removed from the Heating and Cooling ALP using an acidic solution of 0.1M Hydrochloric Acid (HCl). Flush liberally with water when done.

Troubleshooting

Do not attempt to repair the Heating and Cooling ALP without first contacting a Beckman Coulter Service Engineer

Table 10.2 Troubleshooting the Heating and Cooling ALP

If...	Then...
The Heating and Cooling ALP is not functioning correctly.	Make sure that the hoses are attached properly. Contact the circulating bath manufacturer.

CHAPTER 11

High-Density Passive ALPs

Overview

The High-Density Passive ALPs are open structures that hold multiple pieces of labware, allowing more labware on the Biomek deck at one time while using as few deck positions as possible.

The High-Density Passive ALPs increase deck flexibility when a method requires access to large amounts of labware, but still requires access to other ALPs, such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP. These ALPs are also useful when running the Plate Replication Wizard or when running high-throughput screening methods.

High-Density Passive ALPs include:

- 4 x 4 High-Density Passive ALP (refer to *4 x 4 High-Density Passive ALP*)
- 4 x 3 High-Density Passive ALP (refer to *4 x 3 High-Density ALP*)

NOTE An LLS plate can be installed in any or all labware positions on the 4 x 3 High-Density ALP.

The sections in this chapter include:

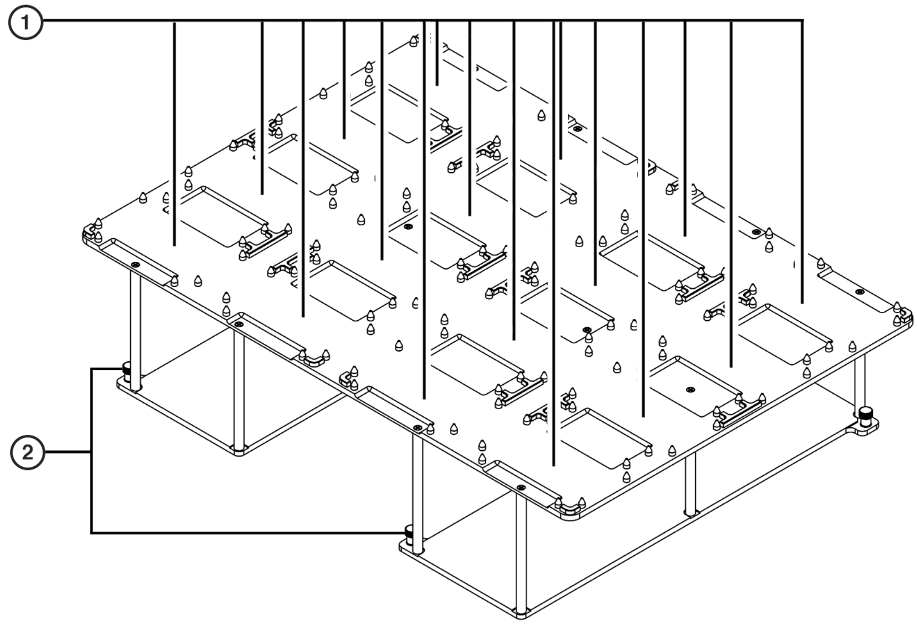
- *Installing High-Density Passive ALPs*
- *Framing Instructions*
- *Removing High-Density Passive ALPs from the Deck*
- *Storage*
- *Preventive Maintenance*

4 x 4 High-Density Passive ALP

The 4 x 4 High-Density Passive ALP can hold up to sixteen pieces of labware. Microplates can be added to the ALP by a lab technician or by the Biomek gripper.

NOTE Labware positioned on the 4 x 4 High-Density Passive ALP is gripper accessible and stackable (Figure 11.1).

Figure 11.1 4 x 4 High-Density Passive ALP



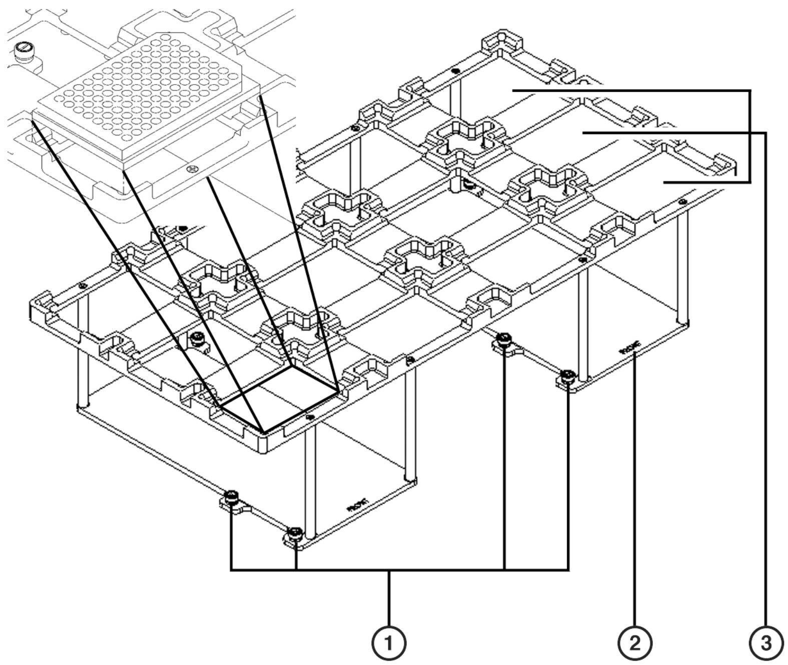
1. **4 x 4 High-Density Passive ALP** — labware positions.
2. **Thumbscrews** — four thumbscrews are used to secure the 4 x 4 High-Density Passive ALP to the deck. (*There are two more thumbscrews on the opposite side of the ALP*.)

4 x 3 High-Density ALP

The 4 x 3 High-Density ALP (Figure 11.2) is a Passive ALP that can hold up to twelve pieces of labware. Microplates can be added to the 4 x 3 High Density ALP by a lab technician or by the Biomek gripper.

NOTE Labware positioned on the 4 x 3 ALP High-Density Passive ALP is gripper accessible and stackable.

Figure 11.2 4 x 3 High-Density Passive ALP with a Microplate Being Placed in a Labware Position



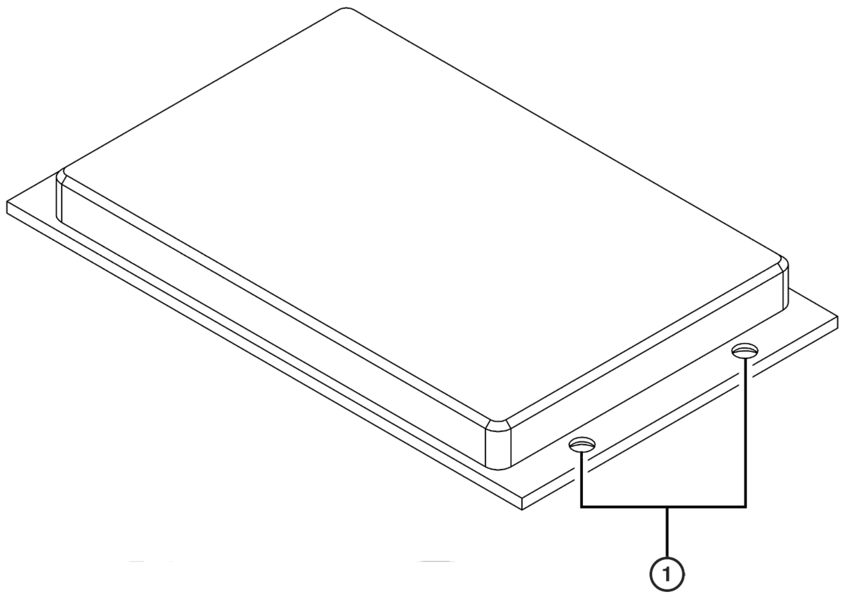
1. **Thumbscrews** — four of the six thumbscrews on the base of the 4 x 3 High-Density Passive ALP are used at any one time to secure the ALP to the deck. (*Five of the six thumbscrews are shown on this graphic. The sixth thumbscrew is partially visible on the top right corner of the ALP base*.)
2. **Front of the ALP**
3. **4 x 3 High-Density Passive ALP** — labware positions (*Three labware positions are indicated here*.)

Adding a Liquid Level Sensing (LLS) Plate to the 4 x 3 High-Density Passive ALP

The 4 x 3 High-Density Passive ALP stand supports an LLS plate option (Figure 11.3) which when installed improves liquid level sensing capabilities in labware positioned on the ALP. An LLS plate can be installed in any or all labware positions on the ALP.

NOTE Labware positioned on a 4 x 3 High-Density Passive ALP with the LLS plate option installed is gripper accessible and stackable.

Figure 11.3 LLS Plate (Top View)



1. **LLS Plate Mounting Screw Holes** — four mounting screws are used to secure the LLS plate to the ALP. (*There are two more screw holes on the opposite side*.)

Installing the LLS Plate Option on a 4 x 3 High-Density Passive ALP

To install an LLS plate, complete the following:

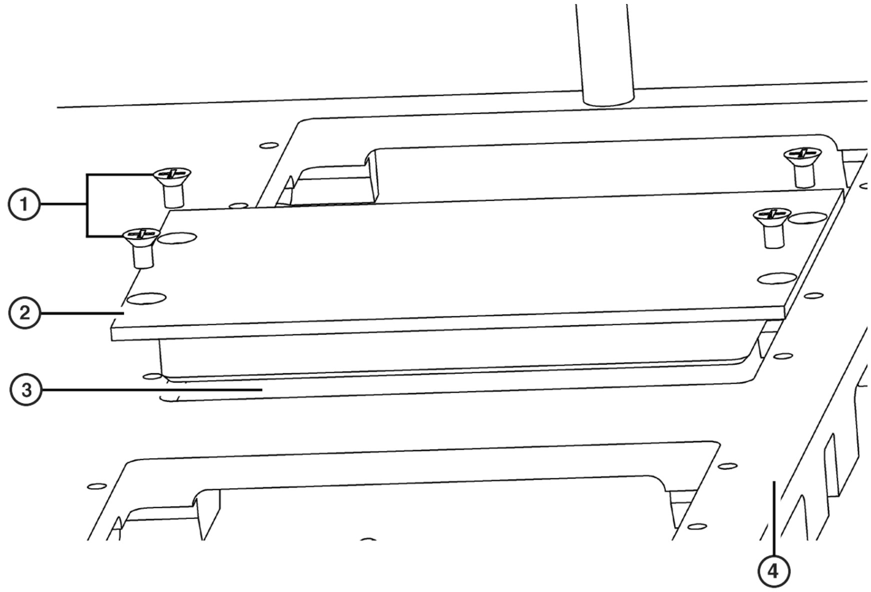
---

1 Turn the High-Density Passive 4 x 3 ALP upside down.

---

2 Position the LLS plate upside down in the desired position on the ALP stand (Figure 11.4).

Figure 11.4 Installing an LLS Plate on an High-Density 4 x 3 ALP

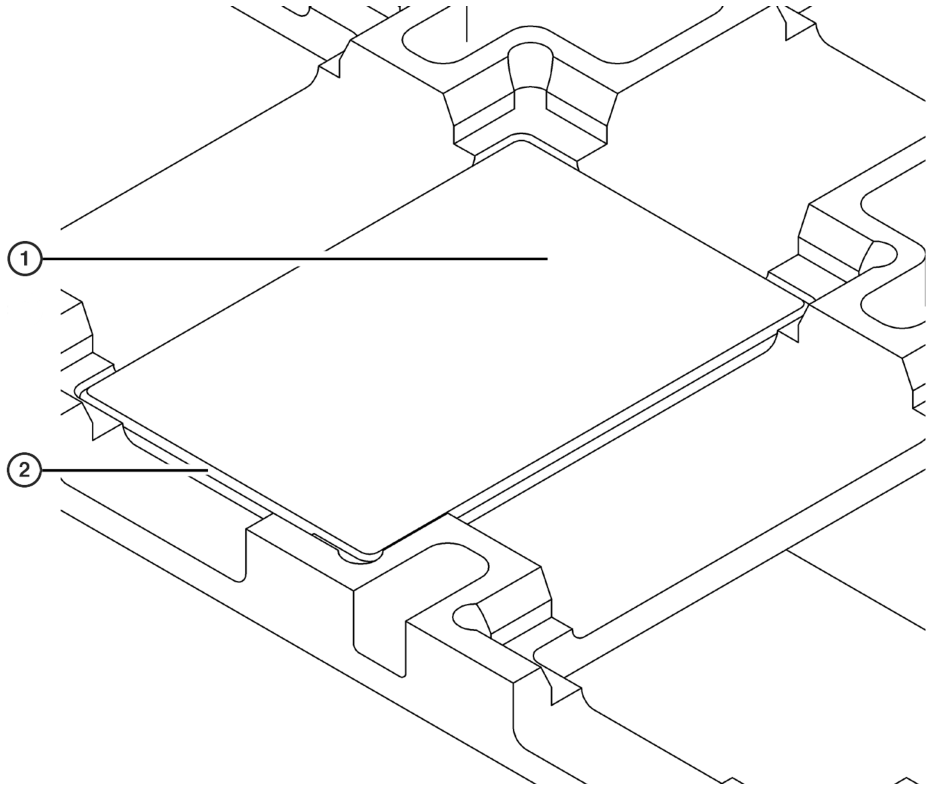


1. **LLS Plate Mounting Screws**
2. **Bottom of LLS Plate**
3. **Top of ALP**
4. **Bottom of ALP**

---

3 Attach the LLS plate to the ALP with the four mounting screws provided by turning the screws clockwise until finger tight. The LLS plate is now installed (Figure 11.5).

Figure 11.5 High-Density Passive 4 x 3 ALP with the LLS Plate Option Installed



1. **High-Density 4 x 3 Passive ALP with LLS Plate Option Installed** — labware rests on top of the LLS plate.
2. **Installed LLS Plate**

Installing High-Density Passive ALPs

Installing High-Density Passive ALPS includes choosing the deck position and mounting the ALP to the deck. The 4 x 3 ALP (Sections *Choosing a Deck Position for the 4 x 3 ALP* and *Mounting a 4 x 3 ALP to the Deck*) and the 4 x 4 ALP (Sections *Choosing a Deck Position for the 4 x 4 ALP* and *Mounting the 4 x 4 ALP to the Deck*) have different deck locations and slightly different instructions for mounting the ALP to the deck.

Choosing a Deck Position for the 4 x 3 ALP

The 4 x 3 ALP occupies four columns and three rows on the Biomek deck. The 4 x 3 ALP can be placed in two separate positions on the Biomek deck, although only one 4 x 3 ALP can appear on the deck at a time. Use the Biomek Software **Deck Editor** to determine available positions when mounting a 4 x 3 ALP on a Biomek Laboratory Automation Workstation.

NOTE When the 4 x 3 ALP is mounted on the Biomek deck, enough space is available in the remaining open row for larger ALPs such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting a 4 x 3 ALP to the Deck

To mount the 4 x 3 ALP to the Biomek deck, complete the following:

1 Choose an appropriate deck location to mount the ALP to the deck (refer to *Choosing a Deck Position for the 4 x 3 ALP*).

2 Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck. Make sure the front of the ALP faces the front of the Biomek deck.

NOTE The front of the 4 x 3 ALP is indicated with the word "FRONT" etched on the base of the ALP stand.

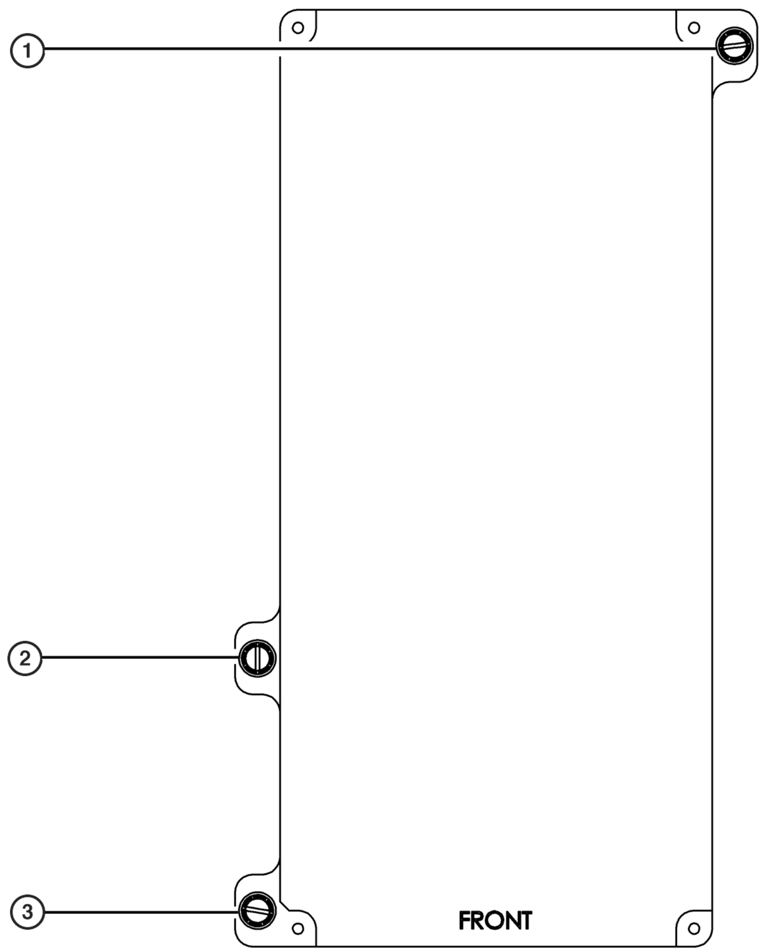
NOTE Use the deck laser etchings as a guide when positioning a 4 x 3 ALP on the deck.

3 Fasten the ALP to the deck using four of the six thumbscrews on the base of the ALP (Figure 11.6) as follows:

NOTE The 4x 3 ALP has two base plates like the one displayed in Figure 11.6. When fastening the ALP to the deck, two thumbscrews on each base plate must be used.

- When positioning the ALP along the front of the Biomek deck, use the 1st (front) thumbscrew and the 3rd thumbscrew.
- When positioning the ALP along the back of the Biomek deck, use the 2nd thumbscrew and the 3rd thumbscrew.

Figure 11.6 Thumbscrew Positioning on the Base of the 4 x 3 ALP



1. **3rd Thumbscrew**
2. **2nd Thumbscrew**
3. **1st Thumbscrew**

Choosing a Deck Position for the 4 x 4 ALP

The 4 x 4 ALP occupies four columns and four rows on the Biomek deck. The 4 x 4 ALP can be placed in one location on the deck. When mounting a 4 x 4 ALP on a Biomek instrument, use the Biomek Software **Deck Editor** to determine the available deck position.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting the 4 x 4 ALP to the Deck

To mount the 4 x 4 ALP to the Biomek deck, complete the following:

1 Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck.

NOTE Use the deck laser etchings as a guide when positioning a 4 x 4 ALP on the deck.

2 Fasten the ALP to the deck using the four thumbscrews on the base of the ALP.

NOTE The 4 x 4 ALP does not have a front or back side.

Framing Instructions

Frame High-Density Passive ALPs according to the instructions in the specific user's manuals for the instruments.

Removing High-Density Passive ALPs from the Deck

To remove High-Density ALPs from the Biomek FX deck:

1 Remove labware from the ALP.

2 Loosen the thumbscrews on the base of the ALP.

3 Lift the ALP straight up and off the deck so that the locating pins on the bottom of the ALP clear the locating holes on the deck.

Storage

Return the High-Density Passive ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the High-Density Passive ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

WARNING

High-Density ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the High-Density Passive ALP with a soft cloth.

CHAPTER 12

High-Density 4 x 3 Passive ALP (NX-S8 only)

Overview

The Biomek NX Span-8 High-Density 4 x 3 ALP (Figure 12.1) can hold up to twelve stacks of labware, allowing more labware on the Biomek NX Span-8 deck at one time while using as few deck positions as possible. It is accessible by the Span-8 Pod on the Biomek NX deck.

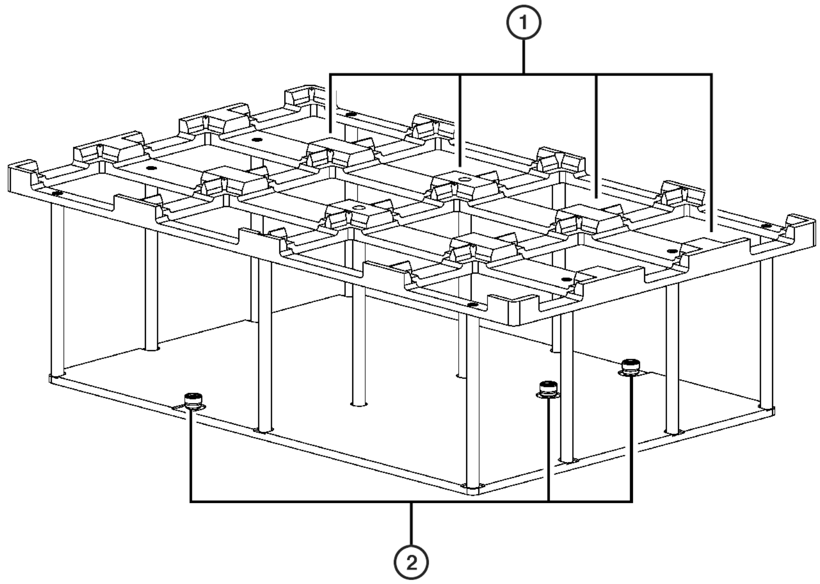
This ALP increases deck flexibility when a method requires access to large amounts of labware, but still requires access to other ALPs, such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP. It is also useful when running high-throughput screening methods.

Microplates can be added to the Biomek NX Span-8 High-Density 4 x 3 ALP by a lab technician or by the Biomek NX Span-8 gripper. Labware positioned on the High-Density 4 x 3 ALP is gripper accessible and stackable.

The information in this chapter includes the following:

- *Adding a Liquid Level Sensing (LLS) Plate*
- *Mounting the High-Density 4 x 3 ALP to the Deck*
- *Removing the High-Density 4 x 3 ALP from the Deck*
- *Storage*
- *Framing the High-Density 4 x 3 ALP*
- *Preventive Maintenance*

Figure 12.1 Biomek NX Span-8 High-Density 4 x 3 ALP



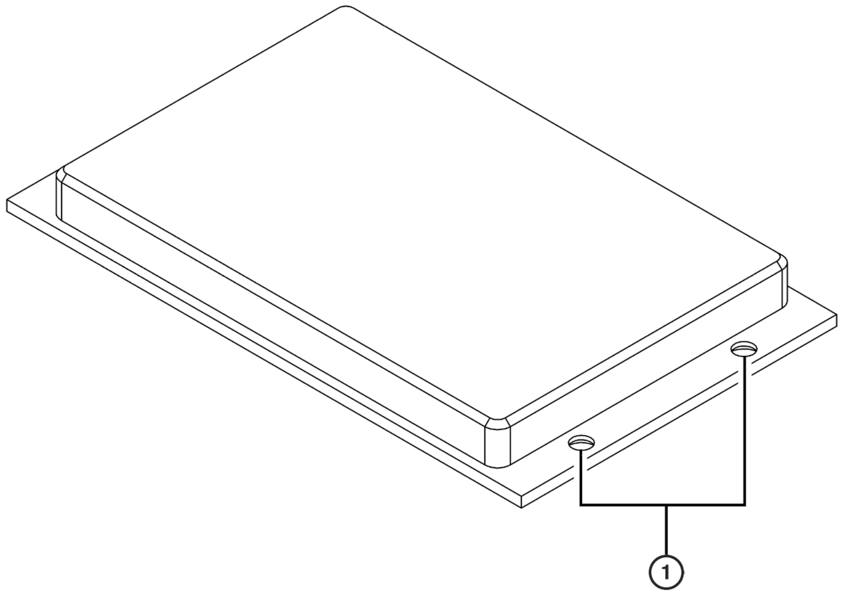
1. **Biomek NX High-Density 4 x 3 ALP** — there are 12 labware positions on the NX-S8 High-Density 4 x 3 ALP (*Four labware positions are indicated here*.).
2. **Thumbscrews** — two of the three thumbscrews on the base of the Biomek NX Span-8 High-Density 4 x 3 ALP are used to secure the ALP to the deck. The ALP can be rotated; therefore, three thumbscrews locations are available.

Adding a Liquid Level Sensing (LLS) Plate

The Biomek NX Span-8 High-Density 4 x 3 ALP stand supports an LLS plate option (Figure 12.2) which, when installed, improves liquid level sensing capabilities in labware positioned on the ALP. An LLS plate can be installed in any or all labware positions on the Biomek NX Span-8 High-Density 4 x 3 ALP.

NOTE Labware positioned on a Biomek NX Span-8 High-Density 4 x 3 ALP with the LLS Plate option installed is gripper accessible and stackable.

Figure 12.2 LLS Plate (Top View)



1. **LLS Plate Mounting Screw Holes** — four mounting screws are used to secure the LLS Plate to the NX-S8 High-Density 4 x 3 ALP. (*There are two more screw holes on the opposite side.*)

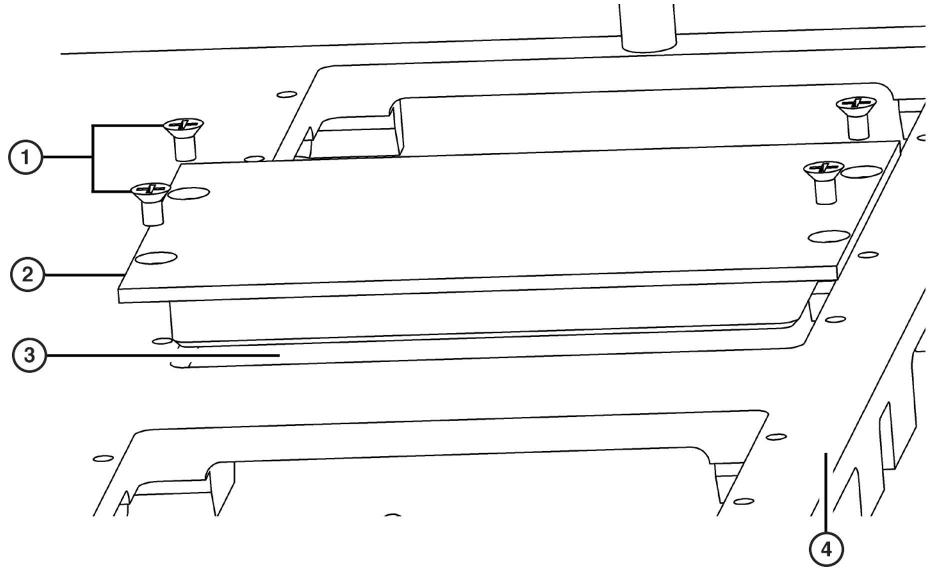
To install an LLS plate:

1 Turn ALP upside down.

2 Position the LLS plate upside down in the desired position on the ALP stand (Figure 12.3).

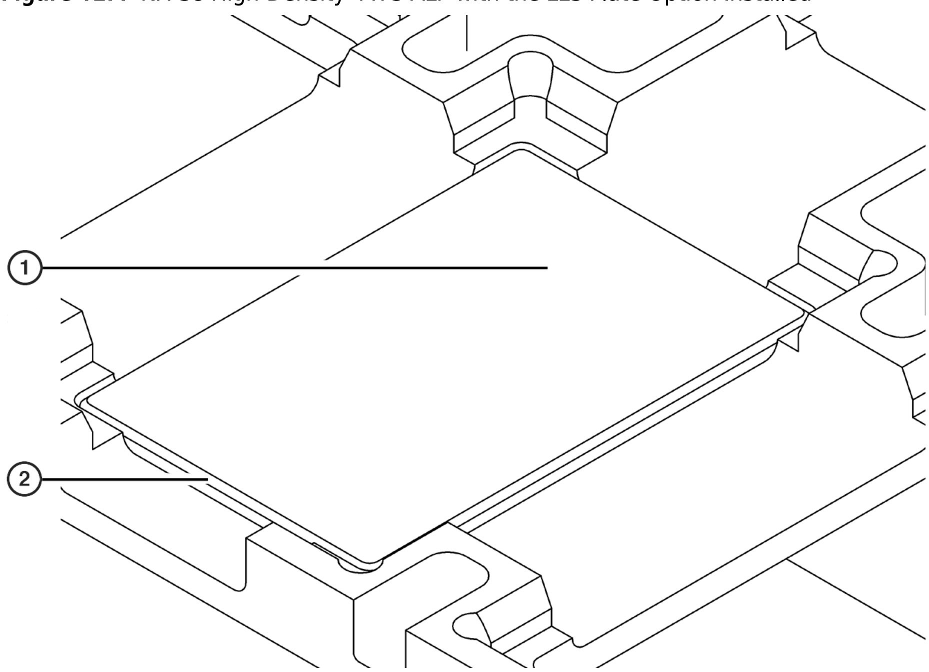
3 Attach the LLS plate to the ALP with the four mounting screws provided by turning the screws clockwise until finger tight. The LLS plate is now installed (Figure 12.4).

Figure 12.3 Installing an LLS Plate on an NX-S8 High-Density 4 x 3 ALP



1. **LLS Plate Mounting Screws**
2. **Bottom of LLS Plate**
3. **Top of NX-S8 High-Density 4 x 3 ALP**
4. **Bottom of NX-S8 High-Density 4 x 3 ALP**

Figure 12.4 NX-S8 High-Density 4 x 3 ALP with the LLS Plate Option Installed



1. **NX-S8 High-Density 4 x 3 ALP with LLS Plate Option Installed** — labware rests on top of the LLS plate.
2. **Installed LLS Plate**

Mounting the High-Density 4 x 3 ALP to the Deck

When it is mounted, NX-S8 High-Density 4 x 3 ALP occupies four columns and three rows on the Biomek NX deck. Refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*, to determine available positions for mounting the NX-S8 High-Density 4 x 3 ALP on the deck.

NOTE When the NX-S8 High-Density 4 x 3 ALP is mounted on the Biomek NX deck, enough space is available in the remaining open row for larger ALPs such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP.

To mount the ALP to the Biomek NX deck:

1 Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck. Make sure the front of the ALP faces the front of the Biomek NX deck.

NOTE The front of the NX-S8 High-Density 4 x 3 ALP contains a single set screw.

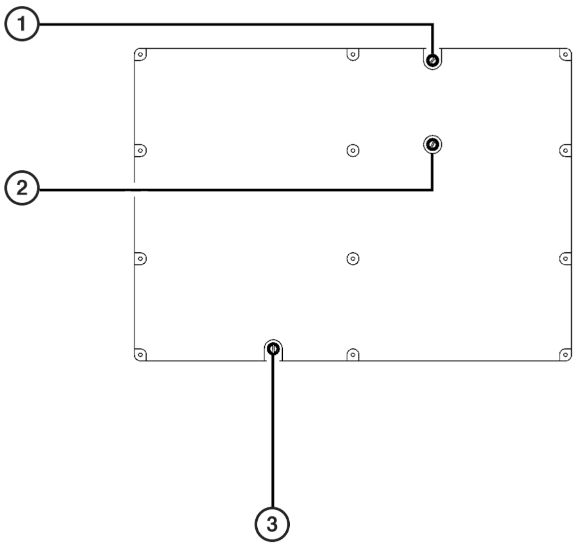
NOTE Use the deck laser etchings as a guide when positioning an NX-S8 High-Density 4 x 3 ALP on the deck.

2 Fasten the ALP to the deck using two of the three thumb screws on the base of the ALP (Figure 12.5) as follows:

NOTE The NX-S8 High-Density 4 x 3 ALP has a single base plate. When fastening the ALP to the deck, two thumb screws on the base plate must be used.

- When positioning the ALP along the front of the deck, use the 1st (front) and 3rd thumb screws.
- When positioning the ALP along the back of the deck, rotate the ALP 180º and use the 1st and 2nd thumb screws.

Figure 12.5 Thumb Screw Positioning on the Base of the NX-S8 High-Density 4 x 3 ALP



1. **3rd Thumbscrew**
2. **2nd Thumbscrew**
3. **1st Thumbscrew**

Removing the High-Density 4 x 3 ALP from the Deck

To remove the NX-S8 High-Density 4 x 3 ALP from the Biomek NX deck:

1 Remove labware from the ALP.

2 Loosen the two thumb screws on the base of the ALP used to secure the ALP to the Biomek NX deck.

3 Lift the ALP straight up and off the deck so that the locating pins on the bottom of the ALP clear the locating holes on the deck.

Storage

Return the NX-S8 High-Density 4 x 3 ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the NX-S8 High-Density 4 x 3 ALP to air-dry before returning it to the original packing materials.

Framing the High-Density 4 x 3 ALP

For instructions to frame the NX-S8 High-Density 4 x 3 ALP, refer to the *Biomek® NX and NX^P Laboratory Automation Workstations Span-8 Pod User's Manual*, Chapter 4, *Framing Instructions*.

Preventive Maintenance

WARNING

The NX-S8 High-Density 4 x 3 ALP may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the NX-S8 High-Density 4 x 3 ALP with a soft cloth.

CHAPTER 13

Labware Stacking ALP

Overview

⚠ **CAUTION**

The Labware Stacking ALP is for use with the Biomek NX^{P} Span-8 (with gripper) Laboratory Automation Workstation only.

⚠ **CAUTION**

Do not attempt to install or remove the Labware Stacking ALP; it must be installed or removed by a Beckman Coulter Service Engineer.

The Labware Stacking ALP (Figure 13.1) is a passive ALP that has two rotated positions that are used to stack tip boxes and labware. It is positioned off the left side of the Biomek NXP Span-8 Laboratory Automation Workstation deck.

The gripper can grasp and move tip boxes to and from the stacks in the ALP using it to retrieve new tip boxes during a method and to store empty tip boxes after they are used. Up to five P20 or P200 tip boxes or up to three P1000 tip boxes can be stacked in each position on the ALP (see Table 13.1).

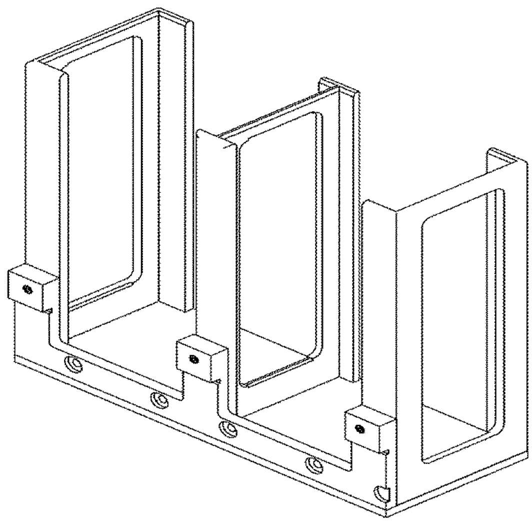
If a microplate rather than a tip box is placed in the ALP or is moved to the ALP, the supplied spacer must be physically placed on the ALP. Reservoirs and some labware cannot be used with the Labware Stacking ALP (see Table 13.1).

A Stack/Unstack Labware step must be used to move labware, tip boxes, and stacks to and from the ALP (refer to *Using the Stack/Unstack Labware Step*). There are also special stacking rules that must be followed when using the ALP (refer to *Understanding the Stacking Rules for the Labware Stacking ALP*).

Using the Labware Stacking ALP on a Biomek NXP Span-8 Laboratory Automation Workstation includes:

- *Framing the Labware Stacking ALP*
- *Using the Labware Stacking ALP with Biomek Software*

Figure 13.1 Labware Stacking ALP



⚠ **WARNING**

Use only supported labware with the Labware Stacking ALP materials.

Table 13.1 Labware Supported and Not Supported for Use with the Labware Stacking ALP

Labware	Supported	Not Supported	Number of Labware/Stack[a]
AB384WellReactionPlate		X	
AP96_200uL_LLS	X		5
AP96_20uL_LLS	X		5
BCDeep96Round	X		7
BCDeep96Square		X	
BCFlat96	X		17 +spacer
BCFullReservoir		X	
BCI_12_Strip		X	
BCSPECollar		X	
BCTuberack_10mm		X	
BCTuberack_12mm		X	
BCTuberack_13mm		X	
BCTuberack_15_5mm		X	
BCUpsideDownTipBoxLid		X	
Collar_36mm		X	
CollarSpacer_23mm		X	
CostarCone96Round	X		17 +spacer
CostarDeep96Square	X		7
CostarFlat384Square	X		17 +spacer
CostarFlat384SquareLid	X		
DrainableRefillableReservoir		X	
FilterHolder		X	
Greiner384ConePP	X		17 +spacer
Greiner384ConePPDeep	X		17 +spacer
Greiner384FlatPP	X		17 +spacer
Greiner384Lid	X		
Greiner384ThermalCycler		X	
Greiner96ConeHalfDeep	X		10
Greiner96ConePP	X		17 +spacer
Greiner96ConePS	X		17 +spacer
Greiner96Flat	X		17 +spacer

Table 13.1 Labware Supported and Not Supported for Use with the Labware Stacking ALP

Labware	Supported	Not Supported	Number of Labware/Stack[a]
Greiner96RoundDeep	X		7
Greiner96RoundDeepSquare	X		6
Greiner96RoundPP	X		17 +spacer
Greiner96RoundPS	X		17 +spacer
Greiner96ThermalCycler		X	
GreinerFlat384Square	X		17 +spacer
GreinerShallow384Round	X		17 +spacer
IMReservoir96		X	
MJ_Microseal_384		X	
ModularReservoir		X	
NuncFlat384Square	X		17 +spacer
NuncLid	X		
NuncReservoir96		X	
NuncReservoirFlat		X	
PlasmidFilter	X		8
Reservoir		X	
SBSDeep384Square	X		7
SBSDeep96Round	X		7
SBSDeep96Square	X		7
SBSFlat384Round	X		17 +spacer
SBSFlat384Square	X		17 +spacer
SBSFlat96Round	X		17 +spacer
SmallTuberack_10mm		X	
SmallTuberack_12mm		X	
SmallTuberack_10mm		X	
SmallTuberack_Microfuge		X	
Span_8_1000uL_LLS	X		3
Span_8_1000uL_LLS_Barrier	X		3
Span_8_200uL_Barrier	X		5
Span_8_200uL_LLS_Barrier	X		5
Span_8_20uL	X		5
Span_8_20uL_Barrier	X		5
Span_8_20uL_LLS_Barrier	X		5
SwapSpace		X	
tipboxlid	X		17 +spacer

Table 13.1 Labware Supported and Not Supported for Use with the Labware Stacking ALP

Labware	Supported	Not Supported	Number of Labware/Stack[a]
Tipload		X	
titerplatelid	X		17 +spacer

a. These values represent the number of same labware that may be contained within a position (stack) of the Labware Stacking ALP.

Framing the Labware Stacking ALP

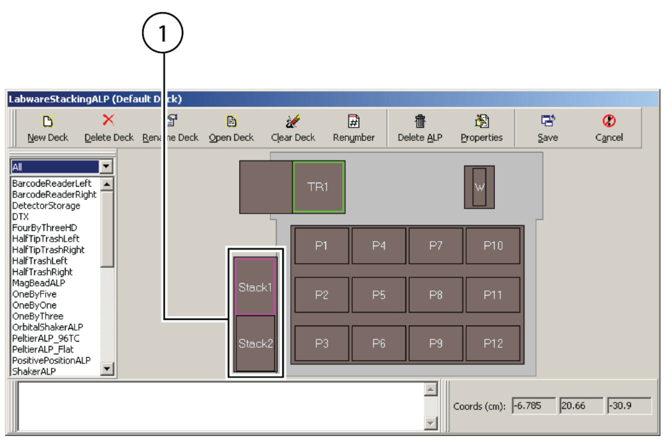
CAUTION

Framing the Labware Stacking ALP sets the correct position for the current deck; it does not change framing information for other decks. If a different deck is used, this ALP must be reframed for that deck before it is used in a method.

While a Beckman Coulter Service Engineer initially frames the Labware Stacking ALP during installation, it may be necessary to reframe the deck if it is reconfigured.

Framing the Labware Stacking ALP includes first framing any ALP position on the deck, preferably a 1 x 1 ALP position, and then using that framed position as a reference point to frame the Labware Stacking ALP. Each position on the Labware Stacking ALP must be framed.

Figure 13.2 Deck Editor with Labware Stacking ALP



1. **First frame any deck position, preferably 1 x 1, then use that framed position as a reference point to frame each position on the Labware Stacking ALP.**

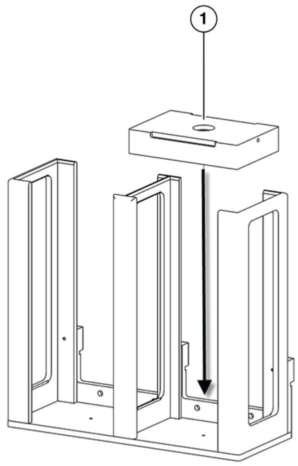
To frame the Labware Stacking ALP:

1 Using the Accuframe, frame a standard deck position to create a reference point from which to frame the Labware Stacking ALP (refer to Biomek NXP Span-8 Laboratory Automation Workstation User's Manual, Framing Instructions).

2 Place a 96-well microplate on this standard, framed position.

3 Place the supplied spacer on the Labware Stacking ALP position to be framed (Figure 13.3).

Figure 13.3 Labware Stacking ALP With Spacer



1. Supplied spacer

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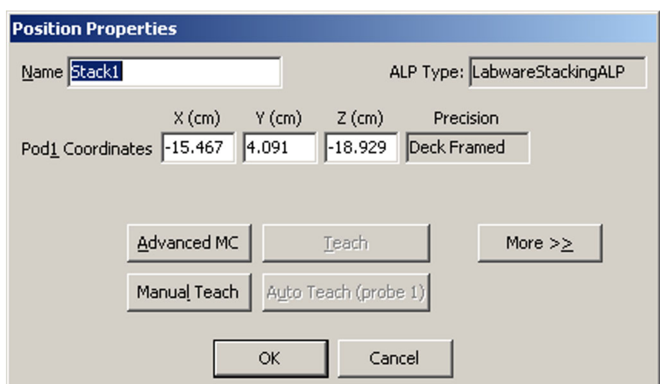
4 From the **Deck Editor**, double-click the Labware Stacking ALP position to be framed. **Position Properties** appears (Figure 13.4).

Figure 13.4 Position Properties



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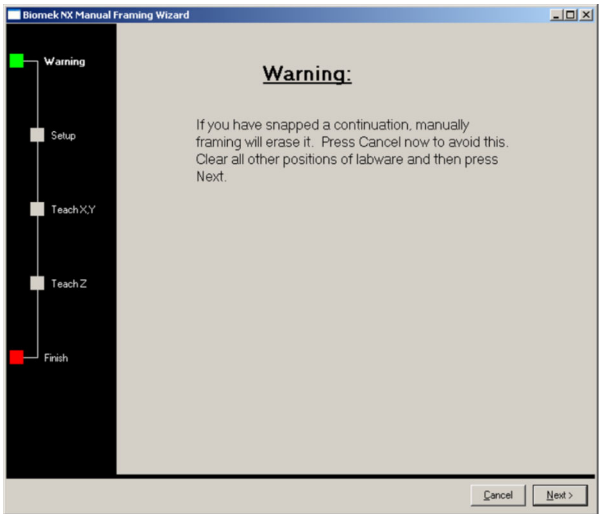
5 Choose **Manual Teach** (Figure 13.4). **Biomek NX^{P} Manual Framing Wizard** — warning appears (Figure 13.5).

Figure 13.5 Warning for Biomek NX[P] Manual Framing Wizard

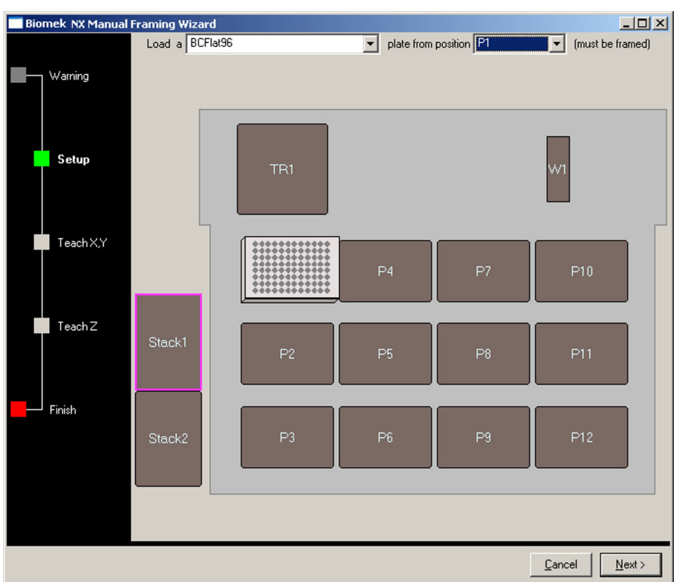


6 Choose **Next**. **Biomek NX[P] Manual Framing Wizard - Setup** appears.

7 From **Load a**, choose the labware type placed on the position that was framed in step 1 (Figure 13.6).

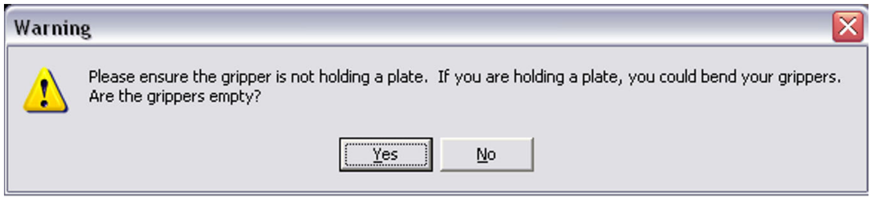
8 From **plate from position**, choose the position that was framed in step 1 (Figure 13.6).

Figure 13.6 Biomek NX[P] Manual Framing Wizard - Setup



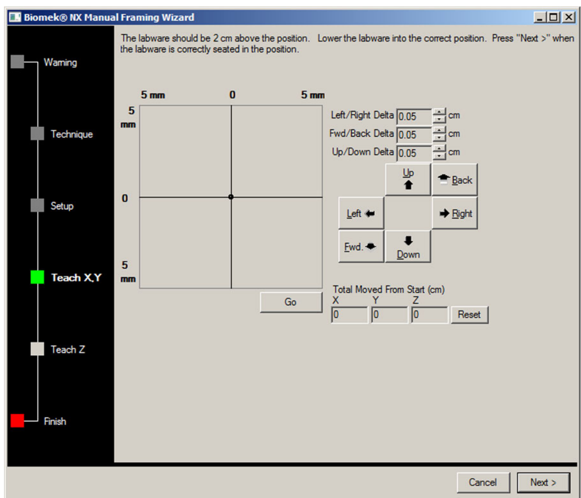
9 Choose **Next**. **Warning** appears (Figure 13.7).

Figure 13.7 Warning to ensure the gripper is not holding a plate



10 Ensure the gripper is not holding a microplate and choose **Yes. Biomek NX^P Manual Framing Wizard-Teach X,Y** appears (Figure 13.8). The gripper picks up the labware from the framed position and moves it approximately 2 cm above the position on the Labware Stacking ALP.

Figure 13.8 Biomek NX^P Manual Framing Wizard - Teach X,Y



11 Adjust the X and Y positions of the gripper to position the microplate appropriately in the ALP by either:

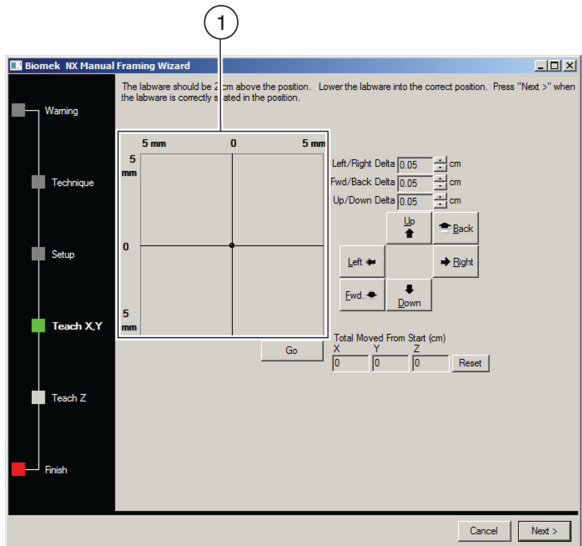
- *Using the Graphic Alignment Tool*
- *Using the Delta Value and Directional Buttons*

12 Adjust the Z position (height) of the gripper to position the microplate appropriately in the ALP using the **Up** and **Down** directional buttons and delta value (refer to *Using the Delta Value and Directional Buttons*).

Using the Graphic Alignment Tool

The graphic alignment tool (Figure 13.9) is used to instruct Biomek Software of the current position of the gripper in relation to the position being framed. Biomek Software uses the information it is given to move the pod so the gripper is directly above the target position.

Figure 13.9 Manual Teaching the X- and Y-axes



1. The graphic alignment tool is a visual representation of the back-left corner of the microplate (small circle) and the position being framed. The small circle is moved until it represents the microplate's current physical location in relation to the position being framed.

To use the graphic alignment tool:

1 Drag the small circle until it represents the physical position of the microplate in relation to the position being framed. The small circle represents the back left corner of the microplate.

NOTE The software uses this graphical representation of the physical position of the microplate to know approximately how far in any direction the gripper must move.

2 Select **Go**. The gripper moves in accordance with the position of the small circle. When the move is completed, the small circle resets itself to the center of the graphical representation.

NOTE The values displayed in **Total Moved from Start (cm)** changes each time steps 1 and 2 are completed. If desired, the values in **Total Moved from Start (cm)** can be reset to zero by selecting **Reset**.

3 Visually verify the position of the microplate in relation to the position being framed. If the microplate is still not accurately positioned above the position being framed, repeat steps 1 and 2 until the appropriate position is obtained.

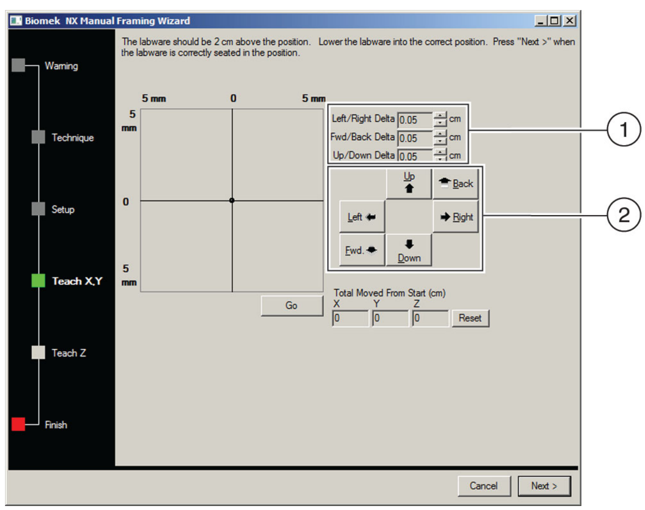
NOTE The microplate may also be aligned with the position using the delta value and directional buttons (refer to *Using the Delta Value and Directional Buttons*).

4 Once the microplate is aligned in the X- and Y-axes to the position being framed, align the Z-axis using the Up and Down directional buttons and delta value (refer to *Using the Delta Value and Directional Buttons*).

Using the Delta Value and Directional Buttons

The microplate can be positioned manually using the delta values and directional buttons to align it with the position being framed (Figure 13.10). Pressing one of the directional buttons moves the gripper in that direction by the distance specified in Delta. Use the directional buttons and delta values to place the microplate appropriately in the position being framed.

Figure 13.10 Using delta values and directional buttons to position a microplate



1. Delta value — The magnitude of change applied to the gripper each time a directional button is selected.
2. Directional buttons — The directional buttons move the pod by the amount shown in Delta with each press of a button.

To use the delta value and directional buttons to position the microplate:

1. In **Delta**, select the magnitude of change applied to the gripper each time a directional button is selected (Figure 13.10). The default **Delta** value is 0.05 cm.

   NOTE If the microplate is a considerable distance from the desired location, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the microplate is almost to the desired location, reduce the **Delta** value to fine tune the position (minimum setting is 0.005 cm).

2. Select the **directional button** representing the motion required to physically move the microplate into the appropriate position at the position being framed (Figure 13.10).

   NOTE Each time a directional button is selected, the gripper and microplate move the distance specified in **Delta** in the indicated direction

   NOTE The microplate can be physically positioned over the position being framed using:

   - the directional buttons in **Manual Teach**
   - the directional keys on the keyboard.
   - the directional keys on the numeric keypad.

   The directional buttons displayed in **Manual Teach** correspond to the keys on the numeric keypad. More specifically, **Fwd** corresponds to the '**1**' on the numeric keypad, while **Down** is found on the '**2**', **Left** is found on the '**4**', **Right** on '**6**', Up on '8', and **Back** on '**9**'.

3. Visually verify the position of the microplate in relation to the position being framed. If the microplate is still not accurately seated in the position being framed, repeat steps 1 and 2 until it is accurately positioned.

   NOTE The microplate may also be aligned in the X- and Y-axes using the graphic alignment tool, (refer to *Using the Graphic Alignment Tool*).

4. Once the microplate is completely resting on the spacer in the position being framed, choose **Next** to complete the procedure. **Biomek NX^{P} Manual Framing Wizard** closes and the gripper moves the labware to the original framed position.

Using the Labware Stacking ALP with Biomek Software

Using the Labware Stacking ALP with Biomek Software includes:

- *Using the Stack/Unstack Labware Step*
- *Understanding the Stacking Rules for the Labware Stacking ALP*

Using the Stack/Unstack Labware Step

CAUTION

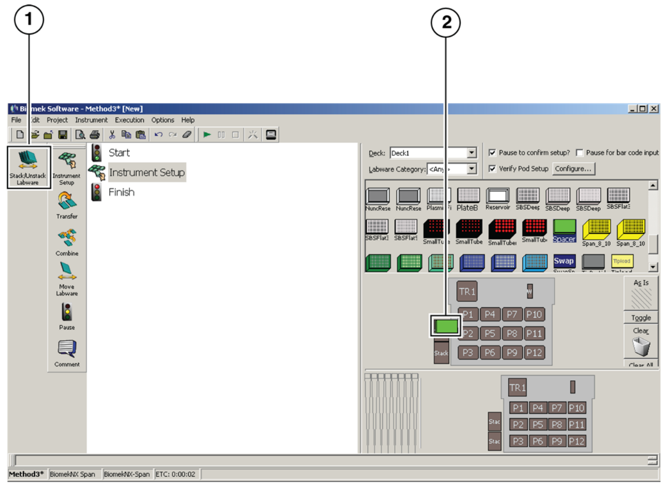
To move labware to and from the Labware Stacking ALP, use the Stack/Unstack Labware step. Using the Move Labware step from the Basic Step Palette will result in a validation error.

The **Stack/Unstack Labware** step is used to move supported labware or stacks of supported labware, (see Figure 13.1) to and from the Labware Stacking ALP (Figure 13.11). Refer to *Understanding the Stacking Rules for the Labware Stacking ALP* for information on configuring the step.

If a microplate rather than a tip box is placed in the ALP or is moved to the ALP, the spacer must be physically placed on the Labware Stacking ALP position and the deck must reflect the presence of the spacer through the Instrument Setup step (Figure 13.11). Refer to Biomek Software User's Manual, Instrument Setup Step for more information on configuring the Instrument Setup step.

Tip boxes must be placed on the Labware Stacking ALP as lidded. Refer to *Understanding the Stacking Rules for the Labware Stacking ALP* for information on other stacking rules.

Figure 13.11 Spacer placed on Labware Stacking ALP in the Instrument Setup step



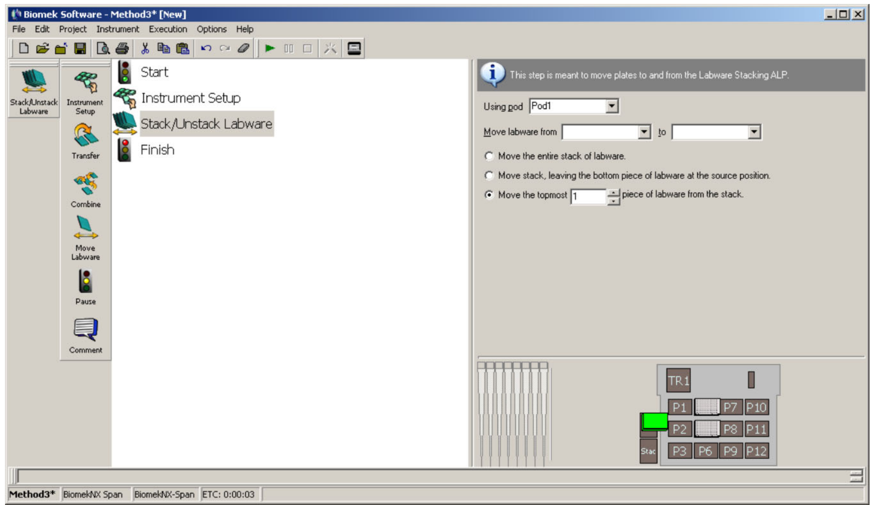
1. Stack/Unstack Labware step
2. Spacer— When a microplate, rather than a tip box, is stacked or will be stacked in the ALP, the spacer must be physically placed on the Labware Stacking ALP position and reflected in the **Instrument Setup** step.

Configuring the Stack/Unstack Labware Step

To configure the **Stack/Unstack Labware** step:

1 Drag and drop **Stack/Unstack Labware** into the Method View (Figure 13.12).

Figure 13.12 Stack/Unstack Labware step configuration



2 In **Using pod, Pod1** is the default and only pod on the instrument.

3 In **Move labware from**, select the original position for the labware from the Current Deck display. This instructs the Biomek instrument to move labware from a specific deck position in preparation for leaving it at a final destination.

4 In **to**, select the final position on the Labware Stacking ALP for the labware from the Current Deck display. This instructs the Biomek instrument to move the labware to a final position.

5 Choose one of the following options:

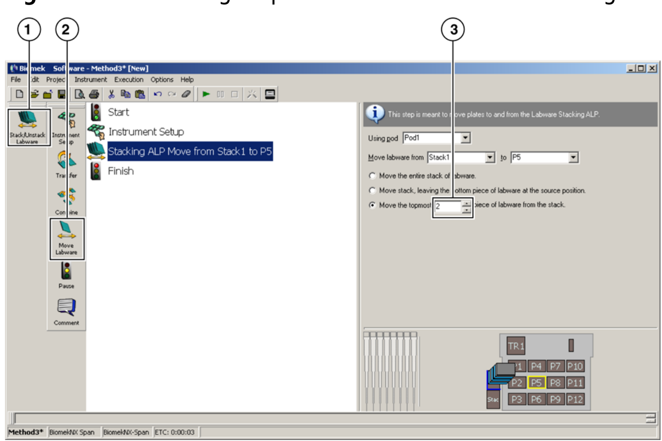
- **Move the entire stack of labware** — moves all labware in the stack
- **Move stack, leaving the bottom piece of labware at the source position** — moves all labware in the stack except for the bottom piece.

  NOTE Selecting Move stack, leaving the bottom piece of labware at the source position when the source position contains only one piece of labware results in an error.

- **Move the topmost... piece of labware from the stack** — moves only the specified number of labware from the top of the stack.

  NOTE Tip boxes must be lidded in the Labware Stacking ALP, so enter 2 to move the lid and the tip box. Once the tip box and lid are placed on the deck, use a **Move Labware** step to move either piece to another position (Figure 13.13).

Figure 13.13 Moving a tip box from the Labware Stacking ALP using the Stack/Unstack Labware step



1. Stack/Unstack Labware step — Use this step to move supported labware or stacks to and from the Labware Stacking ALP.
2. Move Labware step — After labware has been placed on the deck, use this step to move the lid, tip box, or other labware to other positions on the deck.
3. Entering 2 here moves the lid and tip box configured through the Instrument Setup step for placement in the Labware Stacking ALP.

Understanding the Stacking Rules for the Labware Stacking ALP

The following stacking rules must be followed when using the Labware Stacking ALP:

- Stack only supported labware on the Labware Stacking ALP (see Table 13.1)
- Tip boxes must always be placed as lidded in the ALP and can be delidded or relidded on the deck.
- The spacer must be placed at the bottom of the Labware Stacking ALP when a microplate is to be the bottom piece of labware in a stack.
- Lids may not be stacked on lids.
- Lidded plates may not be stacked on lidded plates.
- Stack offsets must be configured for stacks with mixed labware types, (refer to *Stacking Mixed Labware Types in the Labware Stacking ALP*).

NOTE Microplates and tip boxes may be stacked together in the Labware Stacking ALP; however, stack offsets must be configured.

Stacking Mixed Labware Types in the Labware Stacking ALP

To stack mixed labware types in the Labware Stacking ALP, the **Labware Type Editor** must be configured with the correct **Stack Offset Z** for the labware on which other types of labware will be stacked.

NOTE The **Stack Offset Z** is measured from the bottom, back-left corner on the lower piece of labware to the bottom, back-left corner on the upper labware above it (Figure 13.14).

To configure the correct **Stack Offset Z** in the **Labware Type Editor**:

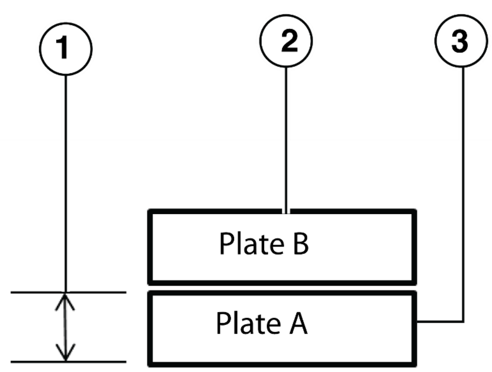
---

1 Choose **Instrument>Labware Type Editor**.

---

2 From the **Labware Type Editor**, double-click the lower labware piece in a stack (Plate A in Figure 13.14)

Figure 13.14 Stackable Items

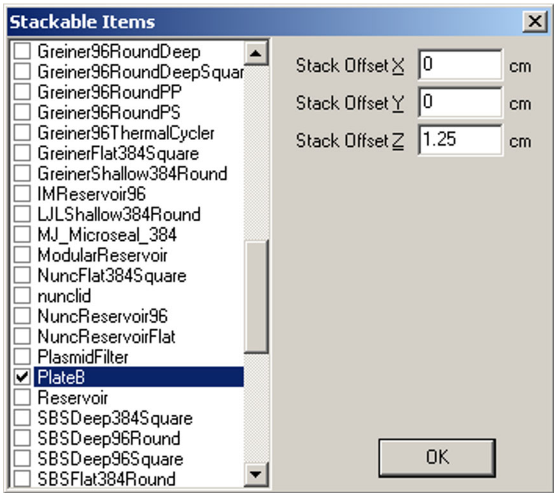


1. **Stack Offset Z**
2. Upper labware piece in a stack — With the upper labware checked in **Stackable Items**, enter the **Stack Offset Z.**
3. Lower labware piece in a stack — Labware being edited in **Stackable** Items.

---

3 From the labware, choose **Stacking>Stack Offsets>Edit**. **Stackable Items** appears (Figure 13.15).

Figure 13.15 Stackable Items



4 From the list of labware, check the upper labware in the stack (Plate B in the example in Figure 13.14) and enter the **Stack Offset Z** value (Figure 13.15).

NOTE The entered **Stack Offset Z** is measured from the bottom, back-left corner on the lower piece of labware to the bottom, back-left corner on the upper labware above it (Figure 13.14).

5 Choose **OK** to save the **Stack Offset Z** value.

CHAPTER 14

Magnetic Bead ALP

Overview

The Magnetic Bead ALP (Figure 14.1) is an active ALP that positions magnetic beads in microplates for pipetting operations. A magnet is engaged (moved closer to the microplate) and disengaged (moved away from the microplate) to position and release magnetic beads for re-suspension in a microplate. A clamping mechanism is provided to flatten microplates, such as thermocycler plates, for pipetting.

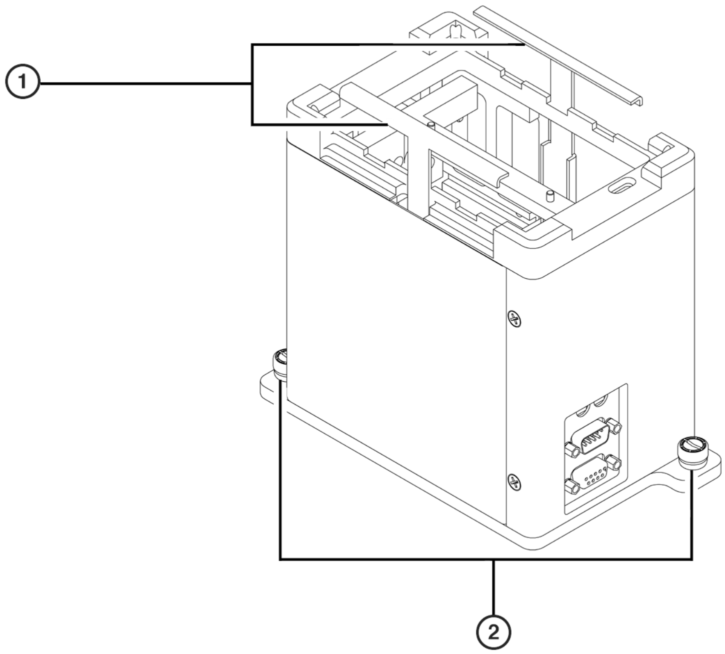
Microplates can be placed on the Magnetic Bead ALP by a lab technician or the Biomek gripper.

NOTE The Magnetic Bead ALP has one open-centered position. When using miniskirted labware or other labware in which the bottom of the wells is below the top surface of the ALP, per-labware offsets must be defined for the head(s) to access the bottom of these labware types (refer to Defining Per-Labware Offsets).

The sections in this chapter include:

- Installing the Magnetic Bead ALP
- Framing Instructions
- Using the Magnetic Bead ALP in a Method
- Controlling the Magnetic Bead ALP Outside a Method
- Removing the Magnetic Bead ALP
- Storage
- Preventive Maintenance
- Troubleshooting

Figure 14.1 Magnetic Bead ALP



1. **Clamps**
2. **Thumbscrews**

Installing the Magnetic Bead ALP

Installing the Magnetic Bead ALP includes:

- Choosing any standard deck position.

  NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

- Mounting the Magnetic Bead ALP to the Deck
- Using Interchangeable Magnets

Mounting the Magnetic Bead ALP to the Deck

To mount the Magnetic Bead ALP to the Biomek deck:

WARNING

Disconnect main power before connecting or disconnecting CAN cables.

1 Turn off power to the Biomek instrument before mounting any ALP.

2 Position the Magnetic Bead ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.

3 Fasten the Magnetic Bead ALP to the deck using the thumbscrews on the base of the ALP.

4 Plug the female end of the CAN communication cable into the male CAN Port on the Magnetic Bead ALP (Figure 14.2).

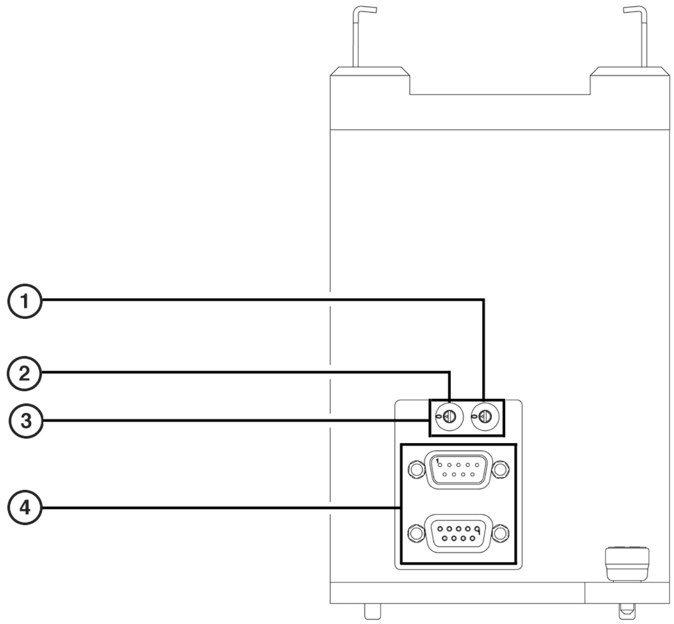
⚠ CAUTION

A maximum of one long CAN cable (1 meter [39.37 in.], Part Number 717781) can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

⚠ CAUTION

A maximum of one device can be chained to a Magnetic Bead ALP. If more than one device is chained to a Magnetic Bead ALP, the Biomek instrument may not be able to supply sufficient electrical current to operate all devices on the chain.

Figure 14.2 Magnetic Bead ALP CAN Connections



1. **ADR2**
2. **ADR1**
3. **Address Switches**
4. **CAN Ports**

NOTE When possible, short (0.56 meter; 22 in.) CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5 Plug the other end of the CAN communication cable into one of the following connectors:

NOTE Make sure the cable routing does not interfere with the operation of the Biomek FX.

- Any female connector labeled **CAN Port** on the main Biomek instrument.
- Any available female connector labeled **CAN Port** on another active ALP, creating a chain of connected devices.

  NOTE A chain links multiple devices together. The maximum number of devices that can be chained together with a Magnetic Bead ALP is two (including the Magnetic Bead ALP). Each chain of two devices must plug into the main Biomek instrument.

6 Verify that address switch **ADR1** is set between 0 and 7.

7 Verify that address switch **ADR2** is set between 0 and F.

Using Interchangeable Magnets

The Magnetic Bead ALP uses interchangeable magnets to draw magnetic beads to specific positions in a microplate. Interchangeable magnets make it possible to use different magnet types for different applications. Flat or post magnets designed for laboratory use may be used with the Magnetic Bead ALP.

The Magnetic Bead ALP supports the following magnets:

- 96-Well Post Magnet (Part Number 379511)
- 96-Well Flat Magnet (Part Number 379512)

Installing Magnets to the Magnetic Bead ALP

To install a magnet in the Magnetic Bead ALP:

---

1 In **Advanced Manual Control**, use the **Move Magnet** command to raise the magnet to a **Magnet Position** of **5** cm (refer to Controlling the Magnetic Bead ALP Outside a Method). The magnet raises to its highest position and a motion error appears (Figure 14.3).

Figure 14.3 Motion Error Resulting from Magnet Reaching Positive Limit

---

2 Choose **OK** to close the error message.

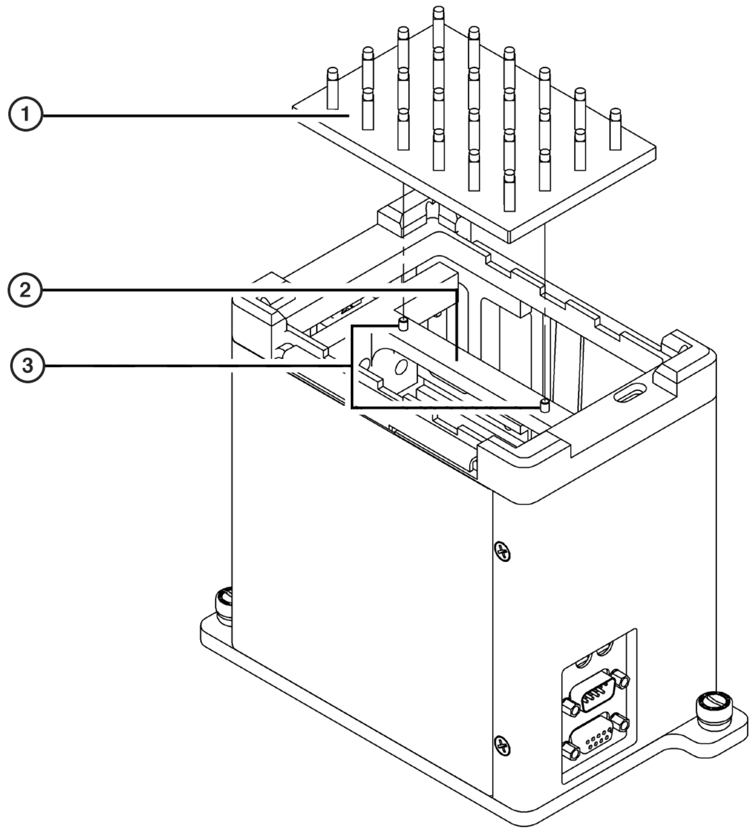
---

3 If another magnet is already installed, remove the magnet from the Magnetic Bead ALP (refer to Removing Magnets from the Magnetic Bead ALP).

---

4 Position the magnet such that the mounting holes on the bottom of the magnet slip over the dowels on the mounting plate (Figure 14.4).

Figure 14.4 Attaching Magnet to Mounting Plate



1. **Magnet**
2. **Mounting Plate**
3. **Dowels** — place the magnet on the mounting plate such that the mounting holes on the bottom of the magnet slip over the dowels on the mounting plate.

NOTE The magnet type configured in **Hardware Setup** must match the magnet type installed in the Magnetic Bead ALP. When changing magnet types, make sure appropriate changes are also made in **Hardware Setup** (refer to Installing and Configuring a Magnetic Bead ALP in Hardware Setup).

Removing Magnets from the Magnetic Bead ALP

To remove a magnet from the Magnetic Bead ALP:

1 In **Advanced Manual Control**, use the **Move Magnet** command to raise the magnet to a **Magnet Position** of **5** cm (refer to *Controlling the Magnetic Bead ALP Outside a Method*). The magnet moves to its highest position and a motion error appears (Figure 14.5).

Figure 14.5 Motion Error Resulting from Magnet Reaching Positive Limit

2 Choose **OK** to close the error message.

3 Lift the magnet in an upward motion to clear the mounting holes from the dowels on the mounting plate and remove the magnet from the ALP.

NOTE The magnet type configured in **Hardware Setup** must match the magnet type installed in the Magnetic Bead ALP. When changing magnet types, make sure appropriate changes are also made in **Hardware Setup** (refer to *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*).

Framing Instructions

Special instructions are necessary to frame the Magnetic Bead ALP.

To frame the Magnetic Bead ALP:

1 In **Advanced Manual Control**, use the **Disengage** command to move the magnet to its home position (refer to *Homing the Magnet*).

2 Frame the Magnetic Bead ALP according to the instructions in the manual for the Biomek instrument on which the ALP is installed.

Using the Magnetic Bead ALP in a Method

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING

Pinch Point! The clamps used to secure a microplate to the Magnetic Bead ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

It is important that deck and labware settings are configured appropriately in the **Deck Editor** (refer to *Configuring a Magnetic Bead ALP in the Deck Editor*) and **Labware Type Editor** (refer to *Configuring Labware Types for Use on the Magnetic Bead ALP*) prior to using the Magnetic Bead ALP in a method for obstacle avoidance and accurate pipetting.

Using the Magnetic Bead ALP in a method includes:

- *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*
- *Configuring a Magnetic Bead ALP in the Deck Editor*
- *Configuring Labware Types for Use on the Magnetic Bead ALP*
- *Configuring the Device Action Step for a Magnetic Bead ALP*

Installing and Configuring a Magnetic Bead ALP in Hardware Setup

After physically installing the Magnetic Bead ALP on the deck, the ALP is detected on the Biomek instrument and must be properly installed and configured in **Hardware Setup**.

Follow the instructions in CHAPTER 1, *Installing an ALP in Hardware Setup*, to install the Magnetic Bead ALP.

Follow the instructions in *Configuring a Magnetic Bead ALP in Hardware Setup*.

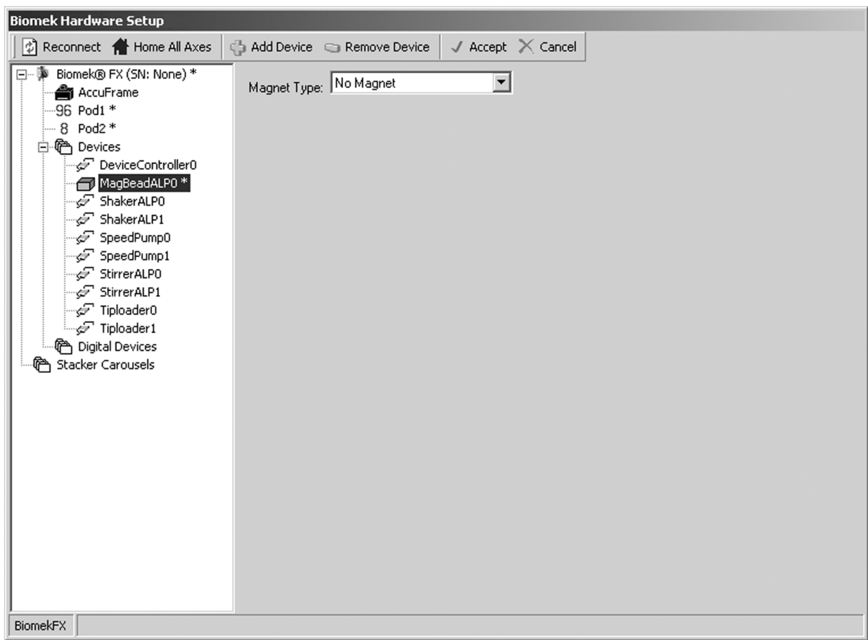
Configuring a Magnetic Bead ALP in Hardware Setup

The software needs to know the magnet type installed in the Magnetic Bead ALP to utilize the ALP in a method.

To configure the Magnetic Bead ALP:

1 Select the **MagBeadALP** from the list of **Devices** in the left pane of **Hardware Setup**. The configuration view for the Magnetic Bead ALP appears in the right pane (Figure 14.6).

Figure 14.6 Hardware Setup — Magnetic Bead ALP Configuration



2 Specify the **Magnet Type**. Options are:

- **96-Well Flat Magnet**
- **96-Well Post Magnet**
- **No Magnet**

3 Choose **Accept** to save changes and close **Hardware Setup**.

Configuring a Magnetic Bead ALP in the Deck Editor

Before the Magnetic Bead ALP can be used in a method, the software needs to know the location of the Magnetic Bead ALP on the deck. The software representation of the instrument deck is configured in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Adding a Magnetic Bead ALP to the Deck

A new Magnetic Bead ALP can be added to the deck in the appropriate locations using the **Deck Editor**. Deck positions are named automatically when a Magnetic Bead ALP is added to the deck.

To add a Magnetic Bead ALP to the deck, complete the following:

1. Select **Instrument > Deck Editor**. The **Deck Editor** appears.

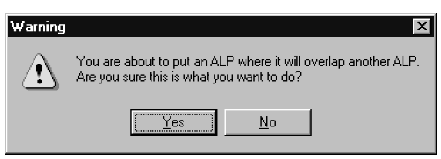
2. Click and hold the mouse button on the **MagBeadALP** in the **ALP Types List**. Notice that the locations capable of supporting the ALP are indicated by dashed boxes.

3. Drag and drop the **MagBeadALP** from the **ALP Types** list to the desired location on the **Deck View**. The ALP appears and deck positions are named automatically.

   NOTE Deck positions may be renamed (refer to *Setting Magnetic Bead ALP Position Properties*).

   NOTE If the **MagBeadALP** is about to be placed where another ALP is currently placed on the deck, the following warning appears (Figure 14.7). Delete the currently-placed ALP before placing the **MagBeadALP** on the deck (refer to the *Biomek Software User's Manual*, Chapter 6, *Deleting ALPs and Deck Positions from a Deck*).

   Figure 14.7 Warning Appears Because an ALP Is About To Be Placed Where it Overlaps Another ALP



Setting Magnetic Bead ALP Position Properties

After a Magnetic Bead ALP is placed on the deck, set the properties of the ALP and related deck position.

NOTE For a description of all the ALP and deck position properties, refer to the *Biomek Software User's Manual*, Chapter 6, *Setting ALP Properties and Deck Positions*.

Deck position properties include **Labware Offsets** that place the labware in the appropriate place for pipetting operations. Because the Magnetic Bead ALP is associated with a device, the **Device** association must be set for the Magnetic Bead ALP deck position.

To set deck position properties:

1 Select the position to modify on the **Deck View** of the **Deck Editor**.

2 Select 

from the **Deck Editor** toolbar.

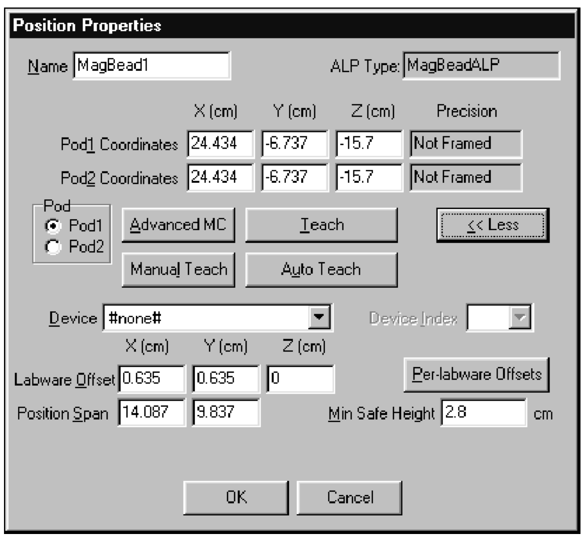
OR

Double-click on the deck position.

OR

Right-click on the desired position and select **Properties** from the menu. **Position Properties** appears (Figure 14.8).

Figure 14.8 Position Properties for Deck Positions



NOTE The deck position is highlighted on the **Deck View** with a pink line inside the ALP.

3 In **Name**, rename the deck position, if desired.

NOTE Names for deck positions must be alphanumeric with no spaces; the only non-alphanumeric character allowed is "_" (underscore). The first character must be a letter.

4 Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by teaching the ALP.

NOTE ALPs are taught indirectly when positions are taught.

- **FX** — If a position is accessible by both pods in a dual-pod system, each pod must be framed to the position.

5 Select More >> to display the device association and labware offset options.

6 In **Device**, choose the appropriate **MagBeadALP** to associate with the deck position.

7 If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to *Defining Per-Labware Offsets*).

8 Adjust the **Min Safe Height**, if necessary. The **Min Safe Height** is the height at which the pod(s) move when moving to or passing over the Magnetic Bead ALP, and is predefined at a height that avoids collisions between the clamp arms and the pod(s).

NOTE The **Labware Offsets** and **Position Span** are predefined in the software. Do not modify these properties.

9 Choose **OK** to save the deck position properties and return to the **Deck Editor**.

10 Choose **Save** to close the **Deck Editor**.

NOTE The deck must be framed (taught) using the framing tools after creating or modifying a deck.

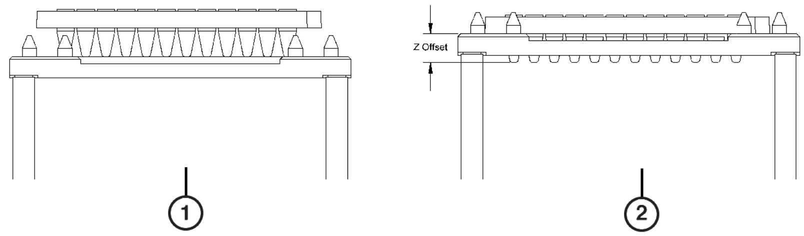
Defining Per-Labware Offsets

A **Per-Labware Offset** tells the software that the labware type is offset from the default labware position when placed on the ALP. Some labware types sit differently on a closed-centered ALP than on an open-centered ALP because the edge, or skirt, of the labware is above the bottom of the wells. Because these miniskirted labware types sit at different heights depending on which type of ALP (open- or closed-centered) they are placed on, the software must know which labware types are offset for a particular ALP position.

On a closed-centered ALP, miniskirted labware types sit on the wells, while on an open-centered ALP, the labware sits on the skirt and the wells extend below the top surface of the ALP (Figure 14.9). For example, when a **PlasmidFilter** is placed on a Magnetic Bead ALP (which is an open-centered ALP), the bottom of the labware is 2.25 centimeters below the top surface of the ALP because the skirt is 2.25 centimeters above the bottom of the wells. This labware type needs a Z offset of -2.25 cm for any open-centered ALP that it is placed on.

NOTE For these miniskirted labware types, it is important to properly define per-labware offsets for obstacle avoidance and accurate pipetting.

Figure 14.9 Miniskirted Labware on Closed- and Open-centered Deck Positions



1. **Closed-centered Deck Position**
2. **Open-centered Deck Position**

To set per-labware offsets for a deck position:

NOTE When creating or modifying a deck, all open-centered positions need to define per-labware offsets for any labware types that extend below the ALP surface.

1 Select **Instrument > Deck Editor**. **Deck Editor** appears.

2 Select the deck position to modify.

3 Select **Properties**

OR

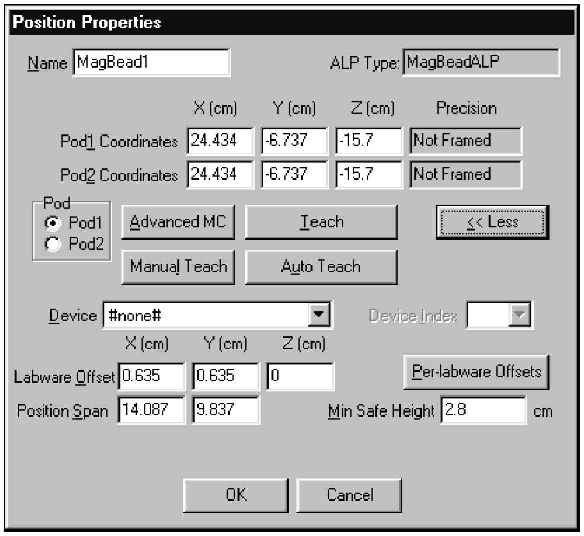
Double-click the deck position

OR

Right-click the desired position and select **Properties**. **Position Properties** appears.

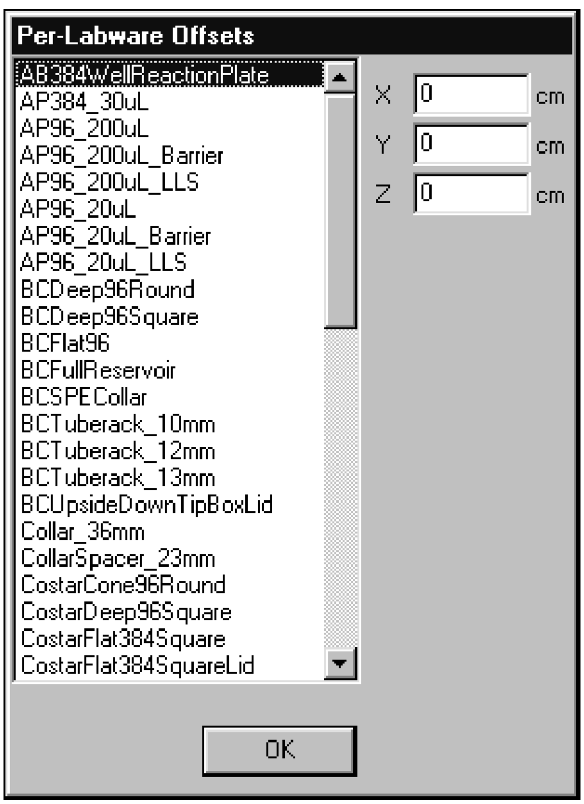
4 Choose **More** to expand **Position Properties**, if necessary (Figure 14.10).

Figure 14.10 Position Properties



5 Choose **Per-Labware Offsets. Per-Labware Offsets** appears (Figure 14.11).

Figure 14.11 Per-Labware Offsets



6 Select the labware type that is not flush with the top surface of the ALP when it is placed on it.

7 In **X**, enter the distance the left edge of the labware type is offset from the right side of the left-most locating cone when placed on the deck position.

NOTE The **X** offset is **0** if the labware type is positioned against the left-most locating cones.

8 In **Y**, enter the distance the back edge of the labware type is offset from the front of the back-most locating cone when placed on the deck position.

NOTE The **Y** offset is **0** if the labware type is positioned against the back-most locating cones.

9 In **Z**, enter the distance the bottom of the labware type is offset from the top of the ALP surface when placed on the deck position.

NOTE A negative **Z** offset indicates that the bottom of the labware is below the surface of the ALP.

NOTE While the offset values in steps 7, 8, and 9 may be calculated using calipers, a more precise measurement should be obtained from the manufacturer's drawings.

10 Repeat steps 6-9 for each labware type that requires per-labware offsets at the position.

11 Choose **OK** to save the offset values. **Position Propertie**s appears.

12 Choose **OK**. **Deck Editor** appears.

13 Repeat steps 2-12 for each position that requires per-labware offsets.

14 Choose **Save** to save per-labware offsets, along with any other changes made in the **Deck Editor**, and close the **Deck Editor.**

NOTE The per-labware offsets are not saved until the deck is saved with those per-labware offsets. Choosing **Cancel** loses all per-labware offsets, along with any other changes made in the **Deck Editor**, and closes the **Deck Editor**.

Configuring Labware Types for Use on the Magnetic Bead ALP

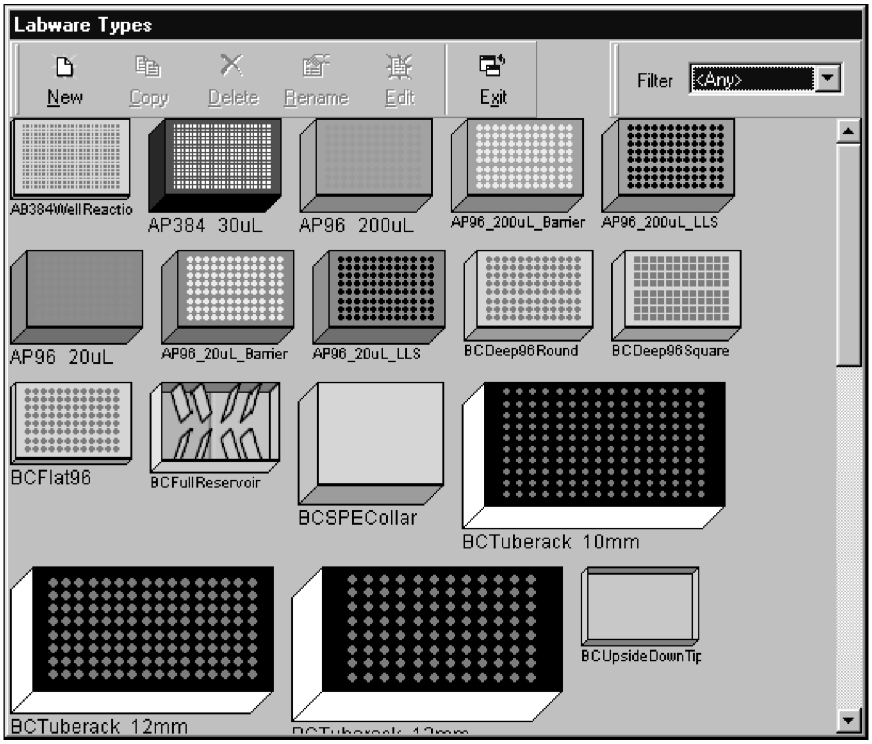
The Biomek Software needs some additional information about labware types used with the Magnetic Bead ALP. Use the **Labware Type Editor** to configure the magnet types compatible with a labware type, the magnet engage height, clamp settings, and labware sensing.

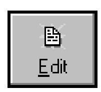
NOTE Refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*, for more information on creating and modifying labware types.

To configure Magnetic Bead ALP properties for a labware type:

1. Choose **Project > Labware Type Editor**. **Labware Types** appears. (Figure 14.12).

Figure 14.12 Labware Types



2. Select the desired labware type and choose 

from the toolbar.

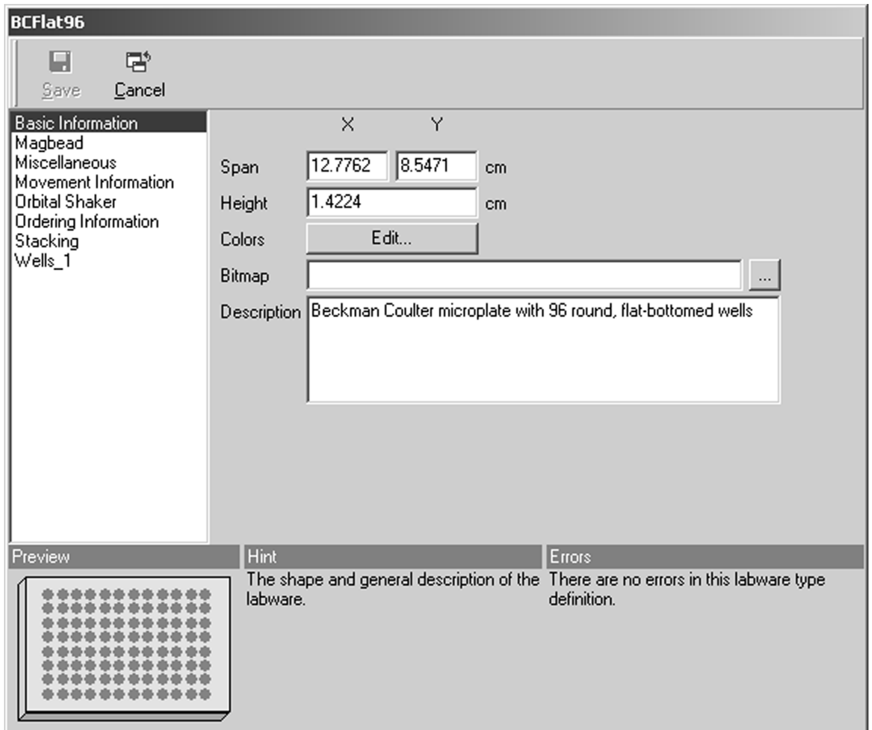
OR

Double-click the desired labware type.

OR

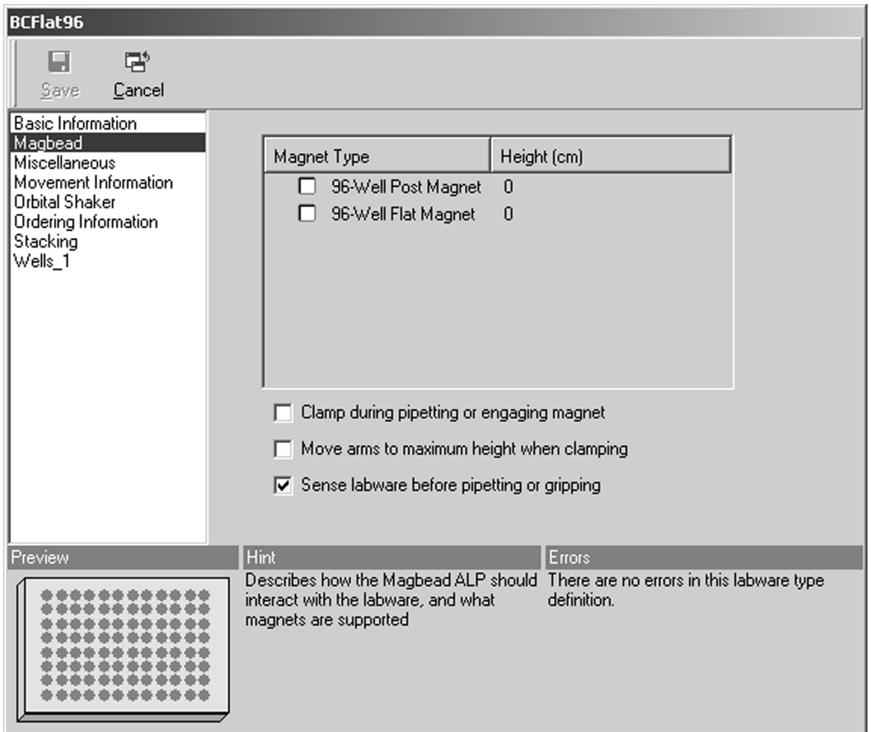
Right-click the desired labware type and choose **Edit** from the menu. **Basic Information** appears (Figure 14.13).

Figure 14.13 Basic Information for the Selected Labware Type



3 Choose **Magbead** in the left pane. The right pane changes to display the **Magbead** configuration information (Figure 14.14).

Figure 14.14 Magbead Configuration for the Selected Labware Type



4 **Magnet Type** lists all available magnet types. Select the magnet types that may be used with the selected labware type.

NOTE If a magnet type is not selected, the magnet cannot be engaged while the labware type is located on the Magnetic Bead ALP.

5 In **Height**, enter the distance in centimeters (cm) from the top of the ALP to which the top of the specified magnet raises to when engaged. This **Height** is used to configure how close the magnet gets to the bottom of the labware type when engaged.

NOTE Refer to *Determining Magnet Engage Height for Labware Types*, for instructions on determining the appropriate engage height.

NOTE For a value greater than zero, the top of the magnet raises above the top of the ALP. For a value less than zero, the top of the magnet is below the top of the ALP.

6 Select **Clamp during pipetting or engaging magnet** to clamp the labware during all pipetting operations or while the magnet is engaging.

NOTE **Clamp during pipetting or engaging magnet** is deselected by default.

7 Select **Move arms to maximum height when clamping** to allow the clamps to move to their maximum height before clamping labware.

NOTE **Move arms to maximum height when clamping** is deselected by default. If **Move arms to maximum height when clamping** is not selected, the clamps go to a specified height determined by the height of the labware type before clamping.

8 Select **Sense labware before pipetting or gripping** to detect the presence of labware on the Magnetic Bead ALP prior to performing pipetting operations on the selected labware type when on the Magnetic Bead ALP.

CAUTION

The Magnetic Bead ALP may be damaged if liquid is dispensed into an ALP that does not have labware positioned on it.

NOTE **Sense labware before pipetting or gripping** is selected by default.

9 Choose **Save**.

NOTE Three sections of hints are offered at the bottom of the edit option. The first section displays a graphic of the labware, the second section explains the selected field, and the third section explains any errors resulting from editing the labware properties. Place the cursor over the desired labware properties field and click to view these hints.

Understanding How the Magnetic Bead ALP Performs Automatically

When certain steps are used in a method that interact with the Magnetic Bead ALP, some magnet positioning and clamping operations are performed automatically:

- The magnet is disengaged and clamps are de-actuated whenever a gripper move is performed at the Magnetic Bead ALP.
- The clamps are actuated whenever a liquid transfer operation is performed at the Magnetic Bead ALP if **Clamp during pipetting or engaging magnet** is selected in the **Labware Type Editor** for the specified labware type.

  NOTE To access labware on the Magnetic Bead ALP without clamping it, deselect **Clamp during pipetting or engaging magnet** on the **MagBead** configuration in the **Labware Type Editor** for the desired labware type (refer to *Configuring Labware Types for Use on the Magnetic Bead ALP*).

NOTE A Magnetic Bead ALP must be configured in **Hardware Setup** (refer to *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*) and placed on the deck in the **Deck Editor** (refer to *Configuring a Magnetic Bead ALP in the Deck Editor*) prior to using the ALP in a method.

Configuring the Device Action Step for a Magnetic Bead ALP

The **Device Action** step is used to configure the actions of the Magnetic Bead ALP on the deck during a method, such as positioning the magnet, verifying the presence or absence of labware, or actuating the clamp.

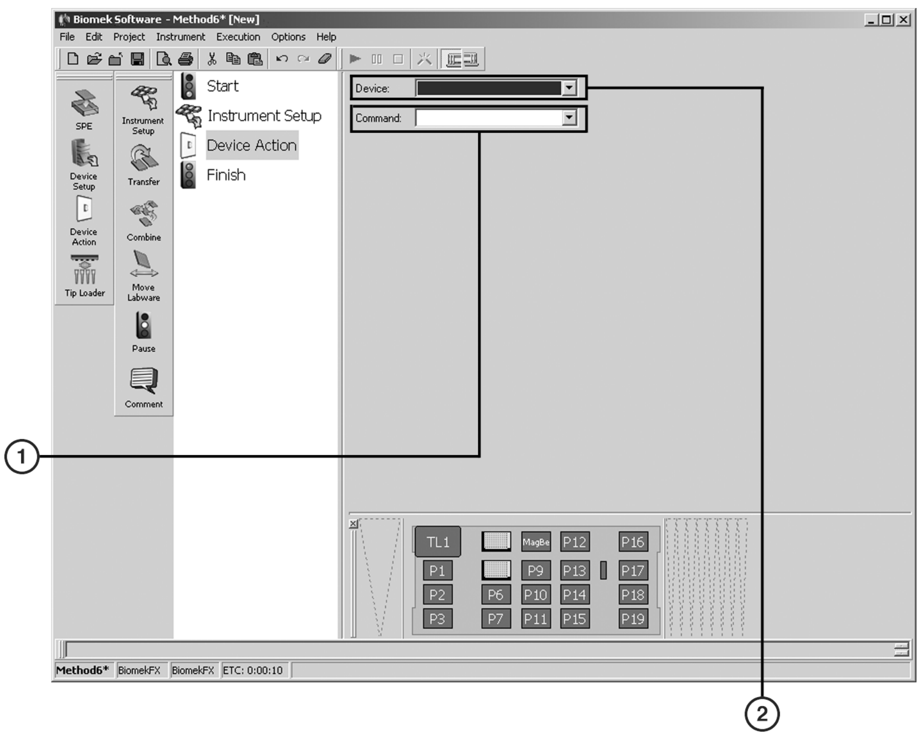
NOTE The magnet position remains in the engaged or disengaged state until another **Device Action** step engages or disengages the magnet.

Insert a 

step into the **Method View** (Figure 14.15).

NOTE The **Device Action** step is located on the **Devices** Step Palette. Refer to the *Biomek Software User's Manual*, Chapter 23, *Displaying the Devices Step Palette*, to display the **Devices** Step Palette.

Figure 14.15 Device Action Step and Configuration



1. **Command** — select the action for the device to execute here. Some commands require further configuration.
2. **Device** — select the device to control here.

To configure the **Device Action** step for a Magnetic Bead ALP:

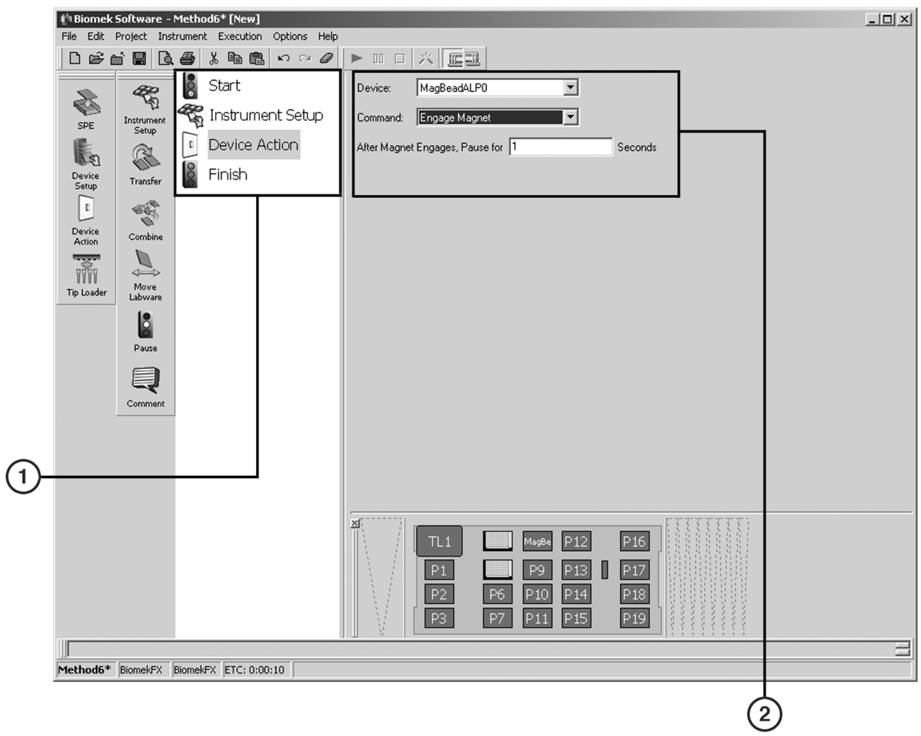
1 From **Device**, select the Magnetic Bead ALP performing the required operation.

OR

Click on the Magnetic Bead ALP on the Current Deck Display to select it. The configuration for the Magnetic Bead ALP appears (Figure 14.16).

NOTE When selected, the deck position has a blue border in the Current Deck Display.

Figure 14.16 Device Action Step for the Magnetic Bead ALP



1. **Method View** — the **Device Action** caption indicates the device and its command.
2. **Device Action Step Configuration** — the **Device Action** step configuration specifies an operation performed on the Magnetic Bead ALP.

2 In **Command**, indicate the desired action for the Magnetic Bead ALP:

- **Disengage** — lowers the magnet to its home position
- **Engage** — raises the magnet to the engage position specified in the **Labware Type Editor** for the labware and magnet type

  NOTE The **Engage** command automatically senses and clamps labware if specified in the **Labware Type Editor**. Refer to *Configuring Labware Types for Use on the Magnetic Bead ALP*, for more information.

- **Clamp** — actuates the clamp to hold the labware in place and flatten warped microplates

- **Unclamp** — releases the clamp to allow the labware to be removed from the ALP

  NOTE Clamping and unclamping of labware occurs automatically if **Clamp during pipetting or engaging magnet** is selected in the **Labware Type Editor** for the specified labware type (refer to *Configuring Labware Types for Use on the Magnetic Bead ALP*).

- **VerifyLabware** — verifies that labware is currently on the Magnetic Bead ALP; an error displays and the method stops if no labware is found
- **VerifyNoLabware** — verifies that there is currently no labware on the Magnetic Bead ALP; an error displays and the method stops if labware is found

NOTE The **Engage** command requires further configuration, as described below. Other commands do not require further configuration.

3 In **Pause After Magnet Engages**, enter the amount of time in seconds to pause to allow the magnetic beads to be drawn to the magnet before performing additional operations at the position.

NOTE **Pause After Magnet Engages** pauses only the position. Operations may still be performed at other deck positions while the Magnetic Bead ALP is paused.

Controlling the Magnetic Bead ALP Outside a Method

To control the Magnetic Bead ALP outside a method, use **Advanced Manual Control** for:

- *Homing the Magnet*
- *Engaging and Disengaging the Magnet*
- *Determining Magnet Engage Height for Labware Types*
- *Clamping or Unclamping Labware on a Magnetic Bead ALP*
- *Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type*

NOTE **Manual Control** is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the **Stop** or **Snap Continuation** button (refer to the *Biomek Software User's Manual*, Chapter 26, *Snapping a Continuation*) before accessing **Manual Control.**

Homing the Magnet

Homing the magnet gives the Biomek instrument a point of reference from which to make subsequent magnet moves. Home position for the magnet is fully disengaged to the lowest point in the magnet's travel.

The magnet automatically homes at the beginning and end of each method.

To home the magnet:

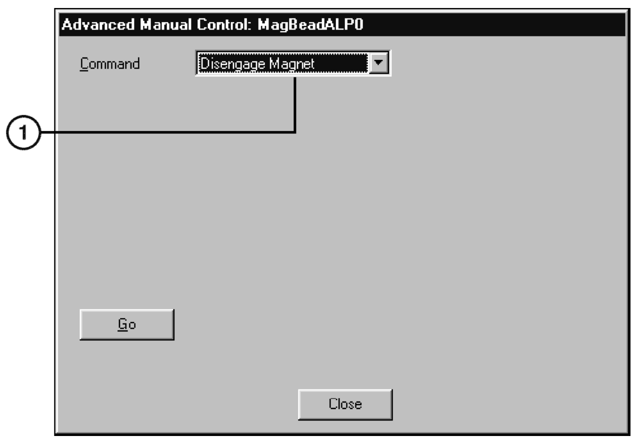
1 Choose **Instrument > Manual Control. Manual Control** appears.

2 Choose **Advanced Controls.** A list of all the installed pods and devices appears.

3 Select the desired **Magnetic Bead ALP. Advanced Manual Control** for the selected Magnetic Bead ALP appears.

4 From **Command**, choose **Disengage Magnet** (Figure 14.17).

Figure 14.17 Advanced Manual Control for a Magnetic Bead ALP with Disengage Magnet Selected



1. From **Command**, choose **Disengage Magnet.**

5 Choose **Go**. The magnet disengages to its lowest position.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Engaging and Disengaging the Magnet

Use **Advanced Manual Control** to engage (raise) the magnet to its highest position or disengage (lower) the magnet to its lowest position.

To engage the magnet:

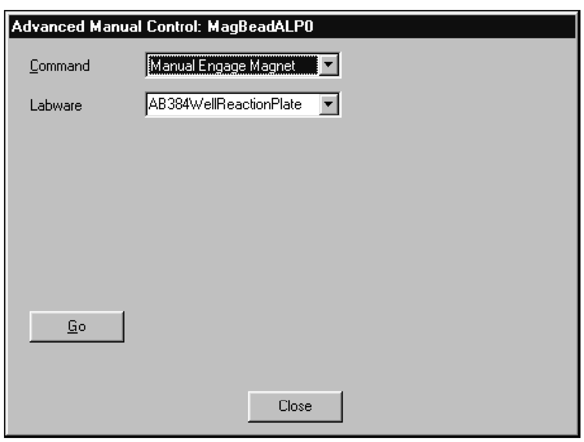
1. Choose **Instrument > Manual Control. Manual Control** appears.

2. Choose **Advanced Controls.** A list of all the installed pods and devices appears.

3. Select the desired **Magnetic Bead ALP. Advanced Manual Control** for the selected Magnetic Bead ALP appears.

4. From **Command**, choose **Manual Engage Magnet** (Figure 14.18).

   Figure 14.18 Advanced Manual Control for a Magnetic Bead ALP with Manual Engage Magnet Selected



5. In **Labware**, select the labware type of the labware positioned on the Magnetic Bead ALP.

   NOTE By default, the labware type listed first alphabetically is the selected **Labware**.

6. Choose **Go.** The magnet engages to the height specified in the **Labware Type Editor** for the selected **Labware** type.

7. Choose **Close** to close **Advanced Manual Control.**

8. Choose **Exit** to close **Manual Control.**

To disengage the magnet:

1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls.** A list of all the installed pods and devices appears.

3 Select the desired **Magnetic Bead ALP**. **Advanced Manual Control** for the selected Magnetic Bead ALP appears.

4 From **Command**, choose **Disengage Magnet.**

5 Choose **Go**. The magnet disengages to its lowest position.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Determining Magnet Engage Height for Labware Types

Different labware types sit differently in the Magnetic Bead ALP. Some labware may have wells that descend below the top surface of the ALP. Different applications may also require a different proximity between the magnet and the labware. For these reasons, it is necessary to specify the magnet engage height for each labware type that is used with the Magnetic Bead ALP.

To determine the desired engage height for a specific labware type:

1 Place the desired labware type on the Magnetic Bead ALP.

2 Choose **Instrument > Manual Control**. **Manual Control** appears.

3 Choose **Advanced Controls.** A list of all the installed pods and devices appears.

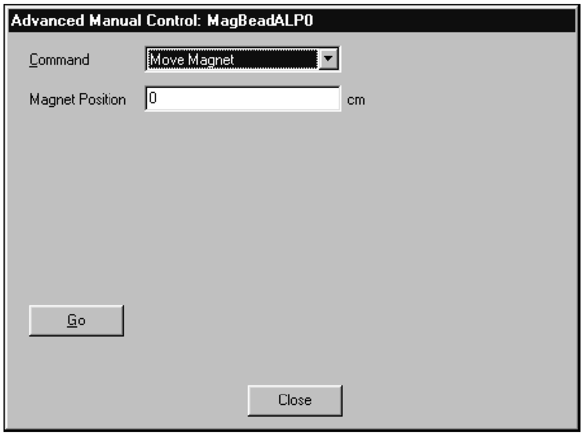
4 Select the desired **Magnetic Bead ALP**. **Advanced Manual Control** for the selected Magnetic Bead ALP appears.

5 From **Command**, choose **Disengage Magnet** to home the magnet.

6 Choose **Go**. The magnet disengages to its lowest position.

7 From **Command**, choose **Move Magnet** (Figure 14.19).

Figure 14.19 Advanced Manual Control for a Magnetic Bead ALP with Move Magnet Selected



8 In **Magnet Position**, enter the desired position for the magnet in centimeters. The magnet moves to a position the specified distance from the top of the Magnetic Bead ALP.

NOTE A magnet position of 0 cm aligns the top of the magnet with the surface of the Magnetic Bead ALP. To move the magnet to a position above the surface of the ALP, enter the value as a positive number; to move the magnet to a position below the surface of the ALP, enter the value as a negative number.

9 Choose **Go**. The magnet moves to the specified position.

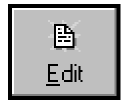
10 Repeat steps 6 and 7 as needed until the magnet is in the desired engaged position.

11 Record the **Magnet Position** once the magnet is in the desired engage position.

12 Choose **Close** to close **Advanced Manual Control**.

13 Choose **Exit** to close **Manual Control**.

14 Choose **Project > Labware Type Editor**. **Labware Types** appears (Figure 14.12).

15 Select the desired labware type and choose  from the toolbar.

OR

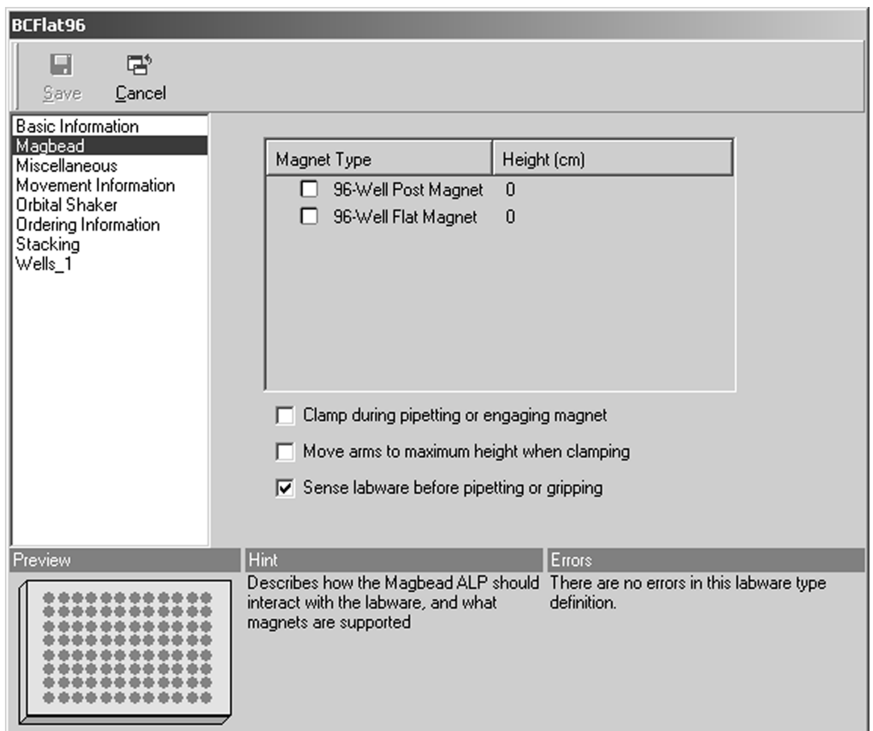
Double-click the desired labware type.

OR

Right-click the desired labware type and choose **Edit** from the menu. **Basic Information** appears.

16 Choose **Magbead** (Figure 14.20).

Figure 14.20 Magbead Configuration for the Selected Labware Type



17 **Magnet Type** lists all available magnet types. Select the magnet types that may be used with the selected labware type.

NOTE If a magnet type is not selected, the magnet cannot be engaged or disengaged while the labware type is located on the Magnetic Bead ALP.

18 In **Height**, enter the **Magnet Position** recorded in step 9. This is the distance in centimeters (cm) between the top of the ALP and the top of the magnet when the magnet is fully engaged.

NOTE If the desired engage position of the magnet is above the top of the ALP, enter the value as a positive number; if the desired engage position of the magnet is below the top of the ALP, enter the value as a negative number.

19 Choose **Save**.

NOTE Refer to *Configuring Labware Types for Use on the Magnetic Bead ALP*, for more labware configuration options.

Clamping or Unclamping Labware on a Magnetic Bead ALP

To clamp labware on a Magnetic Bead ALP:

1 Choose **Instrument > Manual Control. Manual Control** appears.

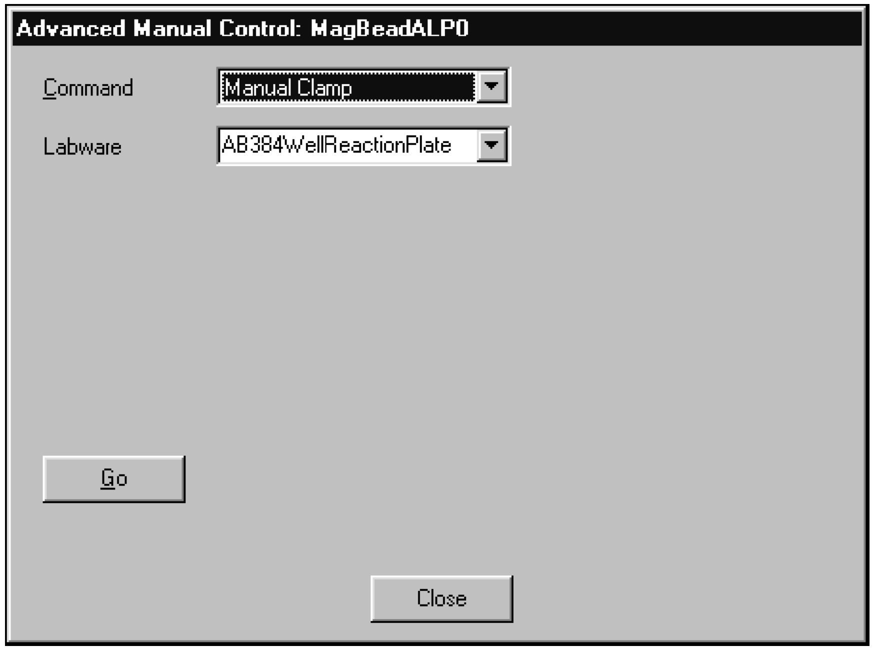
2 Choose 

. A list of all the installed pods and devices appears.

3 Select the desired **Magnetic Bead ALP**. **Advanced Manual Control** for the selected Magnetic Bead ALP appears.

4 From **Command**, choose **Manual Clamp** (Figure 14.21).

Figure 14.21 Advanced Manual Control for a Magnetic Bead ALP with Manual Clamp Selected



5 In **Labware**, specify the labware type to clamp on the Magnetic Bead ALP.

CAUTION

Make sure the labware on the Magnetic Bead ALP matches the labware type specified. The clamps raise to a height set for the labware type before clamping and incorrect settings may result in inaccurate clamping.

6 Choose **Go**. The Magnetic Bead ALP clamps the selected labware.

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

To unclamp labware from a Magnetic Bead ALP:

1 Choose **Instrument** > **Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**. A list of all the installed pods and devices appears.

3. Select the desired **Magnetic Bead ALP**. **Advanced Manual Control** for the selected Magnetic Bead ALP appears.

4. From **Command**, choose **Unclamp.**

5. Choose **Go.**

6. Choose **Close** to close **Advanced Manual Control.**

7. Choose **Exit** to close **Manual Control.**

Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type

The sensor on the Magnetic Bead ALP detects all of the default microplates and lids installed with the Biomek Software. However, some other microplate designs may not be recognized by the sensor.

To verify if the sensor on the Magnetic Bead ALP recognizes a specific labware type:

1. Place the desired labware type on the Magnetic Bead ALP.

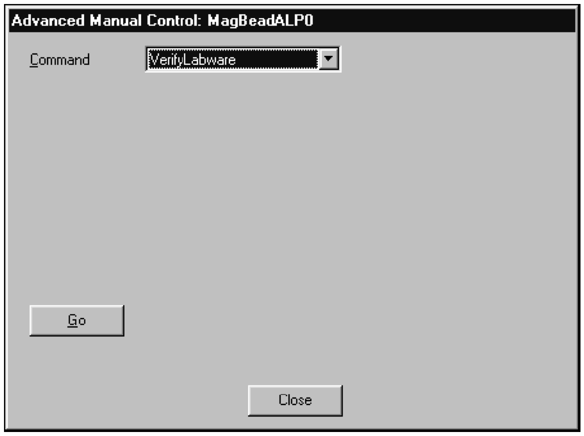
2. Choose **Instrument > Manual Control. Manual Control** appears.

3. Choose **Advanced Controls.** A list of all the installed pods and devices appears.

4. Select the desired **Magnetic Bead ALP**. **Advanced Manual Control** for the selected Magnetic Bead ALP appears.

5. From **Command**, choose **VerifyLabware** (Figure 14.22).

Figure 14.22 Advanced Manual Control for a Magnetic Bead ALP with Verify Labware Selected



6 Choose **Go**. The Magnetic Bead ALP recognizes the piece of labware unless an **Error** appears (Figure 14.23).

NOTE If the following **Error** (Figure 14.23) appears, the sensor does not recognize the labware present on the Magnetic Bead ALP; the sensor is not operating properly or the ALP does not recognize the labware type.

NOTE Contact a Beckman Coulter Service Engineer if several labware types are not recognized; the sensor on the Magnetic Bead ALP may not be operating properly, or may need to be cleaned using a cotton swab with an alcohol solution.

Figure 14.23 Error Indicating Labware Not Found at Sensor

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

NOTE If a labware type is not recognized by the sensor, deselect **Always Sense Labware** in the **Labware Type Editor** for the desired labware type. However, the Magnetic Bead ALP could be damaged if liquid is dispensed into an ALP that does not have labware positioned on it.

Removing the Magnetic Bead ALP

To remove the Magnetic Bead ALP from the deck:

WARNING

Disconnect main power before connecting or disconnecting CAN cables.

1. Turn off power to the Biomek instrument before removing any ALP.
2. Unplug the CAN communication cable(s) from the CAN Port(s) on the Magnetic Bead ALP.
3. Loosen the thumbscrews on the base of the Magnetic Bead ALP.
4. Lift the unit in an upward motion to clear the locating pins from the locating holes on the deck.

Storage

To prepare the Magnetic Bead ALP for storage:

1. Remove the installed magnet from the Magnetic Bead ALP (refer to *Removing Magnets from the Magnetic Bead ALP*).
2. Disengage the magnet mounting plate to its lowest position (refer to *Engaging and Disengaging the Magnet*).
3. Remove the Magnetic Bead ALP from the deck (refer to *Removing the Magnetic Bead ALP*).
4. Return the Magnetic Bead ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Magnetic Bead ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 14.1 Troubleshooting the Magnetic Bead ALP

If...	Then...
The magnet does not engage or disengage.	Make sure the labware type is defined properly in the **Labware Type Editor.** Make sure a good power connection has been established.
The magnet stalls or does not move properly.	Using **Advanced Manual Control**, home the magnet (refer to *Homing the Magnet*).
The magnet is not drawing beads to the desired position.	Make sure the labware type on the Magnetic Bead ALP is properly identified in **Instrument Setup**. Adjust the magnet engage height for the labware in the **Labware Type Editor** (refer to *Setting Magnetic Bead ALP Position Properties*).
The clamps are not grasping the labware.	Make sure the labware type is defined properly in the **Labware Type Editor** (refer to *Setting Magnetic Bead ALP Position Properties*).
The sensors are not functioning properly.	Verify the sensors recognize the labware type (refer to *Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type*).

CHAPTER 15
Microplate Shaking ALP

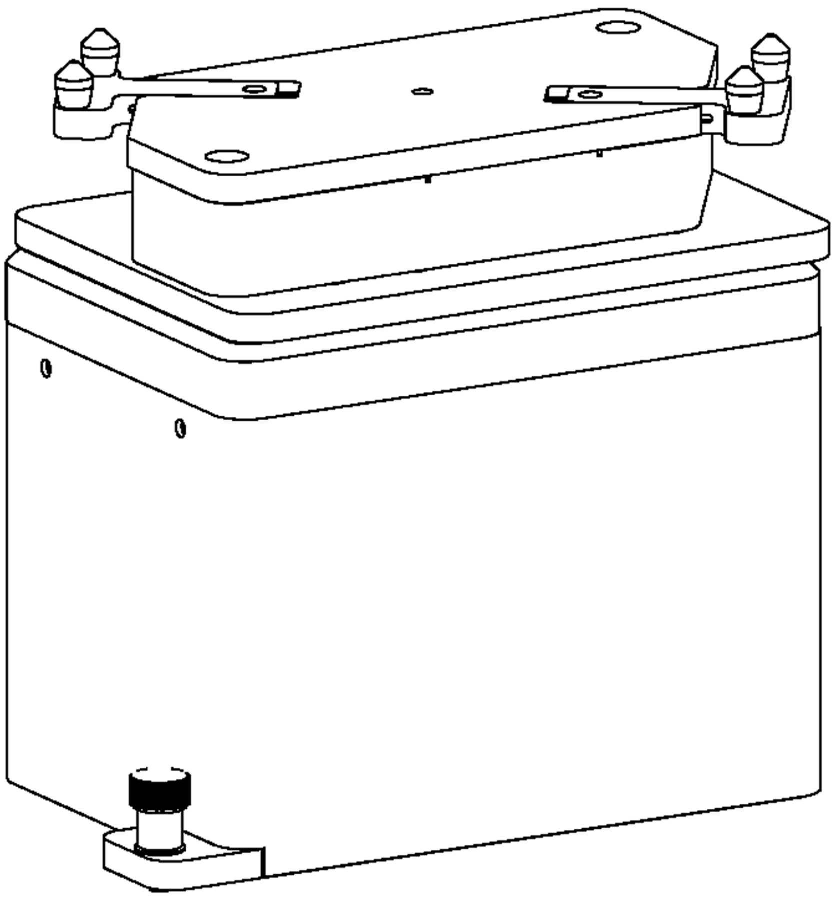
Overview

The Microplate Shaking ALP is an active ALP designed to mix solutions in microplates using a linear shaking motion (Figure 15.1).

The sections in this chapter include:

- *Installing the Microplate Shaking ALP*
- *Framing Instructions*
- *Using the Microplate Shaking ALP in a Method*
- *Controlling the Microplate Shaking ALP Outside a Method*
- *Removing the Microplate Shaking ALP*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 15.1 Microplate Shaking ALP



Installing the Microplate Shaking ALP

Installing the Microplate Shaking ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

NOTE Use Biomek Software **Deck Editor** to determine available deck positions when mounting the ALP on a Biomek instrument.

Mounting the Microplate Shaking ALP to the Deck

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ WARNING

Disconnect main power before connecting or disconnecting CAN cables.

To mount the Microplate Shaking ALP:

1 Turn off power to the Biomek instrument before mounting any active ALP.

2 Position the Microplate Shaking ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.

3 Using the thumbscrews on the base of the ALP, attach the ALP to the deck.

4 Attach the CAN communications cable to the CAN communications port.

⚠ CAUTION

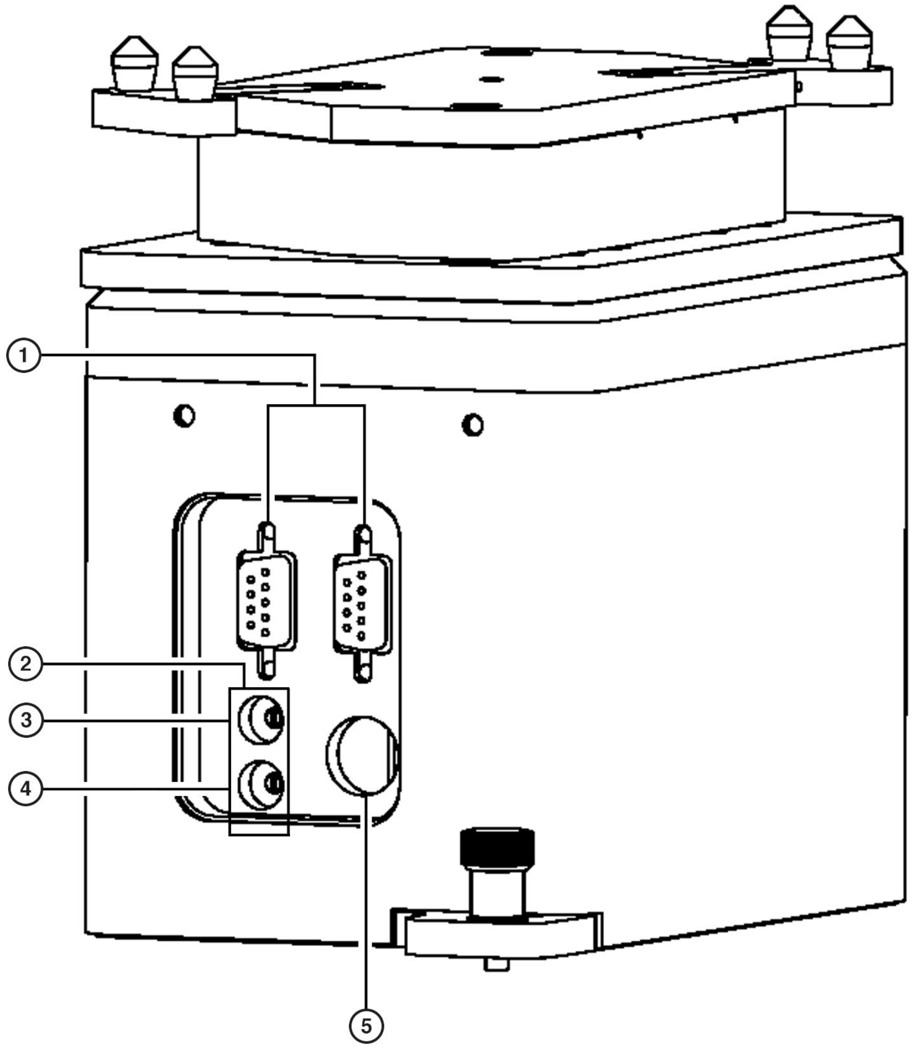
A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

NOTE When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5 Plug one end of the CAN communication cable into either of the two connectors labeled "CAN Port" on the Microplate Shaking ALP (Figure 15.2).

NOTE Make sure the cable routing does not interfere with the operation of the Biomek instrument.

Figure 15.2 Microplate Shaking ALP Connections



1. **CAN Connections**
2. **Address Switches**
3. **ADR1**
4. **ADR2**
5. **Air Connection**

6 Attach air tubing from a 40 psi port on the outside of the left or right tower to the air inlet on the Microplate Shaking ALP (Figure 15.2).

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument.

7 Turn on the corresponding air valve.

8 Verify the ADR1 address switch is set to 1 (Figure 15.2).

9 Set ADR2 to a unique address between zero (0) and F, if multiple Microplate Shaking ALPs are on the deck (Figure 15.2).

NOTE ADR2 is set to a default address of zero (0). If only one Microplate Shaking ALP is on the deck, ADR2 is the default setting.

Framing Instructions

Frame the Microplate Shaking ALP according to the instructions in the specific manual for the Biomek instrument

Using the Microplate Shaking ALP in a Method

To use the Microplate Shaking ALP in a method, it must be installed in **Hardware Setup** (refer to CHAPTER 1, *Installing and Configuring ALPs*).

NOTE Configuration in **Hardware Setup** is not necessary for the ALP.

The Microplate Shaking ALP is controlled and operated through the **Device Action** step in Biomek Software (refer to the *Biomek Software User's Manual*, Chapter 23, *Configuring the Device Action Step for the Microplate Shaking ALP (FX, NX only)*). The speed, shaking time, and ramp time are all configured through the **Device Action** step for use in a method.

⚠ CAUTION

Set the shaking speed at the lowest setting and increase slowly to the desired setting. This helps prevent spills or splashing.

Controlling the Microplate Shaking ALP Outside a Method

Use **Advanced Manual Control** for:

- *Turning On the Microplate Shaking ALP Outside a Method*
- *Timing a Shaking Operation Outside a Method*
- *Turning Off the Microplate Shaking ALP Outside a Method*
- *Clamping or Unclamping a Plate Outside a Method*

Turning On the Microplate Shaking ALP Outside a Method

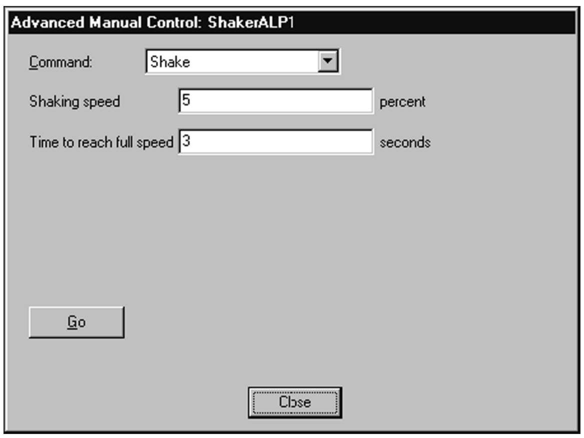
To turn on a Microplate Shaking ALP:

1. Choose **Instrument > Manual Control. Manual Control** appears.

2. Choose **Advanced Controls.**

3. Select the desired **Shake ALP. Advanced Manual Control** for the selected Microplate Shaking ALP appears (Figure 15.3).

   Figure 15.3 Advanced Manual Control for a Selected Microplate Shaking ALP

4. From **Command,** choose **Shake.**

5. Enter a percentage in **Shaking speed.**

   NOTE The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6. Enter a time in seconds in **Time to reach full speed.**

7. Choose **Go.**

8. Choose **Close** to close **Advanced Manual Control**

9. Choose **Exit** to close **Manual Control.**

Timing a Shaking Operation Outside a Method

To time a shaking operation:

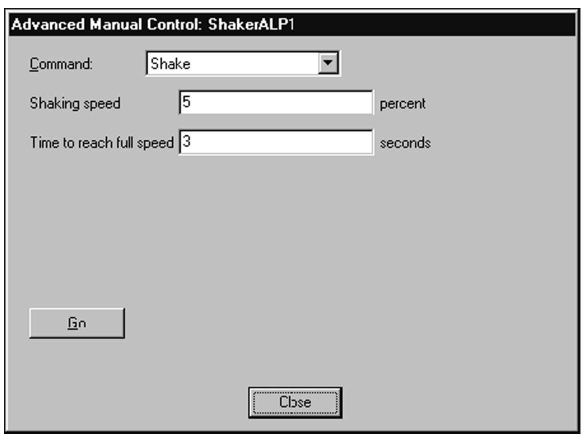
1 Choose **Instrument > Manual Control. Manual Control** appears.

2 Choose **Advanced Controls.**

3 Select the desired **Shaker ALP. Advanced Manual Control** for the selected Microplate Shaking ALP appears (Figure 15.3).

4 From **Command**, choose **Timed Shake. Advanced Manual Control** for the Microplate Shaking ALP with Timed Shake appears (Figure 15.4).

Figure 15.4 Advanced Manual Control for a Microplate Shaking ALP with Timed Shake Choices



5 Enter a percentage in **Shaking speed.**

NOTE The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6 Enter a time in seconds in **Time to reach full speed.**

7 Enter a time in seconds in **Time to shake.**

8 Choose **Go.**

9 Choose **Close** to close **Advanced Manual Control.**

10 Choose **Exit** to close **Manual Control**.

Turning Off the Microplate Shaking ALP Outside a Method

To turn off the Microplate Shaking ALP:

1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Shaker ALP**. **Advanced Manual Control** for the selected Microplate Shaking ALP appears (Figure 15.3).

4 From **Command,** choose **Off**.

5 Choose **Go**.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Clamping or Unclamping a Plate Outside a Method

To clamp or unclamp a plate on the Microplate Shaking ALP:

1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Shaker ALP**. **Advanced Manual Control** for the selected Microplate Shaking ALP appears (Figure 15.3).

4 From **Command**, choose **Clamp** to activate the clamp on the Microplate Shaking ALP.

OR

From **Command**, choose **Unclamp** to deactivate the clamp on the Microplate Shaking ALP.

5 Choose **Go**.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Removing the Microplate Shaking ALP

To remove the Microplate Shaking ALP:

1 Turn off power to the Biomek instrument before removing any active ALP.

2 Detach power/communication connection.

3 Shut off manual air valve on the tower.

4 Detach air tubing.

5 Loosen the thumbscrews on the base of the ALP.

6 Lift ALP straight up to clear the locating pins on the base of the ALP from the locating holes on the deck.

Storage

Return the Microplate Shaking ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Microplate Shaking ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Clean up all spills immediately with a soft cloth, dampened with appropriate cleaning compound.

Troubleshooting

Do not remove covers for any reason. Do not attempt to repair the Microplate Shaking ALP without first contacting a Beckman Coulter Service Engineer.

Table 15.1 Troubleshooting the Microplate Shaking ALP

If....	The...
The Microplate Shaking ALP is not functioning.	Make sure a good power connection has been established.
The clamps are not grasping the labware.	Make sure a good air connection has been established.

CHAPTER 16

Multichannel Disposal ALP

Overview

The Multichannel Disposal ALP is a passive ALP that provides a means to dispose of tips during a method. When the slide is attached, it can be used to dispose of tips, tip boxes, and labware during a method.

This ALP is used by the Multichannel Pod in one of two ways:

- Multichannel Disposal ALP without Slide — The disposed tips are placed in a waste receptacle positioned inside the Disposal ALP base.

  OR

- Multichannel Disposal ALP with Slide — A slide that extends beyond the edge of the Biomek deck is inserted into the ALP. Tips, tip boxes, and labware placed inside the ALP slide down into a receptacle placed below.

NOTE The Multichannel Disposal ALP is shipped so that either of the two options above can be assembled and used.

The sections in this chapter include:

- *Installing the Multichannel Disposal ALP without Slide*
- *Installing a Multichannel Disposal ALP with Slide*
- *Installing Protective Shield Blanking Plate*
- *Framing Instructions*
- *Removing a Multichannel Disposal ALP without Slide*
- *Removing a Multichannel Disposal ALP with Slide*
- *Storage*
- *Preventive Maintenance*

Multichannel Disposal ALP without Slide

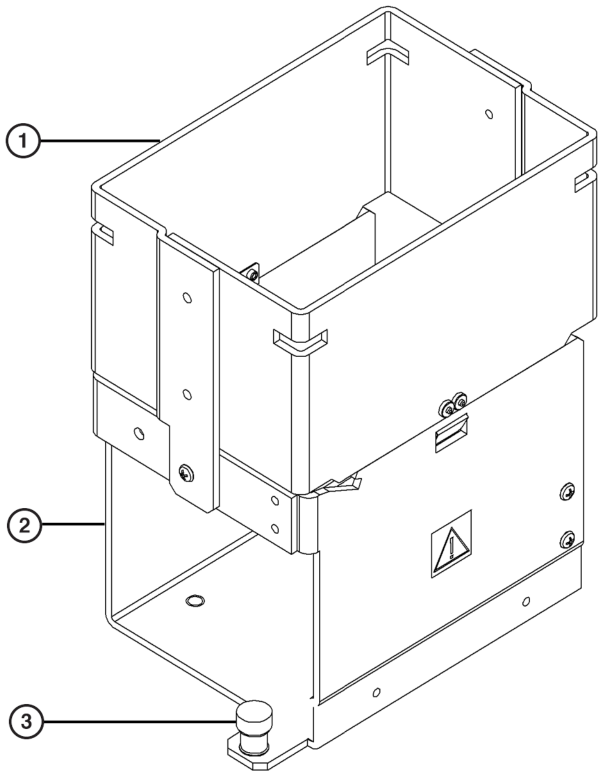
⚠ WARNING

When using the self-contained Multichannel Disposal ALP without the slide, do not overfill the disposal bag. Tips can spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Multichannel Disposal ALP is used as a self-contained waste receptacle without the slide, the bagging extension is attached, and a waste bag is mounted inside the ALP (Figure 16.1). The ALP is used in a standard deck position on the back row of the deck and is particularly effective when lab space is at a premium.

NOTE The Multichannel Disposal ALP without Slide is used only for collecting shucked tips.

Figure 16.1 Multichannel Disposal ALP without Slide



1. **Bagging Extension** — used for multichannel disposal ALP without slide.
2. **ALP Base**
3. **Thumbscrew**

Multichannel Disposal ALP with Slide

The Multichannel Disposal ALP with Slide (Figure 16.2) is positioned on the deck in one of the two center positions in the outside columns, and extends off the edge of the deck. The slide is directed through the gap between the deck and light curtain (or side safety shield). A trash receptacle is placed on the floor at the end of the slide to catch the waste. The Multichannel Disposal ALP with Slide allows the discard of as many used items as the trash receptacle is capable of holding.

The gripper can drop most types of used labware and tips directly into the Multichannel Disposal ALP with Slide.

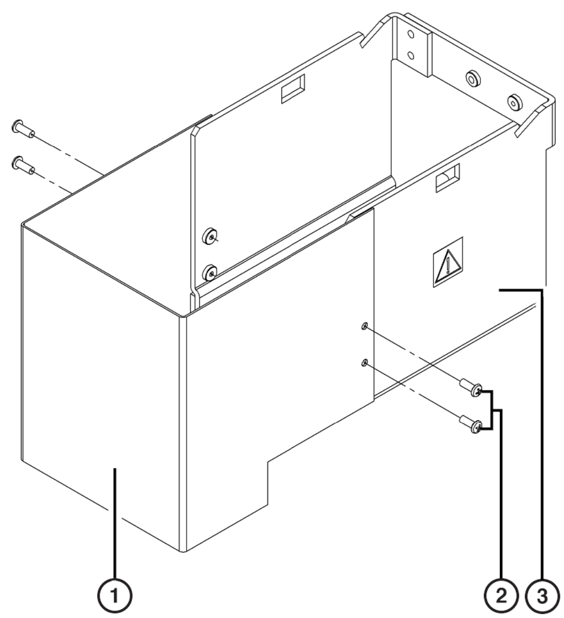
NOTE Separate Multichannel Disposal ALPs with Slides must be used for disposing of tips and labware. Used tips may stick to the slide, which could cause labware to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

NOTE Since the slide of a Multichannel Disposal ALP extends beyond the edge of the Biomek deck, the deck must be modified to accommodate the slide. Refer to *Installing Protective Shield Blanking Plate*, for more information on modifying the deck to accommodate a Multichannel Disposal ALP with Slide.

CAUTION

When using the Multichannel Disposal ALP with Slide, remove the bagging extension to avoid collisions between the pod and the Multichannel Disposal ALP.

Figure 16.2 Multichannel Disposal ALP with Slide



1. **Multichannel Disposal Chute**
2. **Multichannel Disposal Chute Mounting Screws**
3. **Disposal ALP Base**

Installing the Multichannel Disposal ALP without Slide

Installing the Multichannel Disposal ALP without Slide includes choosing a deck position and mounting the ALP to the deck

Choosing a Deck Position for the Multichannel Disposal ALP without Slide

⚠ **CAUTION**

The self-contained Multichannel Disposal ALP without Slide must be mounted on the back row of the Biomek deck to avoid collisions.

⚠ **CAUTION**

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Multichannel Disposal ALP without Slide can be placed in five separate positions along the back of the Biomek deck.

When adding a Multichannel Disposal ALP without Slide to the Biomek deck, the ALP must be associated with that deck position in the **Deck Editor**. To associate the Multichannel Disposal ALP without Slide with a deck position in the **Deck Editor**, drag and drop **TipTrash** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck.*

Mounting a Multichannel Disposal ALP without Slide

To mount a Multichannel Disposal ALP without Slide:

1 Remove the slide and chute from the Multichannel Disposal ALP. (Refer to *Removing a Multichannel Disposal ALP with Slide*, and Figure 16.3 for specific instructions and diagrams.)

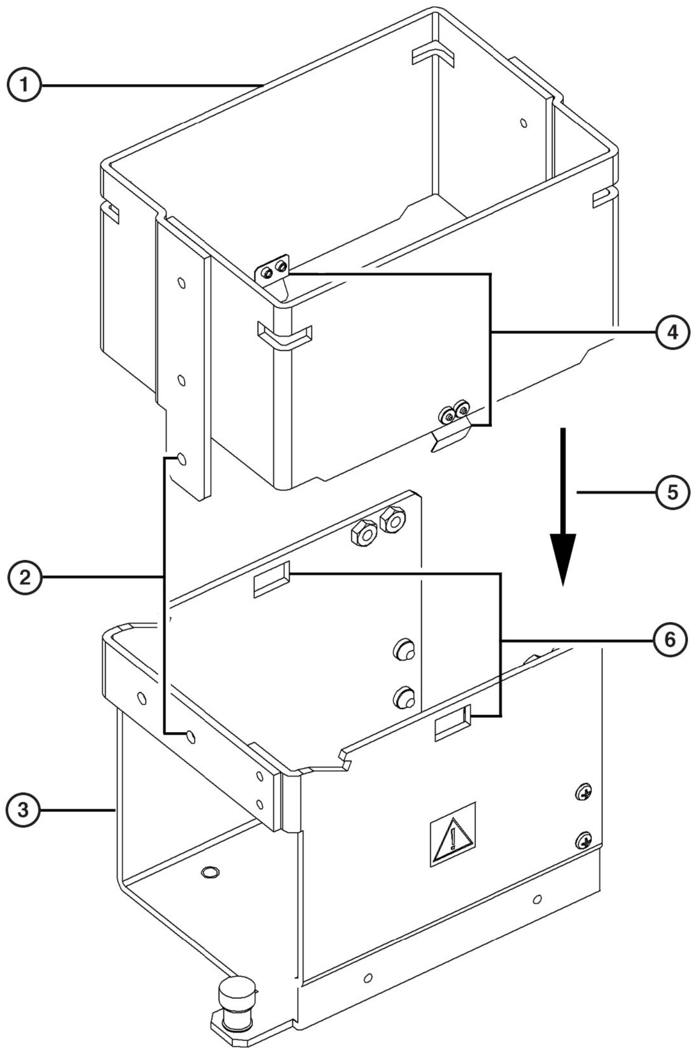
2 Snap the bagging extension onto the Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 16.3).

⚠ **CAUTION**

Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

3 Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Disposal ALP base and lock into the cutouts (Figure 16.3).

Figure 16.3 Multichannel Disposal ALP without Slide - Exploded



1. **Bagging Extension**
2. **Grounding Tab and Screw** — the screw is inserted through the tab and into the base at this location.
3. **Disposal ALP Base**
4. **Springs** — second spring is on the opposite side of the bagging extension.
5. Adding Bagging Extension to Disposal ALP Base — apply downward force to snap the springs into the cutouts, and to align the grounding tab so that the grounding screw can be inserted.
6. **Cutout for Springs** — the springs must snap through to the inside surface of the base.

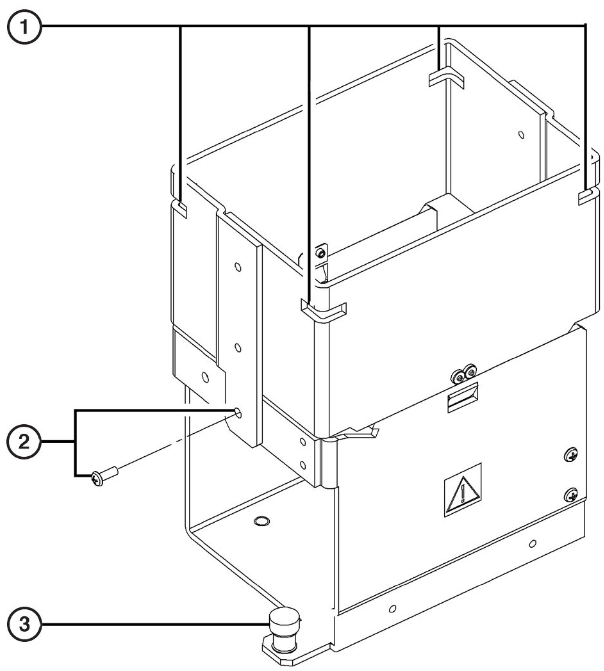
4 Insert a screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Disposal ALP base (Figure 16.4).

NOTE This screw is necessary for proper ESD grounding of the ALP.

5 Slip the locating pins on the bottom of the Multichannel Disposal ALP into the locating holes of the desired deck position.

6 Fasten the Multichannel Disposal ALP to the deck using the thumbscrews on the base of the Multichannel Disposal ALP (Figure 16.4).

Figure 16.4 Multichannel Disposal ALP without Slide Grounding Tab And Screw



1. **Rubber Band Notches**
2. **Grounding Tab and Screw** — the screw is inserted through the tab and into the ALP base at this location.
3. **Thumbscrew** — two thumbscrews are used to secure the Multichannel Disposal ALP to the deck. (*The second thumbscrew is positioned diagonally to the one shown here*.)

7 Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.

WARNING

Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Multichannel Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

8 Smooth out the bag to allow items to drop directly to the bottom of the bag.

NOTE For hazardous applications, appropriately marked autoclavable biohazard bags are recommended.

9 To hold the bag in place, stretch the rubber band over the top of the extension and receptacle bag until it fits into the notches on the corners of the extension (Figure 16.4).

Installing a Multichannel Disposal ALP with Slide

Installing a Multichannel Disposal ALP with Slide includes choosing a deck position and mounting the ALP to the deck.

NOTE Since the slide of a Multichannel Disposal ALP extends beyond the edge of the Biomek deck, the deck must be modified to accommodate the slide. Refer to *Installing Protective Shield Blanking Plate*, for more information on modifying the deck to accommodate a Multichannel Disposal ALP with Slide.

Choosing a Deck Position for the Multichannel Disposal ALP with Slide

CAUTION

The Multichannel Disposal ALP with Slide must be mounted in the 2nd or 3rd row in the left and right outside columns of the Biomek FX deck to avoid collisions.

CAUTION

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Multichannel Disposal ALP with Slide can be placed in one of the two center positions in the outside columns, and extends off the edge of the Biomek deck.

When adding a Multichannel Disposal ALP with Slide on the left or right outside column of the Biomek deck, the ALP must be associated with that deck position in the **Deck Editor**. To associate the Multichannel Disposal ALP with Slide with a deck position in the **Deck Editor**, drag and drop **TrashLeft** or **TrashRight** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck.*

Mounting a Multichannel Disposal ALP with Slide to the Deck

To mount a Multichannel Disposal ALP with Slide:

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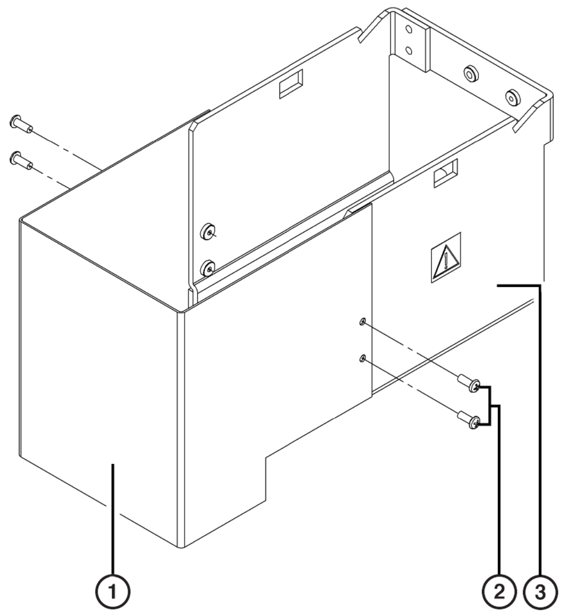
1 Position the Disposal Chute by lining up the holes in the disposal chute with the threaded holes in the Disposal ALP base (Figure 16.5).

Figure 16.5 Multichannel Disposal ALP with Slide



1. **Multichannel Disposal Chute**
2. **Multichannel Disposal Chute Mounting Screws**
3. **Disposal ALP Base**

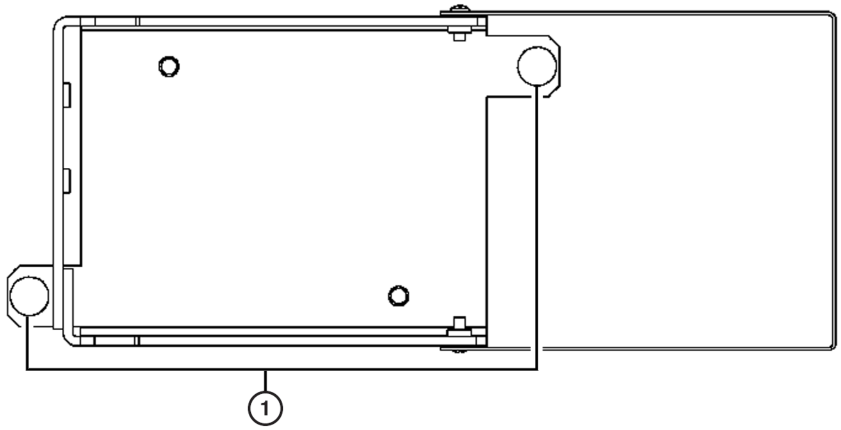
2 Attach the disposal chute to the Disposal ALP base using the four screws supplied (Figure 16.5).

3 Place the Multichannel Disposal ALP in one of the center positions in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.

4 Slip the locating pins on the bottom of the Multichannel Disposal ALP into the locating holes on the deck.

5 Fasten the Multichannel Disposal ALP to the deck using the thumbscrews on the base of the Multichannel Disposal ALP (Figure 16.6).

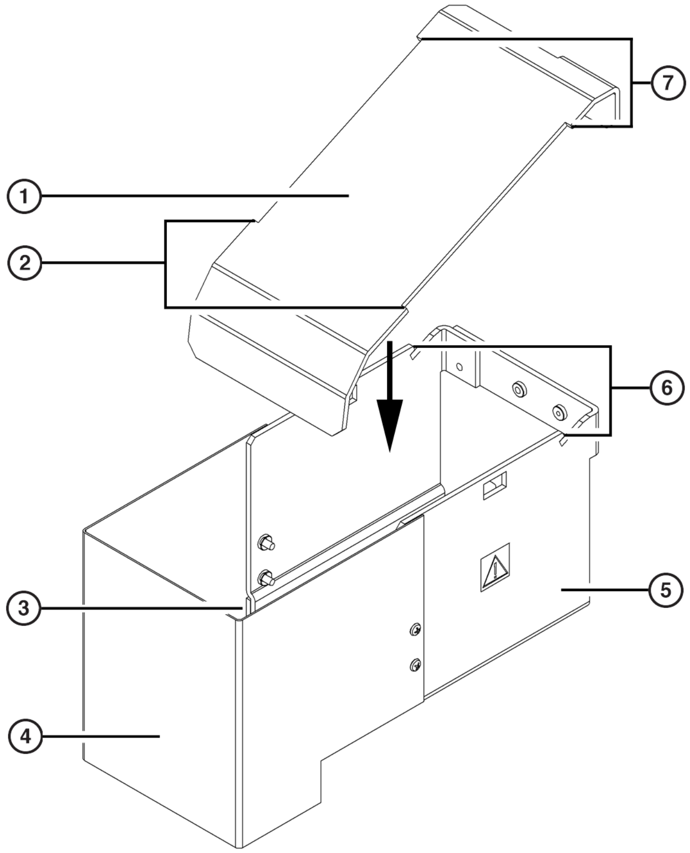
Figure 16.6 Multichannel Disposal ALP with Slide Thumbscrews (Bottom View)



1. **Thumbscrews**

6 Attach the disposal slide to the Multichannel Disposal ALP by lowering the upper tabs into the grooves in the Disposal ALP base (Figure 16.7). The disposal slide rests its lower tabs on the front of the Multichannel Disposal ALP base.

Figure 16.7 Multichannel Disposal ALP Slide Attachment

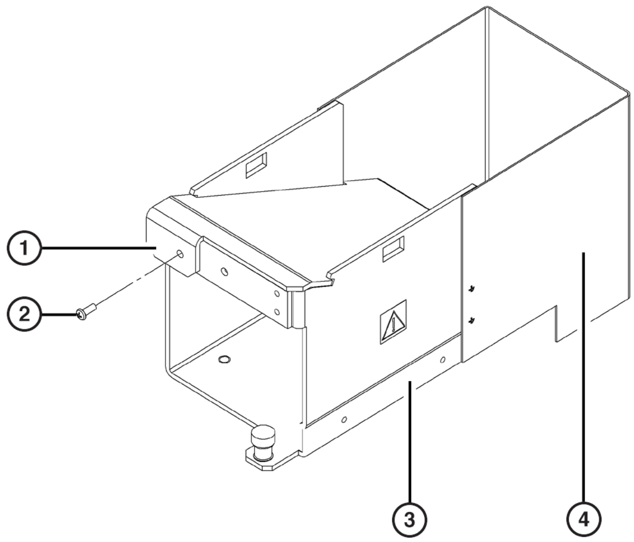


1. **Multichannel Disposal ALP Slide**
2. **Lower Tabs**
3. **Lower Tabs Rest Here**
4. **Disposal Chute**
5. **Disposal ALP Base**
6. **Grooves for Tabs** — upper tabs slide into the grooves.
7. **Upper Tabs**

7 Insert the ground screw through the tab on the back of the disposal slide and into the threaded hole in the Disposal ALP base (Figure 16.8).

NOTE This screw is necessary for proper ESD grounding of the ALP.

Figure 16.8 Multichannel Disposal ALP with Slide Ground Screw Placement



1. **Tab on the Disposal ALP Slide**
2. **Ground Screw**
3. **Disposal ALP Base**
4. **Disposal Chute**

8 Place a trash receptacle at the end of the disposal chute to catch disposed items.

9 Look down through the disposal chute, or drop a test item into the Multichannel Disposal ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

Installing Protective Shield Blanking Plate

WARNING

To reduce risk of personal injury, operate only with all protective shields in place.

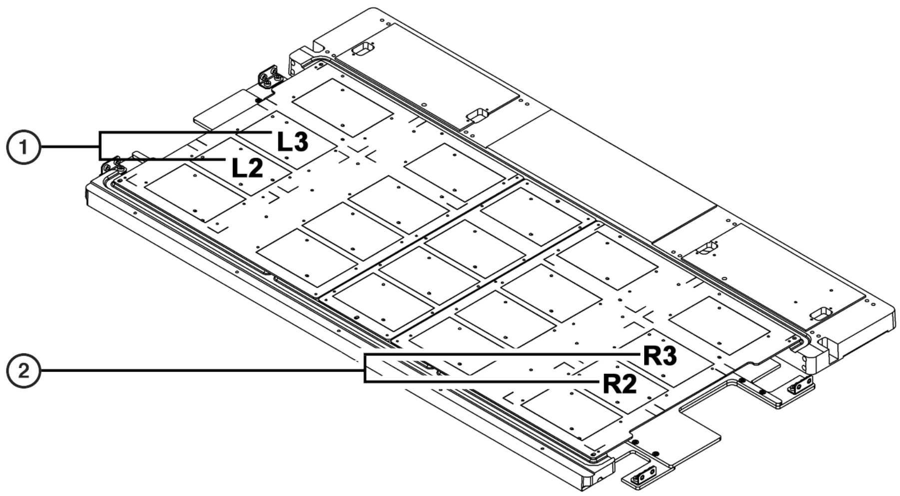
When components of the Biomek FX instrument are installed so that they extend beyond the edge of the work table, a protective bottom shield must be installed by the Beckman Coulter Service Engineer to ensure operator protection on the side overhanging the table. This protective bottom shield contains a solid blanking plate and a cutout blanking plate (Figure 16.10).

When the Biomek FX instrument does not extend beyond the edge of the work table, the solid blanking plate is installed. To accommodate the slide on the Multichannel Disposal ALP with Slide, the solid blanking plate is replaced with the cutout blanking plate. To accommodate the slides of two Disposal ALPs (Multichannel or Span-8), the solid blanking plate and cutout blanking plate are removed, leaving an opening for two Disposal ALP slides.

There are four deck positions available for a Multichannel Disposal ALP with Slide (Figure 16.9):

- L2
- L3
- R2
- R3

Figure 16.9 Multichannel Disposal ALP with Slide Deck Positions



1. **Multichannel Disposal ALP with Slide (Left Positions)**
2. **Multichannel Disposal ALP with Slide (Right Positions)**

Multichannel Disposal ALP with Slide in L2

When a Multichannel Disposal ALP with Slide is installed in L2 on the Biomek FX deck (Figure 16.9), install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

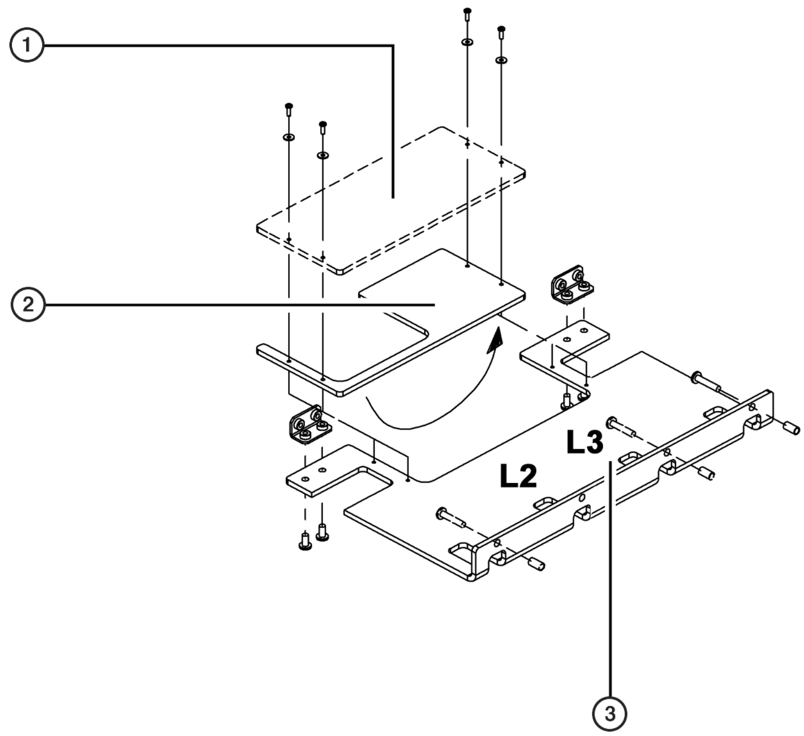
2 Remove the solid blanking plate.

3 Orient the blanking plate cutout as shown in (Figure 16.10).

4 Attach the blanking plate to the bottom shield. This creates an opening next to L2 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Figure 16.10 Left Side Bottom Shield with Solid and Cutout Blanking Plates



1. **Solid Blanking Plate**
2. **Blanking Plate with Cutout** — rotate this blanking plate 180° front to back as required to accommodate the Multichannel Disposal ALP.
3. **Bottom Shield**

Multichannel Disposal ALP with Slide in L3

When a Multichannel Disposal ALP with Slide is installed in L3 on the Biomek FX deck (Figure 16.9), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.

2. Remove the solid blanking plate.

3. Rotate the blanking plate with the cutout 180° from the one shown in Figure 16.10.

4 Attach the blanking plate to the bottom shield. This creates an opening next to L3 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Multichannel Disposal ALPs with Slide in Both L2 and L3

When Multichannel Disposal ALPs with Slide are installed in both L2 and L3:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate. This creates an opening large enough for two slides.

Disposal ALP in R2

When a Multichannel Disposal ALP with Slide is installed in R2 on the Biomek FX deck (Figure 16.9), orient and install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

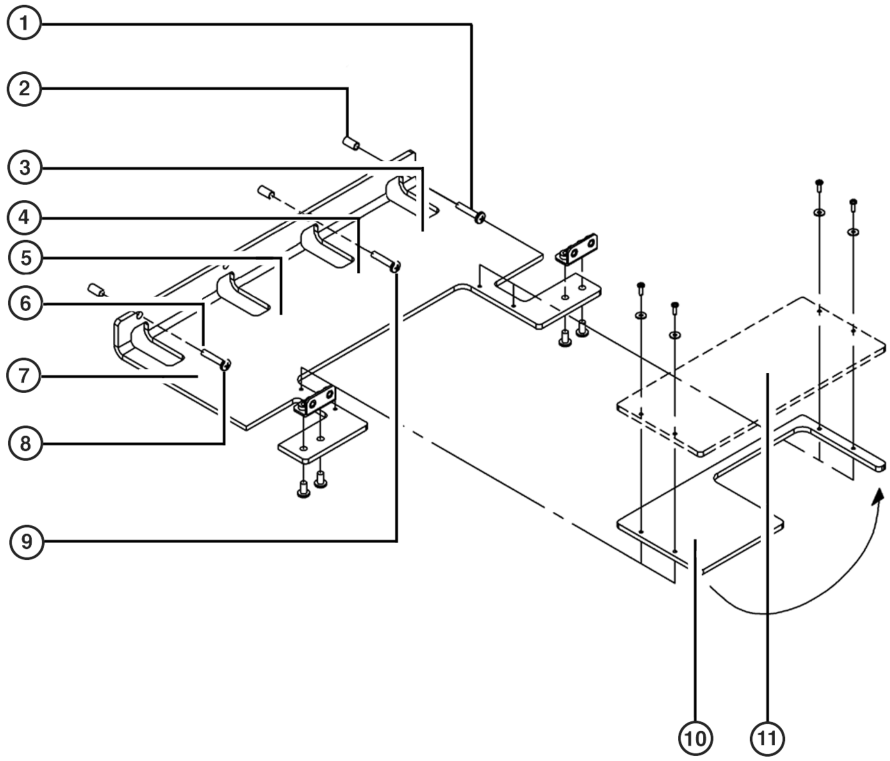
2 Remove the solid blanking plate.

3 Rotate the blanking plate with the cutout 180° from the one shown in (Figure 16.11).

4 Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R2 for the slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Figure 16.11 Right Side Bottom Shield with Solid And Cutout Blanking Plates



1. **Fastener Location C**
2. **Standoff**
3. **R4**
4. **R3**
5. **R2**
6. **R1**
7. **Bottom Shield**
8. **Fastener Location A**
9. **Fastener Location B**
10. **Blanking Plate with Cutout**
11. **Solid Blanking Plate**

Multichannel Disposal ALP with Slide in R3

When a Multichannel Disposal ALP with Slide is installed in R3 on the Biomek FX deck (Figure 16.9), orient and install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate.

3 Orient the blanking plate cutout as shown in Figure 16.11.

4 Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R3 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Multichannel Disposal ALPs with Slide in Both R2 and R3

When Multichannel Disposal ALPs with Slide are installed in both R2 and R3:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate. This creates an opening large enough for two slides.

Framing Instructions

No special framing is necessary for the Multichannel Disposal ALP (with or without Slide). Framing the ALP occurred when the deck was framed with the **Shift Deck** command. For more information refer to the specific manual for the instrument.

Removing a Multichannel Disposal ALP without Slide

Removing a Multichannel Disposal ALP without Slide includes removing the ALP and the bagging extension (refer to *Removing the Bagging Extension*).

WARNING

The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION

SPILL HAZARD.

To remove the Multichannel Disposal ALP without Slide:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the safety officer.
3. Loosen the thumbscrews on the base of the Multichannel Disposal ALP.
4. Lift the Multichannel Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

Removing the Bagging Extension

To remove the bagging extension from the Multichannel Disposal ALP:

1. Remove the grounding screw.
2. Grasp the bagging extension firmly with one hand and the base firmly with the other.
3. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
4. Store the extension in a clean, dry, dust-free area.
5. Insert the screw back into the threaded hole on the Multichannel Disposal ALP base.

Removing a Multichannel Disposal ALP with Slide

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Multichannel Disposal ALP with Slide:

1. Verify that no labware or tips remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.
2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.
3. Remove the grounding screw from the grounding tab on the slide.
4. Lift the slide from the base.
5. Insert the grounding screw back into the threaded hole on the disposal base.
6. Loosen the Multichannel Disposal ALP thumbscrews on the base of the Multichannel Disposal ALP.
7. Lift the Multichannel Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.
8. To detach the chute, remove the four screws attaching the chute to the disposal base.
9. Insert the four screws back into the threaded holes in the disposal base.

Storage

Return the Multichannel Disposal ALPs (with and without Slide) to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the Multichannel Disposal ALPs to air-dry before returning them to their original packing materials.

Preventive Maintenance

WARNING

The Multichannel Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Multichannel Disposal ALP with a soft cloth.

CHAPTER 17

Multichannel Tip Wash ALPs

Overview

Using a step in a method, the 96-Channel Tip Wash ALP (Figure 17.1) and 384-Channel Tip Wash ALP (Figure 17.2) are active ALPs that wash tips on the deck. The 96-Channel Tip Wash ALP, used with a 96-Channel Head, has 96 cleaning wells, while the 384-Channel Tip Wash ALP, used with the 384-Channel Head, has 384 cleaning wells.

NOTE Washing tips in a method using a Multichannel Tip Wash ALP is configured in the **Transfer** or **Combine** steps (refer to the *Biomek Software User's Manual,* Chapter 16, *Configuring Transfer and Combine Steps*), and **Wash** (refer to the *Biomek Software User's Manual*, Chapter 17, *Wash Step*) steps.

NOTE Use the **Device Action** step for a Multichannel Tip Wash ALP to allow the ALP to continue washing until the **Finish** step is executed (refer to *the Biomek Software User's Manual*, Chapter 23, *Configuring the Device Action Step for a Multichannel Tip Wash ALP (FX, NX-MC only)*).

These ALPs provide a flow of wash fluid from a source reservoir for tip washing. A peristaltic pump, also known as a passive or pulsating pump, circulates the fluid through the ALP from the source reservoir to a waste reservoir.

To ensure that the correct Multichannel Tip Wash ALP is used on an instrument with two or more Multichannel Tip Wash ALPs, each ALP must be configured to use a unique liquid type (refer to *Configuring Multiple Wash Stations on an Instrument*).

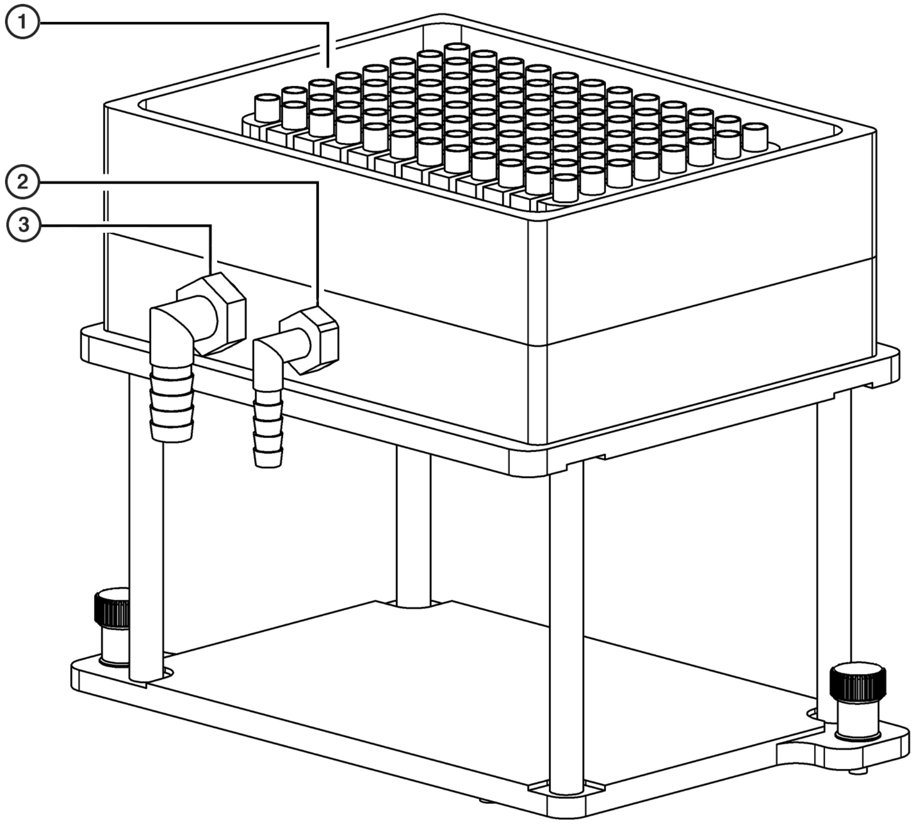
Both Multichannel Tip Wash ALPs are installed and removed in the same manner. While they are also framed using the same procedure, specific Framing Tool Adaptors are used with each type. If a more precise location of the tips when they are submerged into the cleaning wells during a wash is desired, offsets for framing both ALPs may be entered (refer to *Entering Offsets for the Multichannel Tip Wash ALPs*).

NOTE The adaptor for the 96-Channel Tip Wash ALP is red and the adaptor for the 384-Channel Tip Wash ALP is blue. Make sure the correct adaptor is used.

The sections in this chapter include:

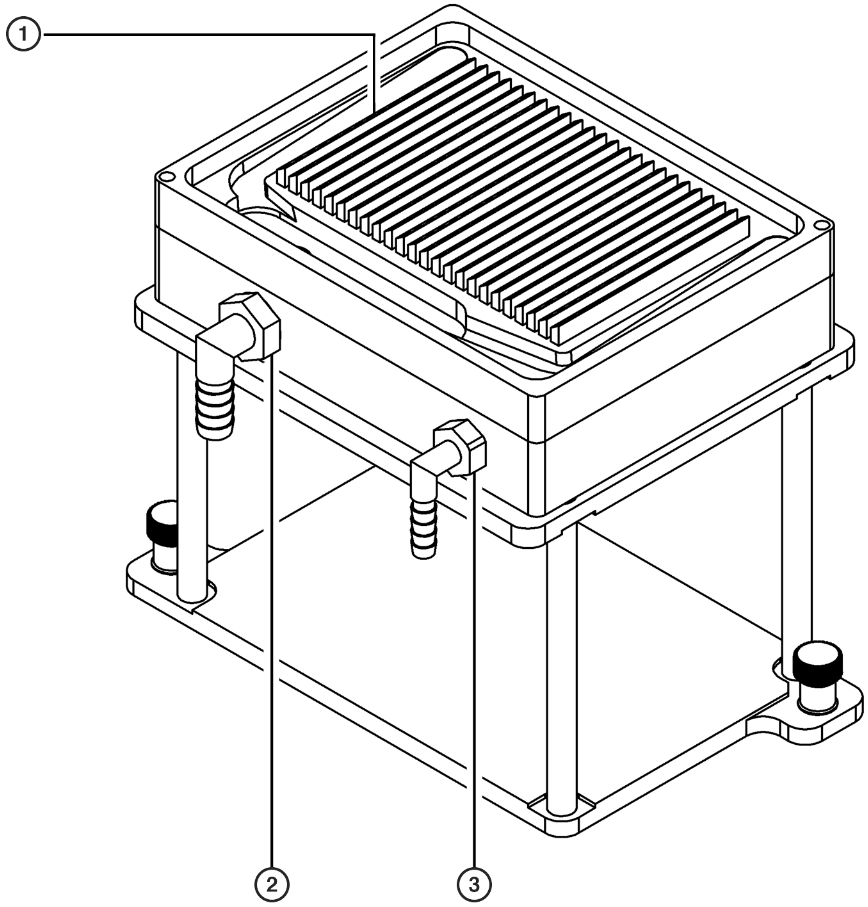
- *Installing Multichannel Tip Wash ALPs*
- *Configuring Multiple Wash Stations on an Instrument*
- *Framing Instructions*
- *Entering Offsets for the Multichannel Tip Wash ALPs*
- *Removing the Multichannel Tip Wash ALPs*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 17.1 96-Channel Tip Wash ALP



1. **Cleaning Wells**
2. **In**
3. **Out**

Figure 17.2 384-Channel Tip Wash ALP



1. **Cleaning Wells**
2. **Out**
3. **In**

Installing Multichannel Tip Wash ALPs

Installing Multichannel Tip Wash ALPs to the deck includes choosing the deck position and mounting the ALP to the deck.

⚠ WARNING

SPILL HAZARD.

⚠ WARNING

Do not kink the hoses.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION

Orient the Multichannel Tip Wash ALPs so the in and out connections face the back of the Biomek instrument.

CAUTION

Use the 96-Channel Tip Wash ALP only with the 96 disposable tip head.

CAUTION

Use the 384-Channel Tip Wash ALP only with the 384 disposable tip head.

NOTE The Multichannel Tip Wash ALPs require both an in and an out hose to attach the ALP to the pump.

Choosing a Deck Position

Use the **Deck Editor** to determine where the ALP may be mounted on the deck. The positions capable of supporting the ALP are indicated by dashed lines.

NOTE In the **Deck Editor**, the 96-Channel Tip Wash ALP is referred to as **WashStation96** and the 384-Channel Tip Wash ALP is referred to as **WashStation384**.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting Multichannel Tip Wash ALPs to the Deck

Before mounting the Multichannel Tip Wash ALPs to the deck, ensure the requirements for tubing are met (refer to *Tubing*).

Tubing

The supply tubing for the Multichannel Tip Wash ALPs is 1/4” inside diameter, while the drain tubing is 3/8” inside diameter. When the tubing is connected, the drain tubing must run through the peristaltic pump in the opposite direction to the supply tubing and into the waste reservoir.

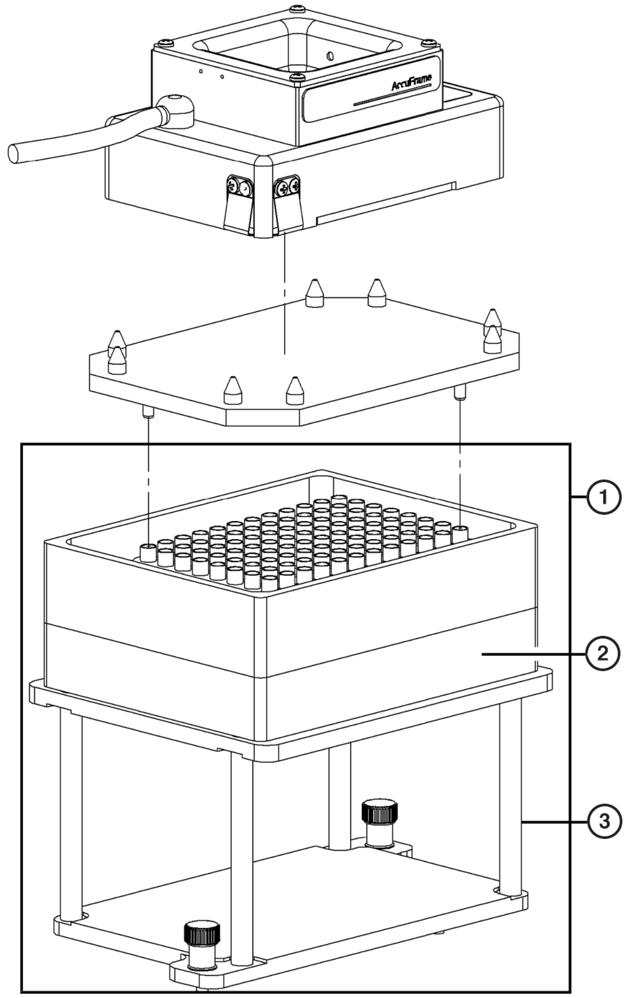
NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument.

To mount Multichannel Tip Wash ALPs to the deck:

1. Ensure the requirements for tubing are met (refer to *Tubing*).

2. Attach the tip wash reservoir to the tip wash stand using the supplied thumbscrews to create the Multichannel Tip Wash ALP (Figure 17.3).

Figure 17.3 Tip Wash Reservoir and Tip Wash Stand to Create the 96-Channel Tip Wash ALP



1. **Multichannel Tip Wash ALP**
2. **Tip Wash Reservoir**
3. **Tip Wash Stand**

3 Position the ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, and the hoses are on the back side of the ALP.

NOTE The in/out hose connections on the 384-Channel Tip Wash ALP MUST face the back of the Biomek instrument.

4 Fasten the ALP to the deck using the thumbscrews located on the base of the tip wash stand (Figure 17.3).

5 Position the peristaltic pump at an off-deck location close to the ALP.

6 Place the source and waste reservoirs under the lab bench or in an accessible space lower than the instrument height.

7 Attach the in hose (part number 6485-35) to the small hole on the ALP (Figure 17.1 or Figure 17.2).

8 Run the in hose through the appropriate pump head of the peristaltic pump.

9 Attach the opposite end of the in hose to the source reservoir. Run the hoses through either the access holes on the back of the instrument between the towers, or between the light curtain and the deck on the side of the Biomek instrument.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument.

10 Attach the out hose to the large hole on the Multichannel Tip Wash ALP (Figure 17.1 or Figure 17.2).

11 Run the out hose (part number 6485-36) in the opposite direction through the out pump head on the peristaltic pump.

NOTE The peristaltic pump must be connected to the Device Controller. The Device Controller turns the pump **On** and **Off** as requested by the software (refer to APPENDIX A, *Device Controller*).

12 Attach the opposite end of the out hose to the waste reservoir.

13 Fill the source reservoir with the desired cleaning fluid.

14 Turn on the pump.

Configuring Multiple Wash Stations on an Instrument

Multichannel Tip Wash ALPs and other wash ALPs are identified as wash stations in the Biomek Software. To ensure that the correct wash station is used on an instrument with two or more wash stations, each wash station must be configured to use a unique liquid type.

To configure a unique liquid type for a wash station:

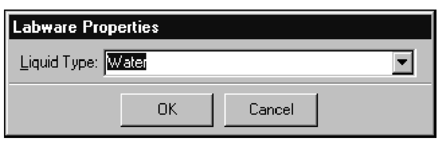
1. In the **Liquid Type Editor**, create a new liquid type or copy an existing liquid type for the wash station; for example, create a new liquid type called **WS1_Liquid**.

   NOTE Each liquid type must have a unique name; for example, **WS1_Liquid** or **WS2_Liquid**.

   NOTE Refer to the *Biomek Software User's Manual*, Chapter 9, *Creating New Liquid Types*, for more information on creating new liquid types, and *Copying and Pasting Liquid Types Within a Project File*, for more information on copying liquid types.

2. In the **Instrument Setup** step, double-click the desired wash station. **Labware Properties** for the wash station appears (Figure 17.4).

   Figure 17.4 Labware Properties for a Wash Station ALP



3. In **Liquid Type:**, select the unique liquid type created for that wash station; for example, **WS1_Liquid**.

4. Choose OK to save the change and close **Labware Properties**.

5. For each additional wash station, repeat steps 2 through 4, selecting the appropriate liquid type for each wash station.

   NOTE Each wash station must use a unique liquid type.

6. In any steps where tips are washed, such as **Transfer** or **Combine**, select a specific wash station by selecting the appropriate liquid type in **Wash tips in**.

Framing Instructions

Special framing instructions are necessary for Multichannel Tip Wash ALPs which are framed using the AccuFrame and a Framing Tool Adaptor.

The Framing Tool Adaptor for the 96-Channel Tip Wash ALP is red and the Framing Tool Adaptor for the 384-Channel Tip Wash ALP is blue. Make sure the correct Framing Tool Adaptor is used for each type of Multichannel Tip Wash ALP.

If a more precise location of the tips when they are submerged into the cleaning wells during a wash is desired, offsets for framing both ALPs may be entered (refer to *Entering Offsets for the Multichannel Tip Wash ALPs*).

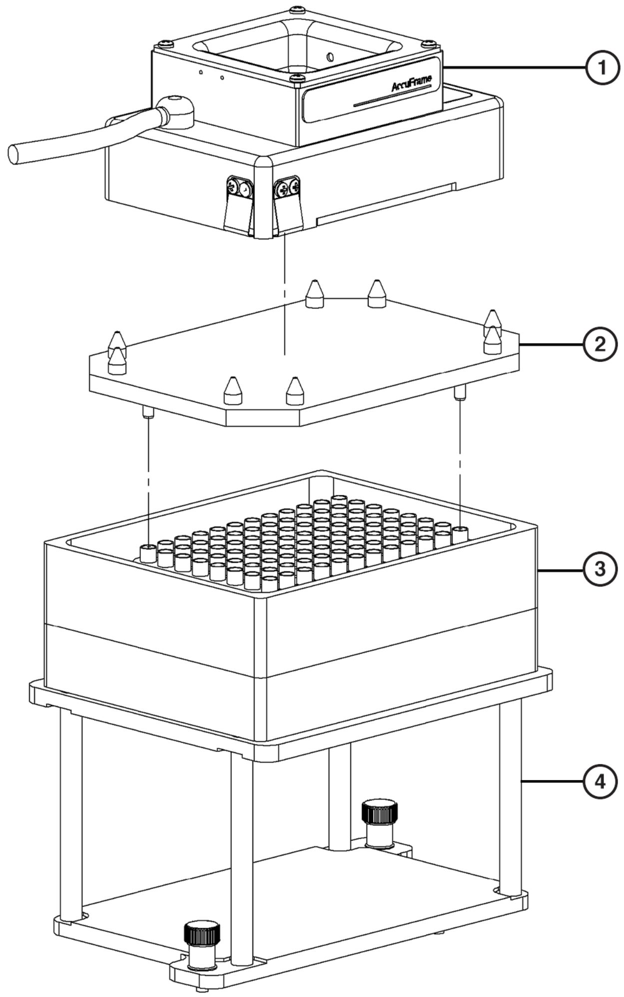
To frame the Multichannel Tip Wash ALPs:

---

1 Place the Framing Tool Adaptor on the ALP (Figure 17.5) ensuring that the correct adaptor is used.

NOTE The Framing Tool Adaptor for the 96-Channel Tip Wash ALP is red and the Framing Tool Adaptor for the 384-Channel Tip Wash ALP is blue.

Figure 17.5 AccuFrame, Framing Tool Adaptor, and the 96-Channel Tip Wash ALP



1. **AccuFrame** — use for both the 96-Channel and 384-Channel Tip Wash ALPs.
2. **Framing Tool Adaptor** — the adaptor for the 96-Channel Tip Wash ALP is red and the adaptor for the 384-Channel Tip Wash ALP is blue. Make sure the correct adaptor is used.
3. **Tip Wash Reservoir**
4. **Tip Wash Stand**

---

2 Turn off power to Biomek instrument before connecting the AccuFrame.

⚠ CAUTION

Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

3 Plug the AccuFrame into an available CAN port on the Biomek tower.

WARNING

Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING

Make sure the AccuFrame cable does not interfere with pod movement.

4 Turn on power to Biomek instrument.

5 Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the adaptor (Figure 17.5).

6 Frame the ALP according to procedures outlined in the specific manual for the instrument.

Entering Offsets for the Multichannel Tip Wash ALPs

If a more precise location of the tips in the cleaning wells of the Multichannel Tip Wash ALPs during a wash is desired, offsets for framing the Multichannel Tip Wash ALPs may be entered.

Refer to the *Biomek Software User's Manual*, Chapter 6, *Changing Per-Labware Offsets* for instructions on changing **Per-labware Offsets**. The X and Y offsets are entered using the following instructions:

1 Create a short method using the Multichannel Tip Wash ALP.

NOTE Washing tips in a method using a Multichannel Tip Wash ALP is configured in the **Transfer** or **Combine** steps (refer to the *Biomek Software User's Manual*, Chapter 16, *Configuring Transfer and Combine Steps*), and **Wash** steps (refer to the *Biomek Software User's Manual*, Chapter 17, *Wash Step*).

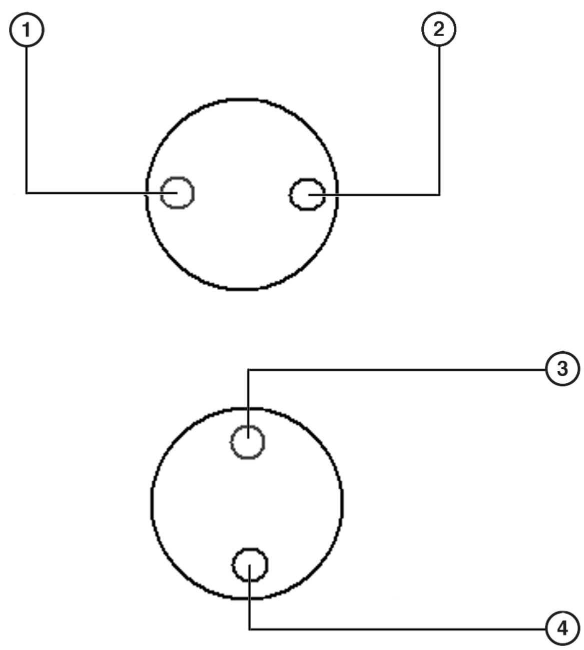
2 Based on a visual observation during the method run, use the following explanation to determine the offsets:

- If the tips are positioned too much to the left of the center of the wells, increase the number in the **X cm** (Figure 17.6).
- If the tips are positioned too much to the right of the center of the wells, decrease the number in the **X cm** (Figure 17.6).

- If the tips are positioned too much to the back of the center of the wells, increase the number in the **Y cm** (Figure 17.6).
- If the tips are positioned too much to the front of the center of the wells, decrease the number in the **Y cm** (Figure 17.6).
- If the tips are positioned are positioned too far down into the wells, increase the number in the **Z cm** (Figure 17.6).
- If the tips are positioned are positioned too far above the wells, decrease the number in the **Z cm** (Figure 17.6).

NOTE Estimate the amount or measure with a ruler or calipers.

Figure 17.6 Tip and Offset Explanation

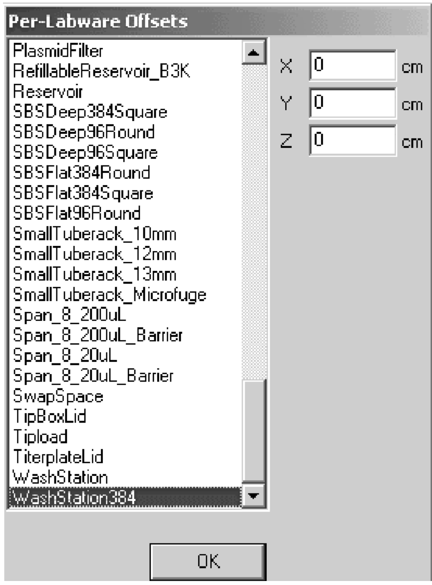


1. **Tip Too Far Left** — increase **X** offset.
2. **Tip Too Far Right** — decrease **X** offset.
3. **Tip Too Far Back** — increase **Y** offset.
4. **Tip Too Far Forward** — decrease **Y** offset.

3 When the offsets have been determined, choose **WashStation** or **WashStation384**, depending on the type of Multichannel Tip Wash ALP, and enter them in **X cm**, **Y cm**, and **Z cm** (Figure 17.7).

NOTE **WashStation** refers to the 96-Channel Tip Wash ALP while **WashStation384** refers to the 384-Channel Tip Wash ALP.

Figure 17.7 Per-Labware Offsets



4 Choose **OK**.

5 Reframe the Multichannel Tip Wash ALP according to the instructions in Section *Framing Instructions*, ensuring the correct Framing Tool Adaptor is used.

Removing the Multichannel Tip Wash ALPs

To remove Multichannel Tip Wash ALPs from the deck:

1 Power down the external pump.

2 Detach the in and out hoses from the tip wash reservoir (Figure 17.1 or Figure 17.2).

WARNING

SPILL HAZARD

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

3 Remove the tip wash reservoir carefully; a small amount of fluid normally remains after draining and could spill.

4 Loosen the thumbscrews from the deck.

5 Lift and tilt the tip wash reservoir slightly to the back right corner to allow the fluid to drain.

WARNING

Always wear protective gloves when draining the tip wash fluid.

6 Remove the ALP from the deck.

Storage

Return Multichannel Tip Wash ALPs to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow Multichannel Tip Wash ALPs to air-dry before returning them to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Troubleshooting

Do not attempt to repair a Multichannel Tip Wash ALP without first contacting a Beckman Coulter Service Engineer.

Table 17.1 Troubleshooting the Multichannel Tip Wash ALP

If...	Then...
A Multichannel Tip Wash ALP is not functioning correctly.	Make sure that the hoses and cables are attached and routed to the Multichannel Tip Wash ALP properly.
The pod is not using the correct wash station.	Make sure the desired liquid type is selected for use during the wash process. OR Make sure a specific wash station is selected when the wash process is configured.

CHAPTER 18
Orbital Shaker ALP

Overview

The Orbital Shaker ALP (Figure 18.1) is an active ALP that shakes labware using an orbital shaking motion. Thumbscrews attach the ALP to the Biomek deck and a clamping mechanism anchors and positions labware for shaking and pipetting operations.

Microplates can be added to the Orbital Shaker ALP by a lab technician or the gripper.

NOTE When labware is manually placed on the Orbital Shaker ALP, it should be placed in the back, left corner of the device.

NOTE Labware positioned on the Orbital Shaker ALP is gripper accessible, but not stackable.

NOTE The Orbital Shaker ALP supports pipetting to and from all labware except 1536-well microplates and PCR microplates.

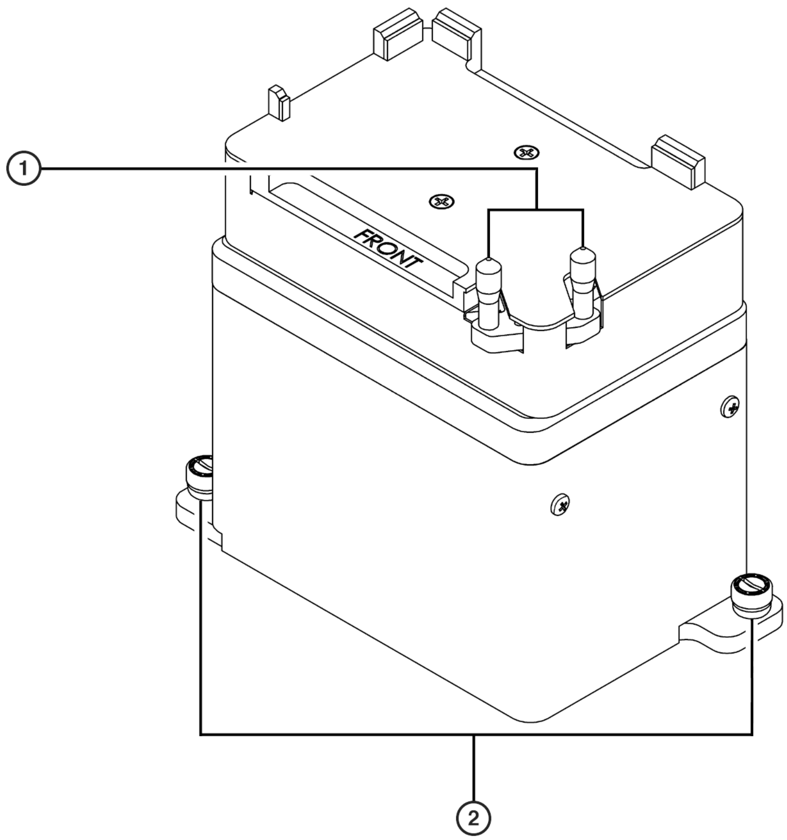
The sections in this chapter include:

- *Installing the Orbital Shaker ALP*
- *Framing Instructions*
- *Using the Orbital Shaker ALP in a Method*
- *Controlling the Orbital Shaker ALP Outside a Method*
- *Removing the Orbital Shaker ALP from the Deck*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

⚠ CAUTION

Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

Figure 18.1 Orbital Shaker ALP



1. **Clamp**
2. **Thumbscrews**

Installing the Orbital Shaker ALP

Installing the Orbital Shaker ALP includes choosing any standard position and mounting the ALP to the deck.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting an Orbital Shaker ALP to the Deck

NOTE Orbital Shaker ALPs cannot be chained together or to any other ALP.

To mount the Orbital Shaker ALP to the deck:

1. Turn off power to Biomek instrument before mounting any active ALP.

2. Position the ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, the CAN connections are oriented to the left and back of the Biomek deck, and the clamp is on the right front corner of the ALP.

   NOTE The front of the ALP is indicated with the word “FRONT” etched on the microplate platform of the ALP.

   NOTE Use the deck laser etchings as a guide when positioning an Orbital Shaker ALP on the deck.

3. Fasten the ALP to the deck using the thumbscrews on the base of the ALP.

4. Plug the female end of the CAN communication cable into the male CAN Port on the ALP (Figure 18.2).

   ⚠ WARNING

   Disconnect main power before connecting or disconnecting CAN cables.

   NOTE Short CAN cables should be used whenever possible, especially when positioning the ALP in the back row of the Biomek deck. Long CAN cables can be used when positioning the ALP in the first three rows on the Biomek deck.

5. Plug the male end of the CAN communication cable into any female connector labeled CAN Port on the Biomek instrument.

   ⚠ WARNING

   Do not chain Orbital Shaker ALPs together or to any other ALP.

   ⚠ CAUTION

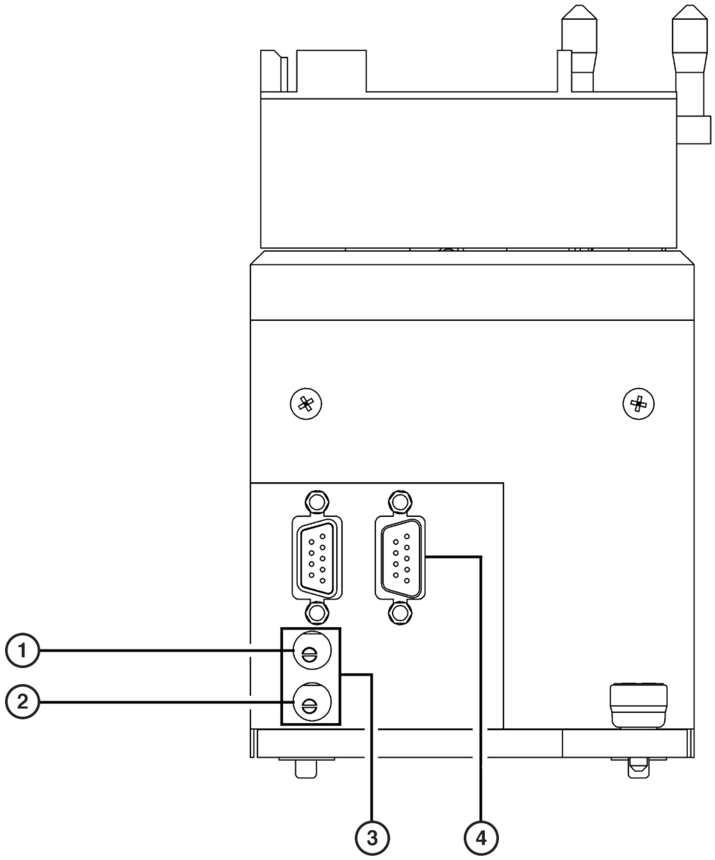
   A maximum of four (4) Orbital Shaker ALPs may be used on a deck at one time.

   NOTE Make sure the cable routing does not interfere with the operation of the Biomek instrument or any other active ALP.

6. Verify that one of the address switches (ADR1 or ADR2) is set to a unique address between zero (0) and F (Figure 18.2).

   NOTE ADR2 is set to a default address of zero (0). If only one Orbital Shaker ALP is on the deck, ADR2 should be left at the default setting and ADR1 should be set to a unique address.

Figure 18.2 Orbital Shaker ALP Connections



1. **ADR1**
2. **ADR2**
3. **Address Switches**
4. **CAN Connections** — only one CAN connection is available for use on the Orbital Shaker ALP.

Framing Instructions

Special framing instructions are necessary for the Orbital Shaker ALP to ensure gripper access to labware and tip access to all wells of a microplate positioned on the ALP without damaging the tips, probes, gripper, pod, labware, or ALP.

NOTE The Orbital Shaker ALP supports pipetting to and from all labware supported by the Biomek instrument except 1536-well microplates and PCR microplates.

The framing process for the Orbital Shaker ALP includes accessing different functions of the Biomek Software, mounting some hardware to the pod, and accurately positioning the AccuFrame Tool on the ALP.

The framing process includes:

- *Installing the Framing Fixture, Homing the Axes, and Installing the AccuFrame Tool*
- *Homing the Microplate Platform and Actuating the Clamps*
- *Framing the Deck Position with the Deck Editor*
- *Removing the AccuFrame from the ALP and the Framing Fixture from the Biomek Instrument Pod*

Installing the Framing Fixture, Homing the Axes, and Installing the AccuFrame Tool

To frame the Orbital Shaker ALP, the AccuFrame Tool and framing fixture must be installed:

⚠ WARNING

Turn off power to the Biomek instrument before attaching or removing the AccuFrame.

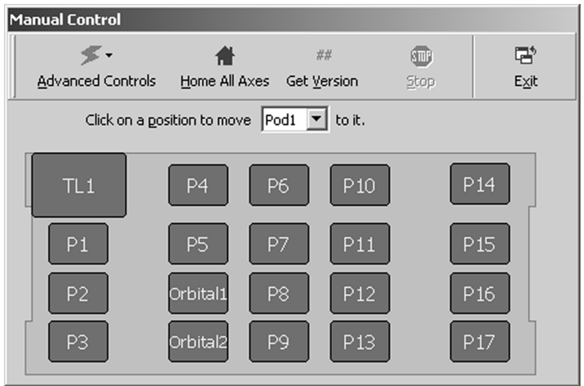
1. Plug the AccuFrame into any available CAN port on a Biomek tower.

2. Turn on power to the Biomek instrument.

3. Choose **Instrument > Manual Control** to open **Manual Control.** An **Information** dialog (Figure 18.3) briefly appears as a connection is established with the Biomek instrument, immediately followed by **Manual Control** (Figure 18.4).

Figure 18.3 Confirms Manual Control is Connecting

Figure 18.4 Manual Control



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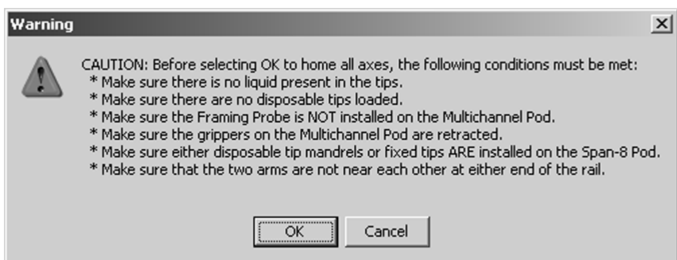
4 Choose **Home All Axes** (Figure 18.4). A **Warning** appears (Figure 18.5).

Figure 18.5 Warning that Appears when Homing All Axes



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5 Meet the conditions and, when conditions have been met, select **OK**. The Biomek instrument homes the pod in the X, Y, Z, and D axes.

---

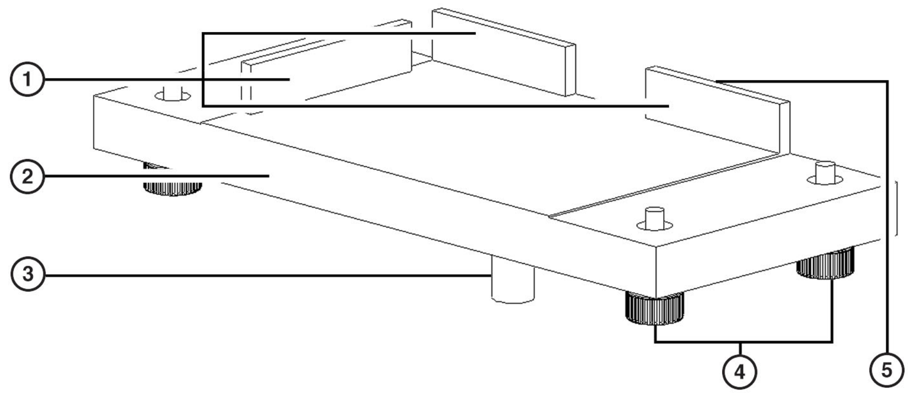
6 Attach the framing fixture (Figure 18.6) to the pod by holding the framing fixture against the head with the framing guides pressed to the outside of the back row and left column of mandrels.

⚠ CAUTION

Make sure there are no tips on the head.

NOTE Make sure the front of the framing fixture is to the front of the instrument, and the framing guides are to the back and left of the instrument (Figure 18.6).

Figure 18.6 Framing Fixture



1. **Framing Guides**
2. **Front of Framing Fixture**
3. **Framing Probe**
4. **Thumbscrews** — four thumbscrews attach the framing fixture to the Multichannel head.
5. **Back of Framing Fixture**

7 Gently pull the framing fixture to the front and right. Verify the framing guides are touching the mandrels.

8 Tighten each thumbscrew by turning to the right until the framing fixture is firmly attached to the head. The pod is now ready for framing.

Now that the AccuFrame Tool and the framing fixture have been installed, continue the framing procedure by homing the microplate platform and actuating the clamps.

Homing the Microplate Platform and Actuating the Clamps

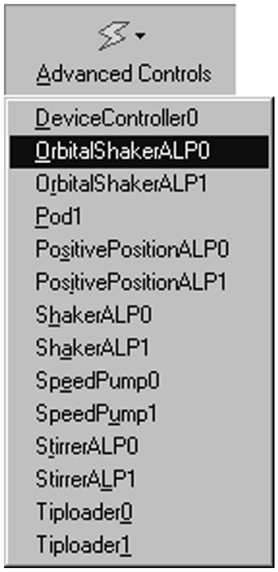
The framing process for the Orbital Shaker ALP continues by accessing **Advanced Manual Control** to home the microplate platform and actuate the clamps.

1 Choose **Instrument > Manual Control** to open **Manual Control.** An **Information** dialog (Figure 18.3) briefly appears as a connection is established with the Biomek instrument, immediately followed by **Manual Control** (Figure 18.4).

2 Choose 

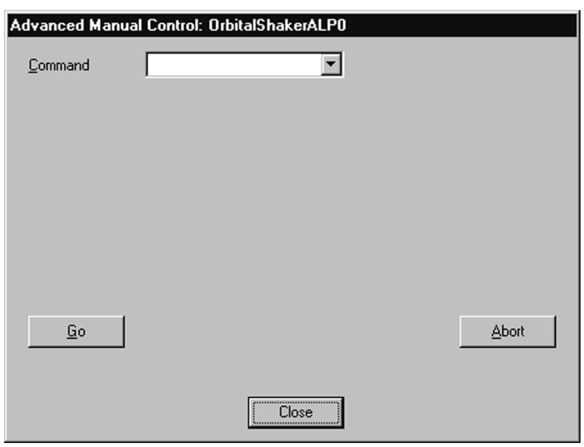
. A list of all the installed pods and devices appears (Figure 18.7).

Figure 18.7 Advanced Controls



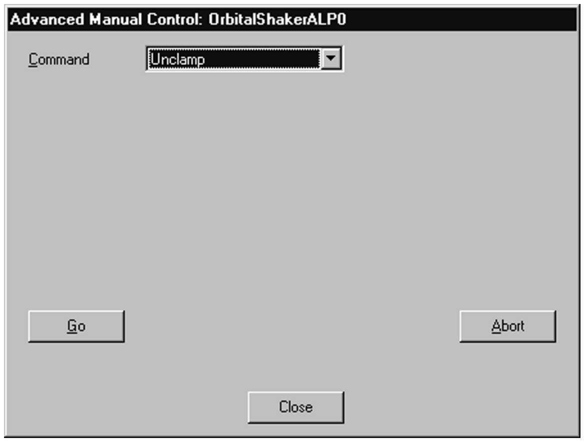
3 Select the desired **OrbitalShakerALP**. **Advanced Manual Control** for the selected Orbital Shaker ALP appears (Figure 18.8).

Figure 18.8 Advanced Manual Control for an Orbital Shaker ALP



4 In **Command**, select **Unclamp** (Figure 18.9).

Figure 18.9 Using Advanced Manual Control to Unclamp an Orbital Shaker ALP



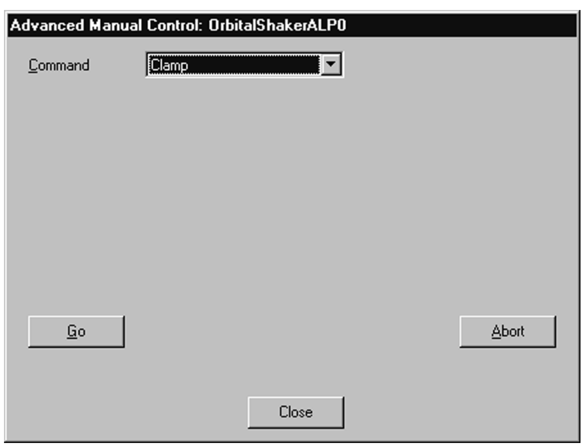
5 Choose **Go**. The Orbital Shaker ALP actuates the clamps.

6 Manually place the AccuFrame against the back, left corner of the Orbital Shaker ALP.

NOTE Make sure that the AccuFrame is fully seated along the posts along the back and left sides of the ALP.

7 In **Command**, select **Clamp** (Figure 18.10).

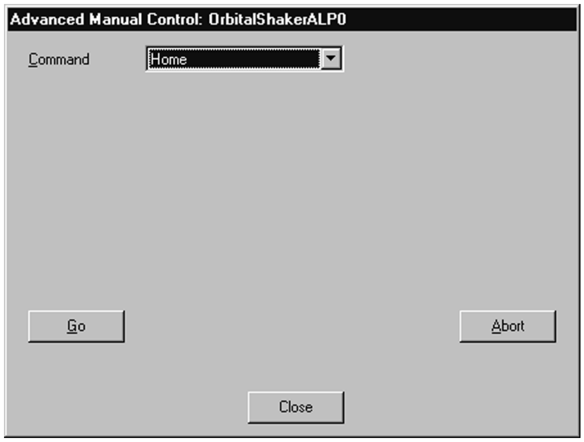
Figure 18.10 Using Advanced Manual Control to Actuate the Clamp on an Orbital Shaker ALP



8 Choose **Go**. The Orbital Shaker ALP securely clamps the AccuFrame.

9 In **Command**, select **Home** (Figure 18.11).

Figure 18.11 Using Advanced Manual Control to Home the Microplate Platform on an Orbital Shaker ALP



10 Choose **Go.** The Orbital Shaker ALP homes the microplate platform.

11 Choose **Close** to close **Advanced Manual Control**.

12 Choose **Exit** to close **Manual Control**.

Now that the microplate platform has been homed and the clamp has been actuated to securely position and hold the AccuFrame, continue the framing process by accessing the **Deck Editor.**

Framing the Deck Position with the Deck Editor

The framing process for the Orbital Shaker ALP continues using the **Deck Editor** to frame the deck position.

1 Choose **Instrument > Deck Editor** to open the **Deck Editor**.

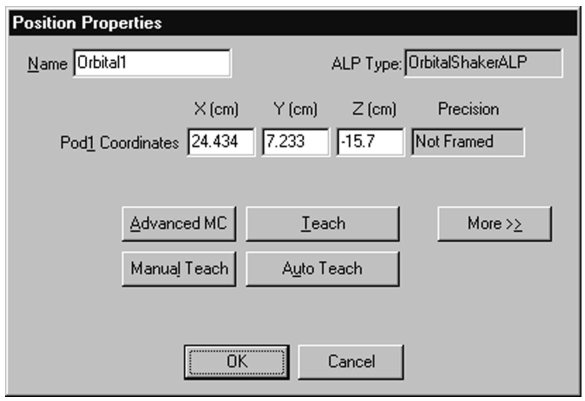
2 Open the deck that requires framing. Verify that the deck displayed in the Deck View reflects the current configuration of ALPs on the physical deck of the Biomek instrument.

NOTE If the Deck View does not reflect the current physical deck, place ALPs on the appropriate deck locations by dragging and dropping ALPs from the ALP Types List onto the Deck View. When the Deck View reflects the configuration of the current physical deck, proceed to step 3.

3 Double-click on the deck position in the deck view that contains the AccuFrame. **Position Properties** appears (Figure 18.12).

NOTE The coordinates displayed in **Position Properties** are default values; the software must be taught precisely where the ALPs physical position is on the deck.

Figure 18.12 Position Properties for the Selected Orbital Shaker ALP



4 In **Pod**, choose the pod used to frame the ALP: **Pod 1** or **Pod 2**.

- **FX** — **Pod** is available only if the Biomek instrument is configured as a dual-pod instrument.

NOTE Any pod accessing an ALP must be framed to that ALP.

5 Choose **Auto Teach**. The pod moves to the position being taught. The framing probe on the framing fixture should be above the AccuFrame in that position.

6 Visually verify that the framing probe is positioned to lower within the AccuFrame Tool without hitting the walls of the AccuFrame.

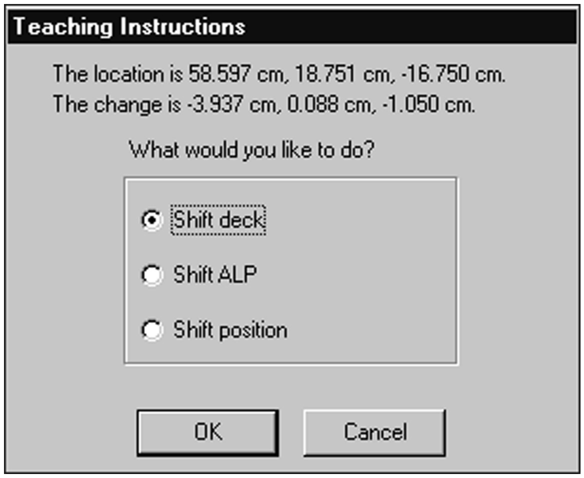
7 Choose **OK** to begin framing the position.

NOTE The pod lowers and moves around inside the AccuFrame automatically until it breaks both light beams. The pod stops after framing is completed, and the two light beam indicators are illuminated.

NOTE An error message appears if both light beams are not broken when the pod is lowered into the AccuFrame. If this occurs, using **Advanced Manual Control**, move the pod until the probe breaks both light beams and all the indicator lights are on. Choose **Teach**, and the pod continues the teaching process. The pod may also be moved by hand until the probe breaks both light beams and all the indicator lights are on.

8 Wait until the pod stops moving and **Teaching Instructions** appears (Figure 18.13).

Figure 18.13 Teaching Instructions



9 Choose from **Shift deck**, **Shift ALP**, or **Shift position** for appropriate teaching instructions.

10 Choose **OK** if the coordinates displayed in **Teaching Instructions** appear reasonable. **Position Properties** appears again, and the position is framed for the selected pod.

11 Choose **OK** to save changes and close **Position Properties**.

12 Choose **Save** to close the **Deck Editor**.

Now that the ALP has been framed, finish the framing procedure by removing the framing fixture and the AccuFrame.

Removing the AccuFrame from the ALP and the Framing Fixture from the Biomek Instrument Pod

The framing process for the Orbital Shaker ALP concludes by removing the framing fixture from the pod and accessing **Advanced Manual Control** to remove the AccuFrame from the ALP.

1 Choose **Instrument > Manual Control > Advanced Controls** to open **Advanced Manual Control**.

2 Select the desired **OrbitalShakerALP**. **Advanced Manual Control** for the selected Orbital Shaker ALP appears (Figure 18.8).

3 In **Command**, select **Unclamp** (Figure 18.9).

4 Choose **Go**. The Orbital Shaker ALP opens the clamps.

5 Turn off power to the Biomek instrument.

WARNING

Turn off power to the Biomek instrument before attaching or removing the AccuFrame.

6 Remove the AccuFrame from the ALP.

NOTE To frame additional Orbital Shaker ALPs, repeat the framing procedure, while moving the AccuFrame to each Orbital Shaker ALP on the physical deck. If not framing other ALPs, continue with step 7.

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

9 Remove the framing fixture from the head of the Multichannel Pod after all Orbital Shaker ALPs have been framed.

NOTE Any pod accessing an ALP must be framed to that ALP.

- **FX** — On a dual-pod system in which both pods access an ALP, both pods must be framed to that ALP.

The Orbital Shaker ALP has been successfully framed. For additional information on framing, refer to the specific manual for the instrument.

Using the Orbital Shaker ALP in a Method

To use the Orbital Shaker ALP in a method, it must be installed in **Hardware Setup** (refer to CHAPTER 1, *Installing an ALP in Hardware Setup*).

CAUTION

When creating a method with an Orbital Shaker and a stack of labware, first move the labware to another ALP, preferably a passive ALP, and then move it to the Orbital Shaker. The offsets allowed with stacking may cause the labware to be gripped off center; however, moving labware from a passive ALP ensures it is gripped properly.

Using the Orbital Shaker ALP in a method includes:

- *Establishing a Safe Maximum Shaking Speed*
- *Configuring a New Labware Type for Use on the Orbital Shaker ALP*
- *Controlling the Actions of an Orbital Shaker ALP*
- *Stopping and Restarting a Method*

Establishing a Safe Maximum Shaking Speed

CAUTION

Only labware compliant with the Society for Biomolecular Screening (SBS) proposed microplate standards is recommended for use on the Orbital Shaker ALP. Non-compliant labware may not be securely grasped by the ALP or may cause physical damage to the ALP.

WARNING

Do not shake tip boxes, tip box lids, or reservoirs on the Orbital Shaker ALP. The clamps on the ALP cannot hold tip boxes, tip box lids, or reservoirs securely during a shaking procedure.

The Orbital Shaker ALP supports most labware used on the Biomek instrument, although not all labware should be shaken at the same speed. The maximum shaking speed appropriate for each type of labware is of particular concern since fluid in labware may splash or spill at different shaking speeds due to labware parameters and fluid viscosity.

Recommended Maximum Shaking Speeds

WARNING

To ensure labware stays securely clamped on the Orbital Shaker ALP, do not exceed the recommended maximum shaking speed.

Recommended maximum shaking speeds were determined for a variety of labware from each class of labware supported by the Biomek instrument. A variety of fluids and shaking parameters were used to establish a recommended maximum shaking speed.

Testing on each piece of labware was conducted by filling the labware with the specified liquid to a percentage of the labware's maximum well capacity and executing a shaking operation.

The maximum shaking speeds presented in Table 18.1 show the results of testing.

NOTE Table 18.1 should be used only as general reference material. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for all labware, liquid, and shaking sequence combinations.

WARNING

The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

WARNING

Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, or radioactive materials.

Table 18.1 Recommended Maximum Labware Shaking Speeds

Labware Type	Liquid	With Fluid			Default Maximum Shaking Speed (Empty) [4/]
		Volume in µL [1/]	Volume as % [2/]	Shaking Speed (RPM) [3/]	
10 mm test tubes	Water	2136	51	800	1000
12 mm test tubes	Water	3100	50	400	400
13 mm test tubes	Water	4984	49	700	800
AB384Well Reaction	Water	20	50	1800	1800
BCFlat96	Water	100	27	1700	1800
BCDeep96Round	Water	712	54	1100	1600
BCDeep96Square	Water	1200	50	1100	1400
CostarCone96Round	Water	178	56	1200	1800
CostarCone96Round	Water	100	31	1700	1800
CostarFlat384Square	Water	100	82	1170	1800
Greiner96Ubottom	Water	239	75	1000	1800
Greiner96Ubottom	Water	100	31	1600	1800
GreinerFlat384Square	Water	100	71	1170	1800
GreinerShallow384Round	Water	15	52	1000	1800
Microfuge Tubes	Water	890	40	900	900
NuncFlat384Square	Water	100	64	1170	1800
CostarDeep96Square	Cell Pellet plus buffer	90 + pellet	4	950	1400
CostarDeep96Square	Cell Pellet plus buffer	210 + cells	8	1000	1400
CostarDeep96Square	Cell Pellet plus buffer	330 + cells	13	1000	1400
CostarDeep96Square	Cell Pellet plus buffer plus MagneSil Blue	355 + cells	15	1000	1400
Greiner96Ubottom	MagneSil Blue	30	9	720	1800
Greiner96Ubottom	MagneSil Red	55	17	720	1800
Greiner96Ubottom	MagneSil Red plus buffers	145	46	1000	1800

[1/]**Volume in µL** provides the number of µL of liquid added to each of the wells of the specified labware.
[2/]**Volume as %** provides the percent of each well filled by the value in **Volume in µL**.
[3/]**Shaking Speed (RPM)** is the recommended maximum speed the specified piece of labware should be shaken when the labware contains fluid. Exceeding this speed may spill or splash fluid out of the labware.
[4/]**Default Maximum Shaking Speed (Empty)** is the maximum shaking speed for the specified labware when it is empty. Exceeding this speed may compromise the ability of the clamping mechanism to securely hold the labware (Refer to *Configuring a New Labware Type for Use on the Orbital Shaker ALP*, for additional information on Maximum Shaking Speeds.)

Table 18.1 Recommended Maximum Labware Shaking Speeds *(Continued)*

Labware Type	Liquid	With Fluid			Default Maximum Shaking Speed (Empty) 4/
		Volume in µL 1/	Volume as % 2/	Shaking Speed (RPM) 3/	
Greiner96Ubottom	MagneSil Red plus Ethanol	150	47	800	1800
Greiner96Ubottom	MagneSil Red plus water	150	47	1000	1800
Greiner96Ubottom	MagneSil Yellow plus Ethanol	100	31	800	1800
Greiner96Ubottom	MagneSil Yellow plus Wash	100	31	1000	1800
Greiner96Ubottom	MagneSil Yellow plus water	100	31	1000	1800

1/**Volume in µL** provides the number of µL of liquid added to each of the wells of the specified labware.
2/**Volume as %** provides the percent of each well filled by the value in **Volume in µL**.
3/**Shaking Speed (RPM)** is the recommended maximum speed the specified piece of labware should be shaken when the labware contains fluid. Exceeding this speed may spill or splash fluid out of the labware.
4/**Default Maximum Shaking Speed (Empty)** is the maximum shaking speed for the specified labware when it is empty. Exceeding this speed may compromise the ability of the clamping mechanism to securely hold the labware (Refer to *Configuring a New Labware Type for Use on the Orbital Shaker ALP*, for additional information on Maximum Shaking Speeds.)

Configuring a New Labware Type for Use on the Orbital Shaker ALP

⚠ CAUTION

Only labware compliant with the Society for Biomolecular Screening (SBS) proposed microplate standards is recommended for use on the Orbital Shaker ALP. Non-compliant labware may not be securely grasped by the ALP or may cause physical damage to the ALP.

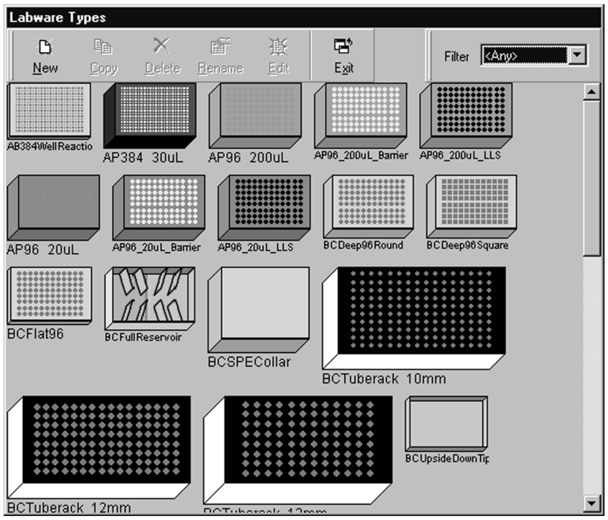
If a piece of labware other than that supported by Biomek Software is used on the Orbital Shaker ALP, the parameters of the labware must be configured in the **Labware Type Editor.** Use the **Labware Type Editor** to configure parameters for each new piece of labware.

NOTE Refer to the *Biomek Software User's Manual*, Chapter 8, *Creating and Modifying Tip and Labware Types*, for more information on creating and modifying labware types.

To configure a new piece of labware for use on the Orbital Shaker ALP:

1 Choose **Project > Labware Type Editor**. **Labware Types** appears (Figure 18.14).

Figure 18.14 Labware Types



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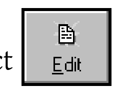
2 Select a piece of labware that closely resembles the new labware and select  on the toolbar.

NOTE To preserve the selected labware type, first copy it and then edit the copy (refer to the *Biomek Software User's Manual*, Chapter 8, *Copying a Labware Type*)

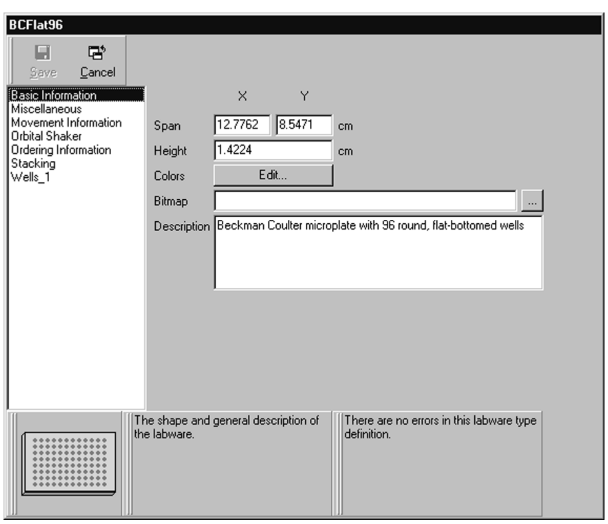
OR

Double-click the desired labware type.

OR

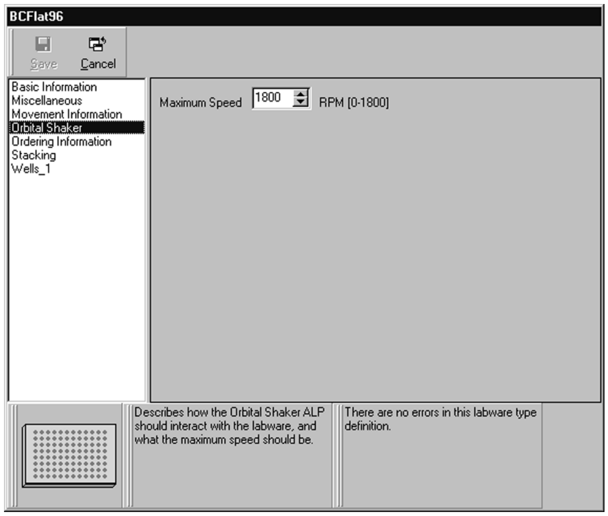
Right-click the desired labware type and choose **Edit** from the menu. **Basic Information** for the selected labware appears (Figure 18.15).

Figure 18.15 Basic Information for the Selected Labware Type



3 Choose **Orbital Shaker** in the left pane. The right pane changes to display the **Maximum Speed** for that piece of labware (Figure 18.16).

Figure 18.16 Orbital Shaking Configuration for the Selected Labware Type



4 In **Maximum Speed**, enter the highest safe maximum shaking speed for that piece of labware.

NOTE If the speed configured in a **Device Action** step exceeds the **Maximum Speed** allowed in the **Labware Type Editor**, an error occurs when the method is validated.

NOTE For more information on how to establish a safe **Maximum Speed** for a piece of labware, refer to *Establishing a Safe Maximum Shaking Speed*.

5 Choose **Save**.

NOTE Three sections of hints are offered at the bottom of the edit option. The first section displays a graphic of the labware, the second section explains the selected field, and the third section explains any errors resulting from editing the labware properties. Place the cursor over the desired labware properties field and click to view these hints.

Controlling the Actions of an Orbital Shaker ALP

CAUTION

Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

After an Orbital Shaker ALP has been physically added to the deck, configured in **Hardware Setup,** and associated with a device and a deck position in the **Deck Editor,** Biomek Software understands the attributes of the ALP and can receive information on how to control it. The **Device Action** step on the **Devices Step Palette** is used to control the actions of the Orbital Shaker ALP during a method run.

NOTE Refer to the *Biomek Software User's Manual*, Chapter 23, *Using the Devices Step Palette*, for information on how to display the **Devices Step Palette**.

NOTE An Orbital Shaker ALP must be configured in **Hardware Setup** (refer to CHAPTER 1, *Installing an ALP in Hardware Setup*) and associated with a device and deck position in the **Deck Editor** prior to using the Orbital Shaker ALP in a method.

When a **Device Action** step is added to a method, the configuration associated with the selected device appears in the Step Configuration (Figure 18.18).

NOTE **Device Action** steps that have not been appropriately configured generate errors when a method is validated or run.

To configure the **Device Action** step for an Orbital Shaker ALP:

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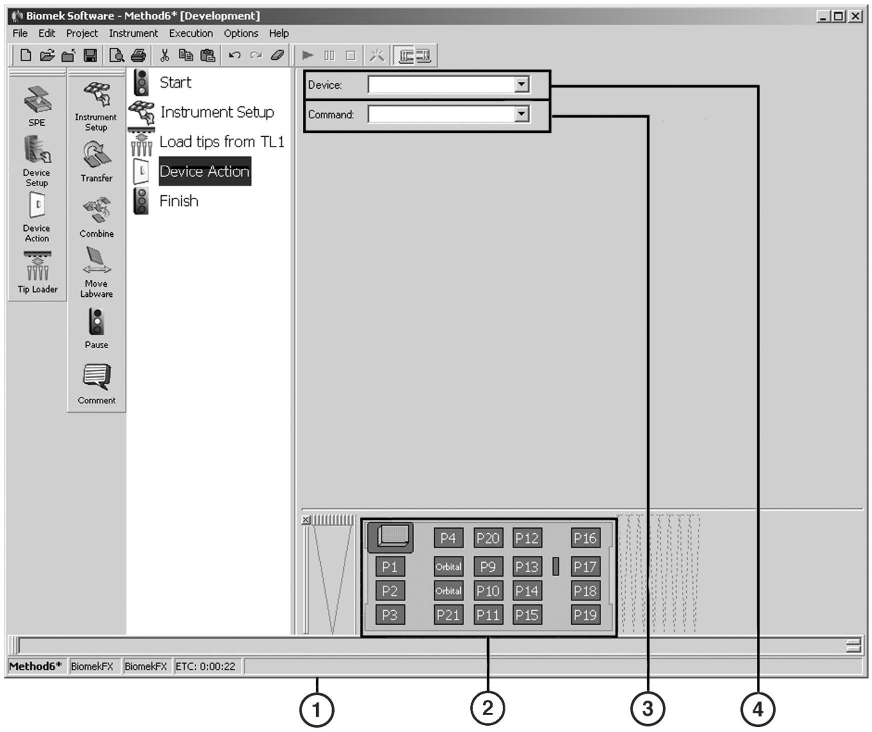
1 Insert a 

step into the **Method View** (Figure 18.17).

Figure 18.17 Device Action Step and Configuration



1. **Device Action Step Configuration** — the **Device Action** step configuration for the Orbital Shaker ALP allows the configuration of the action completed by the ALP and the parameters required to perform that action. The step configuration for the ALP changes based on the selection made in **Command**.
2. **Current Deck Display**
3. **Command** — select the action for the device to execute here. Some commands require further configuration.
4. **Device** — select the device to control here.

---

2 In **Device**, select the desired **OrbitalShakerALP**.

OR

Click on the Orbital Shaker ALP in the current deck display to select it. The configuration for the ALP appears (Figure 18.18).

NOTE Any devices installed in **Hardware Setup**, except Tip Loaders and Device Controllers, are listed under **Device** in the **Device Action** step configuration.

NOTE When an Orbital Shaker ALP is selected in **Device**, the ALP is highlighted by a blue border in the current deck display.

3 In **Command**, select the desired action for the Orbital Shaker ALP:

- **Shake** — shakes labware at the indicated number of revolutions per minute (RPM) in the specified direction (refer to *Configuring the ALP to Run a Standard Shaking Procedure*).
- **Timed Shake** — shakes labware at the indicated RPM in the specified direction for the indicated number of seconds (refer to *Configuring the ALP to Run for a Specific Length of Time*).
- **Run** — shakes labware using parameters from a previously created shaking profile (refer to *Configuring the ALP to Run a Previously Defined Shaking Profile*).
- **Pulse** — shakes labware using a pulsing sequence at a specific velocity for the indicated number of seconds, then for the indicated number of seconds in the opposite direction. This sequence of events is repeated the specified number of times. (refer to *Configuring a Pulsing Shake Sequence*).
- **Stop** — stops any shaking procedure by slowing the shaking action within the specified number of seconds (refer to *Stopping a Shaking Procedure Already in Process*).
- **Clamp** — tightens the clamp to hold the labware in place (refer to *Clamping and Unclamping Labware on the Orbital Shaker ALP*).
- **Home** — centers the microplate shaking plate on the ALP base (refer to *Homing the Microplate Platform on the Orbital Shaker ALP*).
- **Unclamp** — releases the clamp to allow the labware to be removed from the ALP (refer to *Clamping and Unclamping Labware on the Orbital Shaker ALP*).

NOTE The configuration for the Orbital Shaker ALP changes based on the selection made in **Command**.

NOTE If a light curtain violation occurs while the Orbital Shaker ALP is operating, the shaking operation is completed.

Configuring the ALP to Run a Standard Shaking Procedure

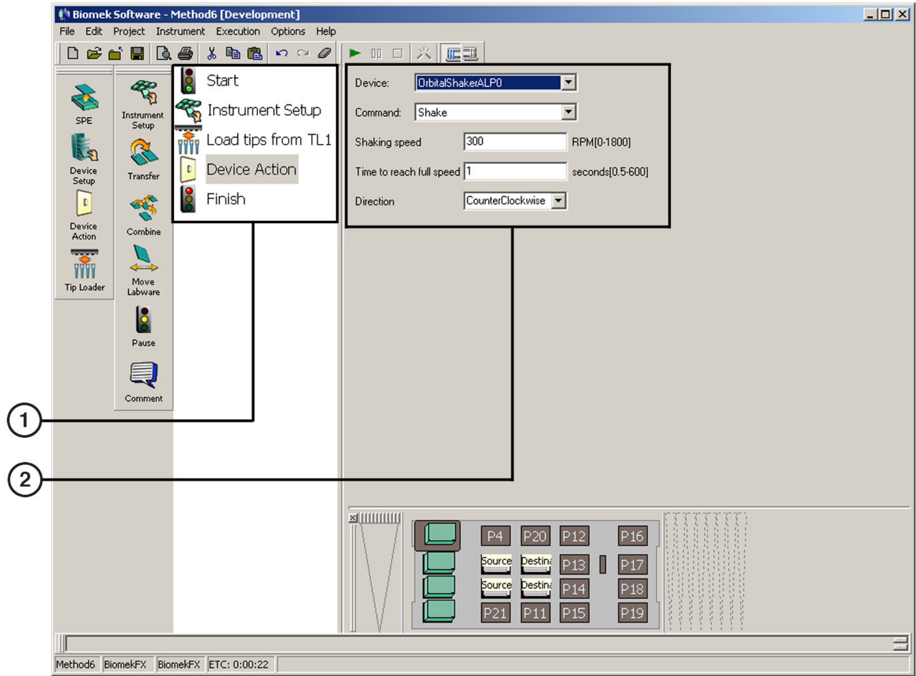
Shaking operations on the Orbital Shaker ALP can be configured to run continuously in a specified direction. The number of RPM applied during the shaking operation and the amount of time the device uses to ramp up to the specified shaking speed are configured when using the **Shake** command.

NOTE The default configuration for the Orbital Shaker ALP is to shake labware **CounterClockwise** with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

To configure the Orbital Shaker ALP to shake labware using new parameters:

1 In **Command**, select **Shake** (Figure 18.18).

Figure 18.18 Device Action Step Configured for a Continuous Shaking Motion on an Orbital Shaker ALP



1. **Method View** — the **Device Action** caption indicates the device and its command.
2. **Device Action Step Configuration** — the **Device Action** step configuration specifies an operation performed on the Orbital Shaker ALP.

2 In **Shaking speed**, indicate the desired shaking speed in RPM.

NOTE The minimum **Shaking speed** allowed is **0** RPM while the maximum **Shaking speed** allowed is **1800** RPM. Refer to *Establishing a Safe Maximum Shaking Speed*, for more information.

3 In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

NOTE The minimum value allowed in **Time to reach full speed** is **0.5** seconds while the maximum value is **600** seconds.

4 In **Direction**, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

NOTE The default **Direction** is **CounterClockwise**.

Configuring the ALP to Run for a Specific Length of Time

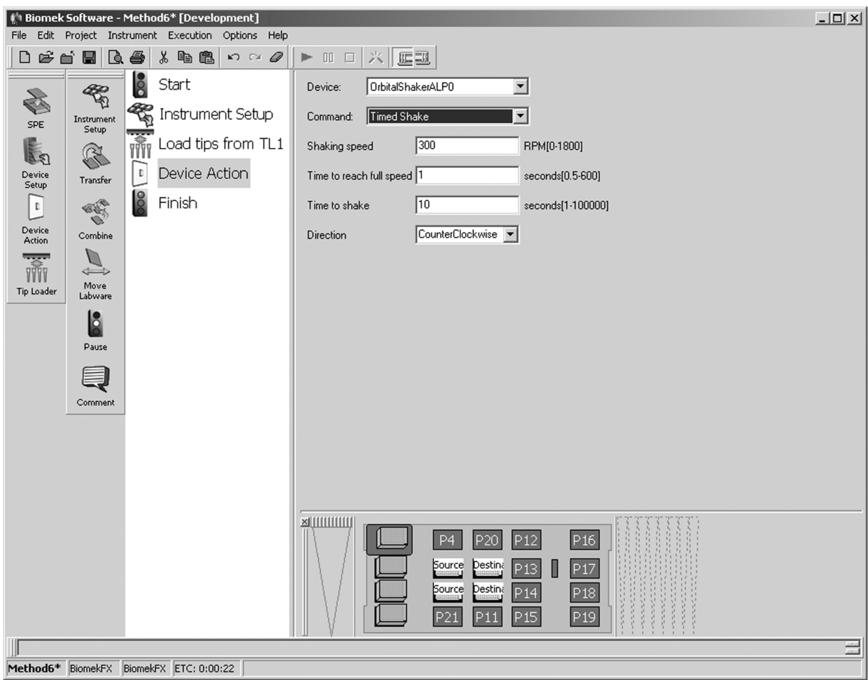
Shaking operations on the Orbital Shaker ALP can be configured to run a specified length of time. The **Timed Shake** configuration controls how many seconds and in which direction labware is shaken. The maximum shaking speed and the amount of time used to reach that speed are also configured in the **Timed Shake** command.

NOTE The default configuration for a timed shaking sequence is to shake labware for **10** seconds in a **CounterClockwise** direction with a **1** second ramp-up to **300** RPM.

To configure the Orbital Shaker ALP to shake labware a specific length of time:

1 In **Command**, select **Timed Shake** (Figure 18.19).

Figure 18.19 Device Action Step Configured for a Timed Shaking Motion on an Orbital Shaker ALP



2 In **Shaking speed**, indicate the desired shaking speed in RPM.

NOTE The minimum **Shaking speed** allowed is **0** RPM while the maximum is **1800** RPM. Refer to *Establishing a Safe Maximum Shaking Speed*, for more information.

3 In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

NOTE The minimum value allowed in **Time to reach full speed** is **0.5** second while the maximum value is **600** seconds.

NOTE The **Time to reach full speed** is also used when ramping down at the end of the configured **Time to Shake**.

4 In **Time to Shake**, enter the duration (in seconds) the ALP shakes the labware.

NOTE The minimum value allowed in **Time to shake** is **1** second while the maximum value is **100,000** seconds.

NOTE The **Time to shake** does not include the **Time to reach full speed** or the time to ramp down and return to a full stop.

5 In **Direction**, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

NOTE The default **Direction** is **CounterClockwise**.

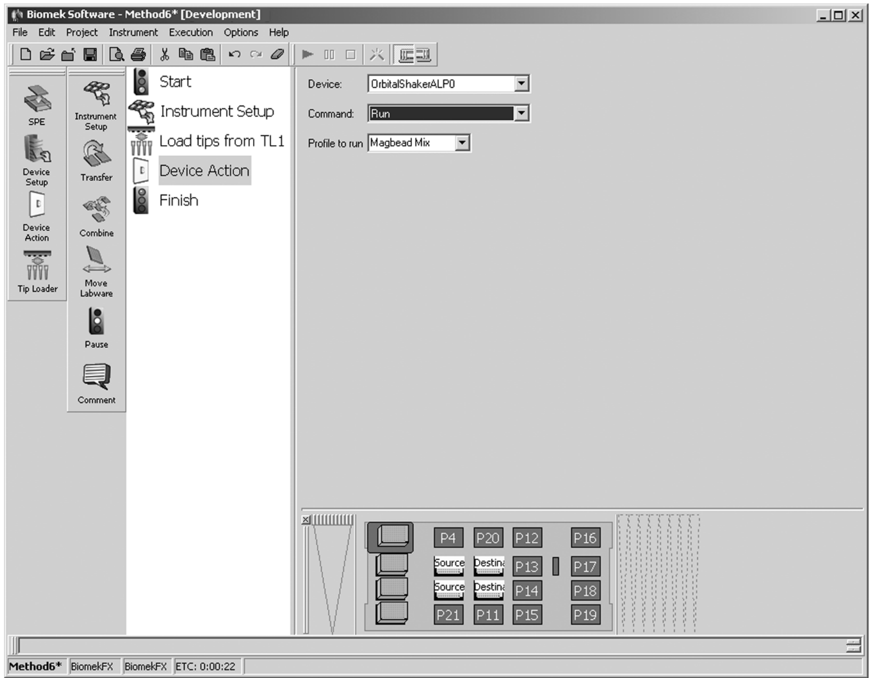
Configuring the ALP to Run a Previously Defined Shaking Profile

The Orbital Shaker ALP is capable of running previously defined shaking profiles. Profiles are loaded to the Biomek Software directory when the Orbital Shaker ALP is installed.

To configure the Orbital Shaker ALP to follow previously defined shaking profiles:

1 In **Command**, select **Run** (Figure 18.20).

Figure 18.20 Device Action Step Configured to Run a Previously Designed Shaking Profile on an Orbital Shaker ALP



2 In **Profile to Run**, select the desired profile. There are three profiles available for selection:

- **Cell pellet breakup** — resuspends cells using 190µL Promega Cell Resuspension Solution in a Costar 96 square, deep-well microplate. The **Cell pellet breakup** profile completes five 1-second pulses at 950 RPM, then 28 5-second pulses at 900 RPM, and, finally, 90 seconds of shaking in a counterclockwise direction at 900 RPM.
- **Magbead Mix** — mixes MagneSil™ particles in low-viscosity fluids.The **Magbead Mix** profile completes three 2-second pulses at 800 RPM, followed by 60 seconds of shaking in a constant direction at 750 RPM.

  NOTE More gentle mix typically used for particles in low-viscosity fluids.

- **MagneSil Yellow** — mixes MagneSil™ Yellow particles in a water or wash solution.The **MagneSil** profile completes 12 4-second pulses at 1000 RPM.

  NOTE More vigorous mix typically used with small volumes and higher-viscosity fluids.

Configuring a Pulsing Shake Sequence

The Orbital Shaker ALP is capable of performing a pulsing shake sequence. A pulsing shake sequence applies a series of shaking motions to a piece of labware. The **Pulse** configuration shakes labware in one direction at the indicated speed for the specified length of time followed by shaking the labware at the same speed for the same length of time in the opposite direction. The labware is shaken in this manner in alternating directions the specified number of times.

NOTE The default configuration for a pulsing shake sequence on the ALP is to pulse labware **1** time each direction for **1** second at **300** RPM. The default values do not correspond with the parameters displayed in Table 18.1. Refer to Table 18.1 (for recommended shaking speeds for tested labware and fluid combinations.

WARNING

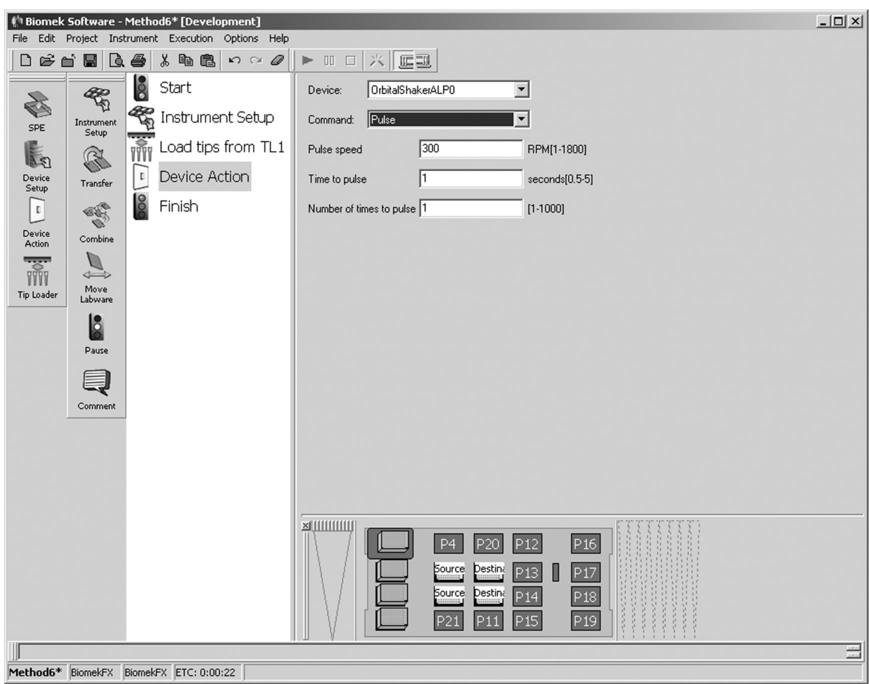
The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

To configure the Orbital Shaker ALP to shake labware using a pulsing motion:

---

1 In **Command**, select **Pulse** (Figure 18.21).

Figure 18.21 Device Action Step Configured for a Pulsing Shake Motion on an Orbital Shaker ALP



2 Enter a **Pulse Speed** in RPM.

NOTE The minimum **Pulse Speed** allowed is **1 RPM** and the maximum is **1800 RPM**.

3 In **Time to Pulse**, enter the duration (in seconds) the Orbital Shaker ALP shakes in each direction.

NOTE The minimum value allowed in **Time to Pulse** is **0.5** second while the maximum value allowed in **Time to Pulse** is **5** seconds.

4 Enter the **Number of times to Pulse** within the time frame specified in **Time to Pulse**.

NOTE The minimum value allowed in **Number of times to Pulse** is **1** and the maximum is **1000**.

NOTE A pulsing shake sequence is an effective technique for removing bubbles from solutions. Some experimentation may be necessary when designing a pulsing shake sequence effective at removing bubbles from a specific solution.

Stopping a Shaking Procedure Already in Process

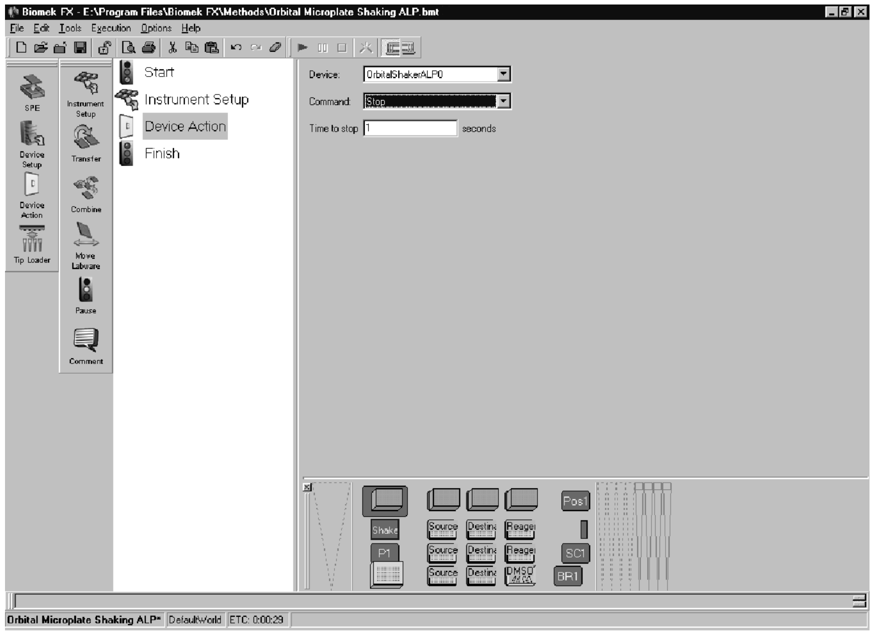
Stopping a shaking procedure already in process is accomplished using the **Stop** command. The number of seconds the Orbital Shaker ALP has to stop the shaking procedure is specified in the **Stop** command configuration.

NOTE The default configuration for stopping a shaking procedure is **1** second.

To configure the Orbital Shaker ALP to stop a shaking procedure already in process:

1 In **Command**, select **Stop** (Figure 18.22).

Figure 18.22 Device Action Step Configured to Stop All Shaking Motion on an Orbital Shaker ALP



2 In **Time to stop**, enter the duration (in seconds) the device has to move from full speed to a full stop.

NOTE The minimum value allowed in **Time to stop** is **0.5** second while the maximum value is **600** seconds.

Clamping and Unclamping Labware on the Orbital Shaker ALP

The Orbital Shaker ALP clamps automatically before a microplate is accessed for pipetting and before any shaking procedure is initiated. It remains clamped until a gripper move, the **Device Action** step, or the end of a method releases the microplate; however, a **Device Action** step can be used to actuate the clamps at any time during a method.

⚠ CAUTION

Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

The **Clamp** and **Unclamp** commands found in the **Device Action** step configuration for the Orbital Shaker ALP are used to actuate the clamps at any time during a method. No configuration is necessary beyond the selection of **Clamp** or **Unclamp** in the step configuration.

NOTE The microplate platform on the Orbital Shaker ALP must be in the home position before labware on the ALP can be accessed for a pipetting operation. If access to a microplate is required, the ALP actuates the clamps and homes the microplate platform, if necessary, prior to allowing access to the labware on the ALP.

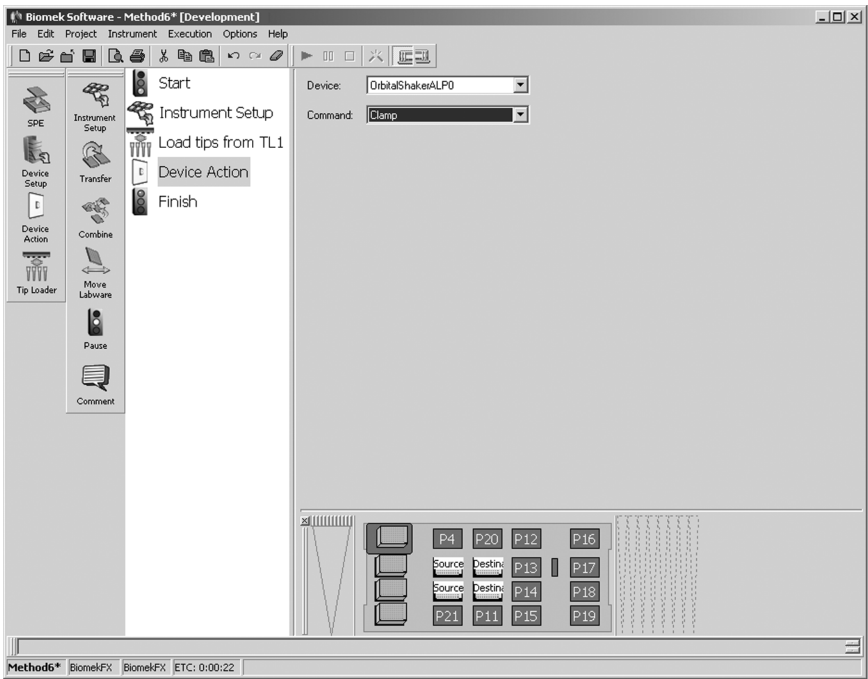
NOTE If a light curtain violation occurs while the clamp on the Orbital Shaker ALP is in motion, the motion is completed. The state of the clamp on the ALP does not change when the light curtain is violated or during a pause in a method.

NOTE The Orbital Shaker ALP can also be controlled outside a method using **Manual Control** in Biomek Software (refer to *Manually Clamping and Unclamping Labware*).

To configure the Orbital Shaker ALP to clamp or unclamp labware during a method run:

In **Command**, select **Clamp** or **Unclamp** (Figure 18.23).

Figure 18.23 Device Action Step Configured to Actuate the Clamps on an Orbital Shaker ALP



Homing the Microplate Platform on the Orbital Shaker ALP

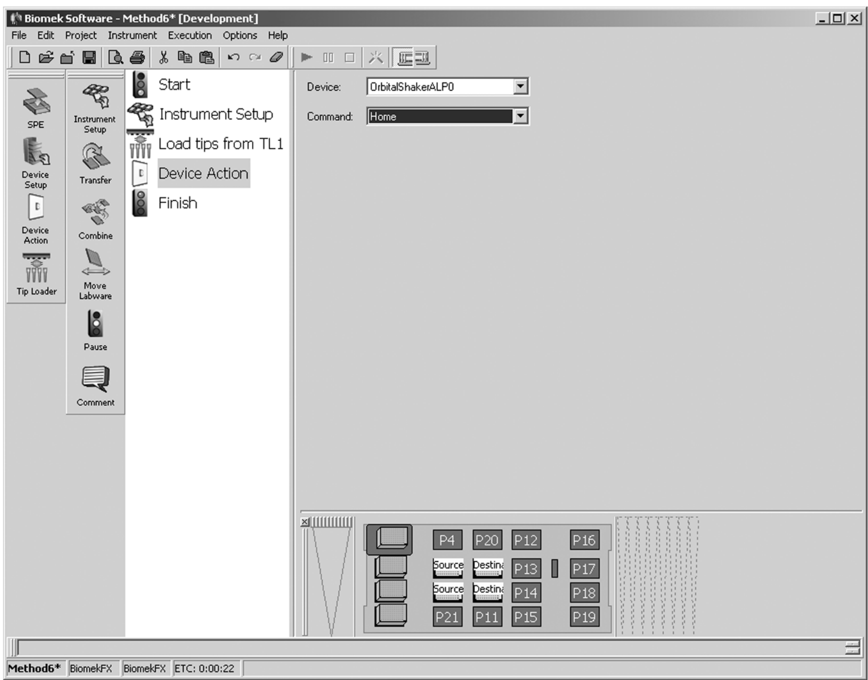
Homing the microplate platform ensures that the Biomek instrument can accurately access labware on the ALP for pipetting operations. The microplate platform on the Orbital Shaker ALP can be homed at any time during a method run, as long as a shaking operation is not already in process on the ALP. The home position for the microplate shaking platform is in the center of the ALP.

NOTE The microplate platform automatically homes at the beginning of each method.

No configuration is necessary beyond the selection of **Home** in the step configuration. To configure the Orbital Shaker ALP to home the microplate platform during a method run:

In **Command**, select **Home** (Figure 18.24). The microplate platform moves to the center of the ALP.

Figure 18.24 Device Action Step Configured to Home the Microplate Shaking Platform On an Orbital Shaker ALP



Stopping and Restarting a Method

If a need for manual control is realized during a method run and the method is stopped using either the **Stop** or **Snap Continuation** buttons (refer to the *Biomek Software User's Manual*, Chapter 26, *Snapping a Continuation*), the Orbital Shaker ALP does not automatically restart the shaking procedure when the Continuation method is started. In order to restart a shaking operation, a **Device Action** step must be inserted into the Continuation method.

Snap Continuation stops the method after Biomek instrument completes the move in progress and creates a Continuation method (refer to the *Biomek Software User's Manual*, Chapter 26, *Light Curtain Errors*).

⚠ CAUTION

If using Biomek FX Software version 2.1c or prior, crashes may occur when executing a Continuation method. To avoid crashes, delete any partially completed Orbital Shaker ALP steps and reinsert them into the Continuation method.

NOTE **Manual Control** is available only when a method is not being executed.

NOTE If the method is in the process of performing a move, such as aspirating or dispensing, the Biomek instrument completes the move; however, the instrument may not complete the entire step. For example, if the Biomek instrument is in the process of performing a **Transfer** step and an error occurs while it is aspirating, selecting **Snap** results in completing the aspiration but not the **Transfer** step.

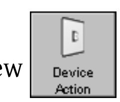
Choosing Snap

Snap allows the method to be modified without changing the original method. When **Snap** is chosen, a Continuation is created. A Continuation is a new method consisting of the step causing the error, any steps not yet completed, and, if applicable, any incomplete substeps of the step which generated the error (refer to the *Biomek Software User's Manual*, Chapter 26, *Snapping a Continuation*).

To use **Snap**:

1 Choose **Snap** to create a Continuation (refer to the *Biomek Software User's Manual*, Chapter 26, *Snapping a Continuation*).

2 Delete all partially completed Orbital Shaker ALP **Device Action** steps.

3 Reinsert the deleted Orbital Shaker ALP **Device Action** steps by inserting a new 

step into the **Method View** (Figure 18.17).

NOTE A new **Device Action** step must be inserted for each Orbital Shaker ALP step deleted.

4 In **Device**, select the desired **OrbitalShakerALP**.

OR

Click on the Orbital Shaker ALP in the Current Deck Display to select it. The configuration for the ALP appears (Figure 18.18).

NOTE Any devices installed in **Hardware Setup**, except Tip Loaders and Device Controllers, are listed under **Device** in the **Device Action** Step Configuration.

NOTE When an Orbital Shaker ALP is selected in **Device**, the ALP is highlighted by a blue border in the Current Deck Display.

5 In **Command**, select the desired action for the Orbital Shaker ALP.

NOTE The configuration for the Orbital Shaker ALP changes based on the selection made in **Command**.

NOTE If a light curtain violation occurs while the Orbital Shaker ALP is operating, the shaking operation is completed.

Controlling the Orbital Shaker ALP Outside a Method

Advanced Manual Control is used to control the Orbital Shaker ALP outside a method. Controlling the Orbital Shaker ALP outside a method includes:

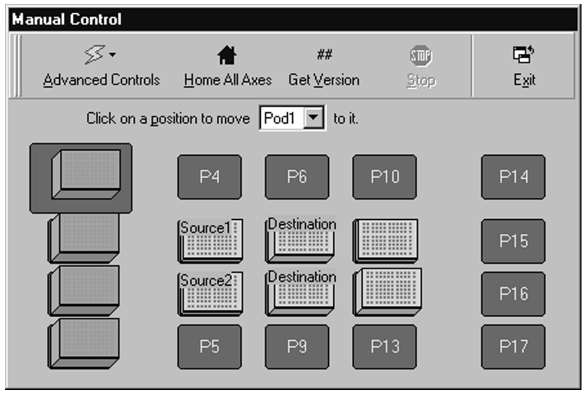
- *Manually Controlling a Standard Shaking Procedure*
- *Manually Controlling a Shaking Procedure of a Specific Length of Time*
- *Manually Executing a Previously Defined Shaking Profile*
- *Manually Controlling a Pulsing Shake*
- *Manually Stopping a Shaking Procedure Already in Process*
- *Manually Clamping and Unclamping Labware*
- *Manually Homing the Microplate Platform*

To open **Manual Control**, choose **Instrument > Manual Control**. An **Information** dialog (Figure 18.25) briefly appears as a connection is established with the Biomek instrument, immediately followed by **Manual Control** (Figure 18.26).

NOTE **Manual Control** is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the  or the  button (refer to the *Biomek Software User's Manual*, Chapter 26, *Snapping a Continuation*) before accessing **Manual Control.**

Figure 18.25 Confirms Manual Control is Connecting

Figure 18.26 Manual Control



Access **Advanced Manual Control** to select and control the appropriate Orbital Shaker ALP. **Advanced Manual Control** can be used to command the ALP to:

- **Shake** — shake labware at the indicated RPM in the specified direction.
- **Timed Shake** — shake labware at the indicated RPM in the specified direction for the indicated number of seconds.
- **Run** — shake labware using parameters from a previously defined shaking profile.
- **Pulse** — shake labware using a sequence of actions that pulse the labware in alternating directions at a specific velocity for an indicated number of seconds.
- **Stop** — stop any shaking procedure by slowing the shaking action within the indicated number of seconds.
- **Clamp** — actuate the clamp to hold the labware in place.
- **Home** — center the microplate platform on the ALP base.
- **Unclamp** — release the clamp, allowing removal of the labware from the ALP.

To open **Advanced Manual Control** for a specific Orbital Shaker ALP:

---

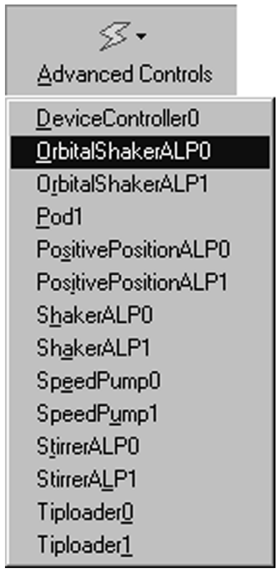
1 Choose **Instrument > Manual Control**. **Manual Control** appears (Figure 18.26).

---

2 Click on 

and a list of all the installed pods and devices appears (Figure 18.27).

Figure 18.27 Selecting an Orbital Microplate Shaking in Advanced Manual Control



3 Select the desired **Orbital Shaker ALP**. **Advanced Manual Control** for the selected ALP appears.

4 Configure the device to perform the desired action.

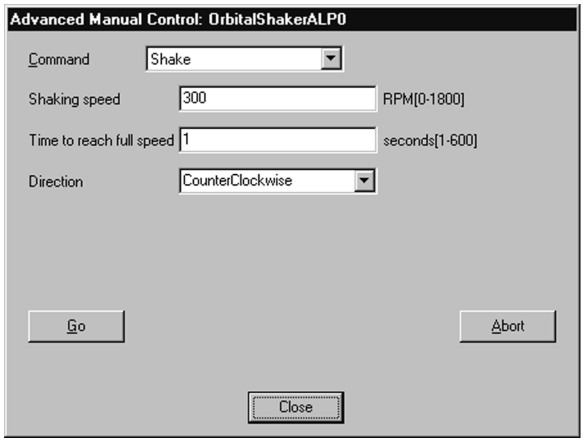
Manually Controlling a Standard Shaking Procedure

To configure the Orbital Shaker ALP to shake labware:

NOTE The default configuration for the Orbital Shaker ALP is to shake labware **CounterClockwise** with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

1 In **Command**, select **Shake** (Figure 18.28).

Figure 18.28 Using Advanced Manual Control for a Continuous Shaking Motion on an Orbital Shaker ALP



2 In **Shaking speed**, indicate the desired shaking speed in RPM.

NOTE The minimum **Shaking speed** allowed is **0** RPM while the maximum **Shaking speed** allowed is **1800** RPM. Refer to *Establishing a Safe Maximum Shaking Speed*, for more information.

3 In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

NOTE The minimum value allowed in **Time to reach full speed** is **1** second while the maximum value allowed in **Time to reach full speed** is **600** seconds.

4 In **Direction**, select whether the orbital shaking motion shakes in a **Clockwise** or **CounterClockwise** direction.

NOTE The default **Direction** is **CounterClockwise**.

5 Choose **Go.** The ALP shakes the microplate platform according to the specified parameters.

OR

Choose **Abort** to immediately stop the action in process.

6 Choose **Close** to close **Advanced Manual Control.**

7 Choose **Exit** to close **Manual Control.**

Manually Controlling a Shaking Procedure of a Specific Length of Time

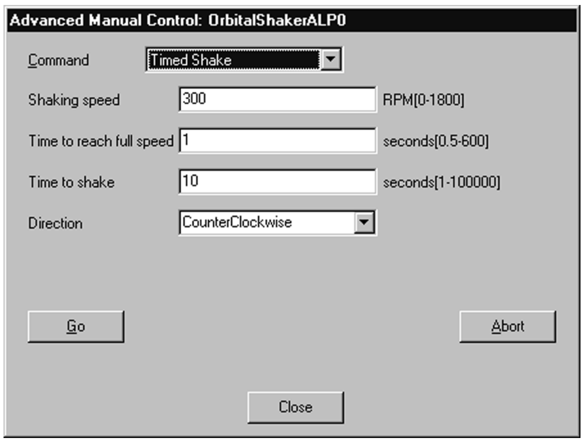
To configure the Orbital Shaker ALP to shake labware a specific length of time:

NOTE The default configuration for a timed shaking sequence is to shake labware for **10** seconds in a **CounterClockwise** direction with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

---

1 In **Command**, select **Timed Shake** (Figure 18.29).

Figure 18.29 Using Advanced Manual Control to Control a Timed Shaking Motion on an Orbital Shaker ALP



---

2 In **Shaking speed**, indicate the desired shaking speed in RPM.

NOTE The minimum **Shaking speed** allowed is **0** RPM while the maximum **Shaking speed** allowed is **1800** RPM. Refer to *Establishing a Safe Maximum Shaking Speed*, for more information.

---

3 In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

NOTE The minimum value allowed in **Time to reach full speed** is **0.5** seconds while the maximum value is **600** seconds.

---

4 In **Time to Shake**, enter the duration (in seconds) the ALP shakes the labware.

NOTE The minimum value allowed in **Time to shake** is **1** second while the maximum is **100,000** seconds.

---

5 In **Direction**, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

NOTE The default **Direction** is **CounterClockwise**.

6 Choose **Go**. The ALP shakes the labware according to the specified parameters.

OR

Choose **Abort** to immediately stop the action in process.

7 Choose **Close** to close **Advanced Manual Control**.

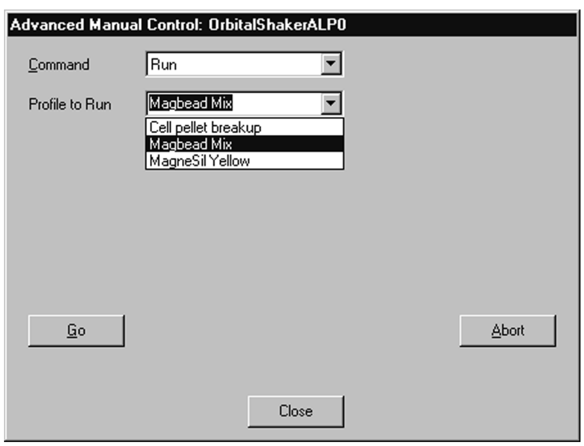
8 Choose **Exit** to close **Manual Control**.

Manually Executing a Previously Defined Shaking Profile

To configure the Orbital Shaker ALP to follow previously defined shaking profiles:

1 In **Command**, select **Run** (Figure 18.30).

Figure 18.30 Using Advanced Manual Control to Run a Previously Defined Shaking Profile on an Orbital Shaker ALP



2 In **Profile to Run**, select the desired profile. There are three profiles available for selection:

- **Cell pellet breakup** — resuspends cells using 190µL Promega Cell Resuspension Solution in a Costar 96 square, deep-well microplate. The **Cell pellet breakup** profile completes five 1-second pulses at 950 RPM, then 28 5-second pulses at 900 RPM, and, finally, 90 seconds of shaking in a counterclockwise direction at 900 RPM.

- **Magbead Mix**— mixes MagneSil™ particles in low-viscosity fluids.The **Magbead Mix** profile completes three 2-second pulses at 800 RPM, followed by 60 seconds of shaking in a constant direction at 750 RPM.

  NOTE More gentle mix typically used for particles in low-viscosity fluids.

- **MagneSil Yellow**— mixes MagneSil™ Yellow particles in a water or wash solution. The **MagneSil** profile completes 12 4-second pulses at 1000 RPM.

  NOTE More vigorous mix typically used with small volumes and higher-viscosity fluids.

3 Choose **Go**. The ALP runs the selected profile.

OR

Choose **Abort** to immediately stop the action in process.

4 Choose **Close** to close **Advanced Manual Control**.

5 Choose **Exit** to close **Manual Control**.

Manually Controlling a Pulsing Shake

WARNING

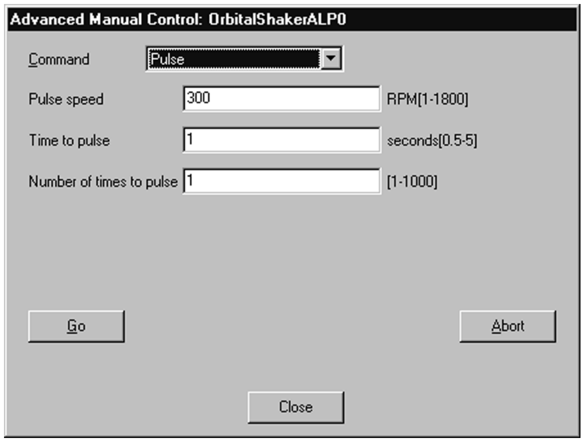
The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

To configure the Orbital Shaker ALP to shake labware using a pulsing motion:

NOTE The default values for **Pulse** do not correspond with the parameters displayed in Table 18.1. (Refer to Table 18.1, *Recommended Maximum Labware Shaking Speeds*, for recommended shaking speeds for tested labware and fluid combinations.)

1 In **Command**, select **Pulse** (Figure 18.31).

Figure 18.31 Using Advanced Manual Control for a Pulsing Shake Motion on an Orbital Shaker ALP



2. Enter a **Pulse Speed** in RPM.

   NOTE The minimum **Pulse Speed** allowed is **1 RPM** and the maximum is **1800 RPM**.

3. In **Time to Pulse**, enter the duration (in seconds) the Orbital Shaker ALP shakes in each direction.

   NOTE The minimum value allowed in **Time to Pulse** is **0.5** seconds while the maximum value allowed in **Time to Pulse** is **5** seconds.

4. Enter the **Number of times to Pulse** to execute the pulsing sequence.

   NOTE The minimum value allowed in **Number of times to Pulse** is **1** and the maximum is **1000**.

5. Choose **Go.** The ALP pulses the labware according to the specified parameters.

   OR

   Choose **Abort** to immediately stop the action in process.

6. Choose **Close** to close **Advanced Manual Control**.

7. Choose **Exit** to close **Manual Control**.

Manually Stopping a Shaking Procedure Already in Process

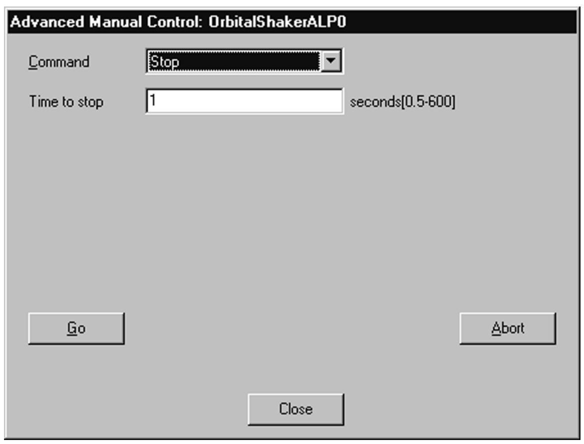
To configure the Orbital Shaker ALP to stop a **Manual Shake** procedure already in process:

NOTE **Stop** will not halt a timed shake, pulse shake, or profile shake procedure already in process. **Abort** must be used to stop a timed shake, pulse shake, or profile shake procedure.

NOTE The default configuration for stopping a shaking procedure is **1** second.

1 In **Command**, select **Stop** (Figure 18.32).

Figure 18.32 Using Advanced Manual Control to Stop All Shaking Motion on an Orbital Shaker ALP



2 In **Time to stop**, enter the duration (in seconds) the device has to move from full speed to a full stop.

NOTE The minimum value allowed in **Time to stop** is **0.5** seconds while the maximum value is **600** seconds.

3 Choose **Go**. The ALP stops all shaking motion.

OR

Choose **Abort** to immediately stop the action in process.

4 Choose **Close** to close **Advanced Manual Control**.

5 Choose **Exit** to close **Manual Control**.

Manually Clamping and Unclamping Labware

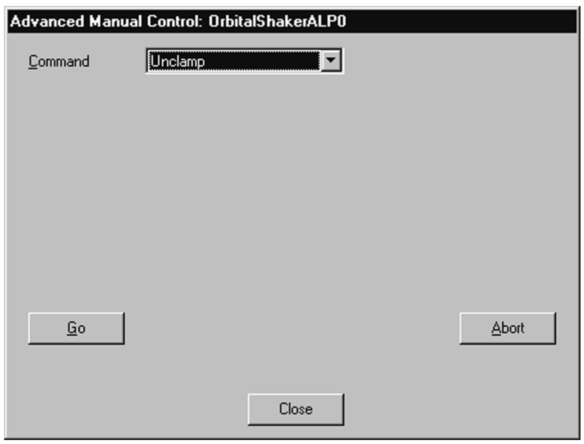
To configure the Orbital Shaker ALP to clamp or unclamp labware:

NOTE **Clamp** and **Unclamp** cannot interrupt a shaking operation. All shaking operations must stop before using **Clamp** or **Unclamp**.

NOTE If a light curtain violation occurs while the clamp is in motion, the motion is completed. The state of the clamp does not change when the light curtain is violated or during a pause in a method.

1 In **Command**, select **Clamp** or **Unclamp** (Figure 18.33).

Figure 18.33 Using Advanced Manual Control to Actuate the Clamps on an Orbital Shaker ALP



2 Choose **Go**. The ALP actuates the clamps.

OR

Choose **Abort** to immediately stop the action in process.

3 Choose **Close** to close **Advanced Manual Control**.

4 Choose **Exit** to close **Manual Control**.

Manually Homing the Microplate Platform

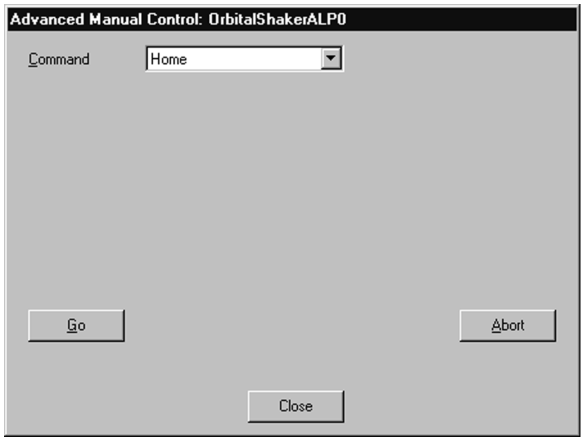
To configure the Orbital Shaker ALP to home the microplate platform:

NOTE All shaking operations must stop before using **Home**.

NOTE The ALP must be clamped prior to homing.

1 In **Command**, select **Home** (Figure 18.34).

Figure 18.34 Using Advanced Manual Control to Home the Microplate Platform on an Orbital Shaker ALP



2 Choose **Go**. The ALP homes the microplate platform.

OR

Choose **Abort** to immediately stop the action in process.

3 Choose **Close** to close **Advanced Manual Control**.

4 Choose **Exit** to close **Manual Control**.

Removing the Orbital Shaker ALP from the Deck

To remove the Orbital Shaker ALP:

WARNING

Disconnect main power before connecting or disconnecting CAN cables.

1 Turn off power to Biomek instrument.

2 Unplug the CAN communication cable from the CAN Port on the Orbital Shaker ALP.

3 Unplug the CAN communication cable from the CAN Port on the Biomek instrument.

4 Loosen the thumbscrews on the base of the ALP.

5 Lift ALP straight up to clear the locating pins on the base of the ALP from the locating holes on the deck.

Storage

Return the Orbital Shaker ALP and CAN communications cable to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Orbital Shaker ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Troubleshooting

Do not remove covers for any reason. Do not attempt to repair the Orbital Shaker ALP without first contacting a Beckman Coulter Service Engineer.

Table 18.2 Troubleshooting the Orbital Shaker ALP

If...	Then...
The Orbital Shaker ALP is not functioning.	Make sure a good CAN connection has been established.
The clamps are not grasping the labware.	Make sure the labware is supported by the Biomek instrument. Make sure the labware is defined properly in the **Labware Type Editor.** Refer to the *Biomek Software User's Manual*, Chapter 8, *Creating and Modifying Tip and Labware Types* for more information on defining labware. Contact a Beckman Coulter Service Engineer.

Positive Position ALP

Overview

The Positive Position ALP (Figure 19.1) is an active ALP that verifies the presence or absence of a microplate on the ALP and accurately and precisely positions it for interaction with the Biomek instrument. The Positive Position ALP accepts most microplates; however, its main function is to accurately position microplates requiring high precision within wells. Microplates can be loaded to the Positive Position ALP by a lab technician, the ORCA Robot, or by the Biomek gripper.

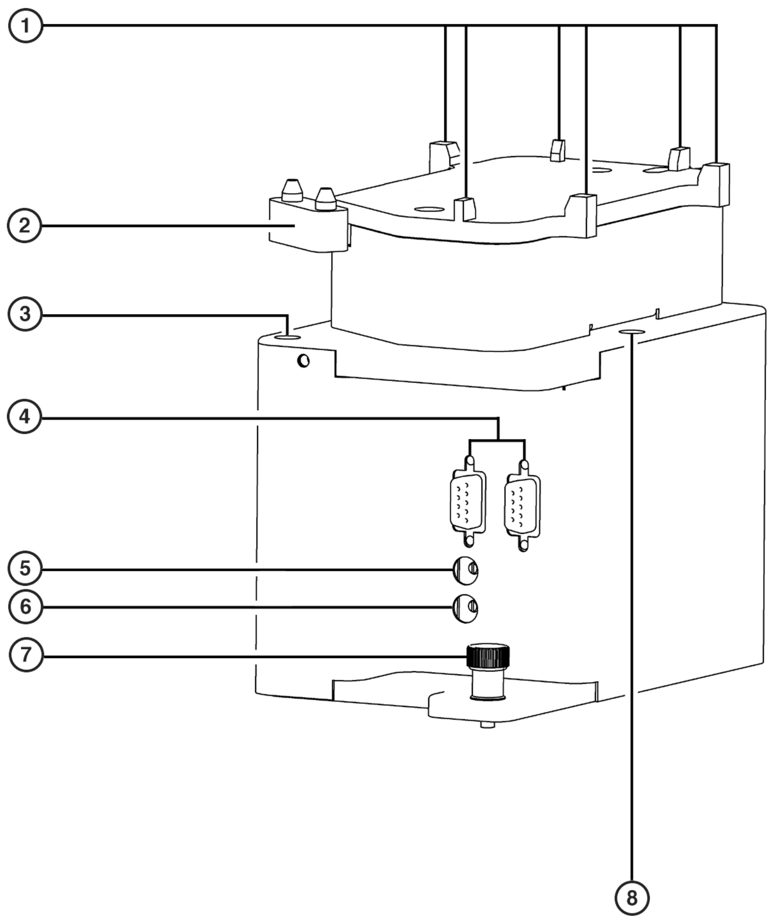
NOTE The Positive Position ALP may not be able to detect unskirted microplates. Verify that the Positive Position ALP is capable of detecting unskirted microplates using a **Device Action** step (refer to the *Biomek Software User's Manual*, Chapter 23, *Device Action Step*). The Positive Position ALP can also be manually controlled using **Advanced Manual Control** in the Biomek Software (refer to *Controlling the Positive Position ALP Outside a Method*).

NOTE The Positive Position ALP does not support the Costar Deep 96-well microplate.

The sections in this chapter include:

- *Installing the Positive Position ALP*
- *Framing Instructions*
- *Using the Positive Position ALP in a Method*
- *Controlling the Positive Position ALP Outside a Method*
- *Removing the Positive Position ALP from the Deck*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 19.1 Positive Position ALP



1. **Fixed Labware Positioning Guides**
2. **Positive Position ALP Clamp**
3. **X-Axis Leveling Screw**
4. **CAN Communication Ports**
5. **ADR1**
6. **ADR2**
7. **Thumbscrew**
8. **Y-Axis Leveling Screw**

Installing the Positive Position ALP

Installing the Positive Position ALP includes:

- Choosing any standard deck position.

  NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

- *Mounting a Positive Position ALP to the Deck*
- *Leveling the Positive Position ALP*
- *Aligning the Top of the Positive Position ALP with the Multichannel Head or Span-8 Probes*

Mounting a Positive Position ALP to the Deck

WARNING

Disconnect main power before connecting or disconnecting CAN cables.

To mount the Positive Position ALP:

1. Turn off power to the Biomek instrument before mounting any ALP.

2. Position the Positive Position ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, the CAN connections are to the right of the ALP, and the clamp is in the front right corner of the ALP when facing the Biomek instrument.

CAUTION

Orient the Positive Position ALP so the CAN connections are to the right of the ALP and the clamp is in the front right corner of the ALP when facing the Biomek instrument.

3. Fasten the Positive Position ALP to the deck using the thumbscrews on the base of the ALP.

4. Plug the female end of the CAN communication cable into the male CAN Port on the Positive Position ALP.

CAUTION

A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

NOTE When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5. Plug the other end of the CAN communication cable into one of the following connectors:

   NOTE Make sure the cable routing does not interfere with the operation of the Biomek instrument.

   - Any female connector labeled “CAN Port” on the main Biomek instrument.
   - Any available female connector labeled “CAN Port” on another Active ALP, creating a chain of connected cables.

     NOTE A chain links multiple devices together. The maximum number of devices that can be chained together is three. Each chain of three devices must plug into the main Biomek instrument at some point.

     NOTE The maximum number of Positive Position ALPs allowed on the Biomek deck is 20.

6 Verify that address switch ADR1 is set between 0 and 7.

NOTE The device address for a Positive Position ALP is set by both ADR1 and ADR2.

NOTE The default setting for ADR1 is 0, with legal addresses for ADR1 being 0 through 7. If ADR1 is set to addresses 8, it is remapped to 0; if ADR1 is set to 9, it is remapped to 1; and if ADR1 is set to addresses A through F, they are remapped down to addresses 2 through 7.

7 Verify that address switch ADR2 is set between 0 and F.

NOTE The default setting for ADR2 is 0.

Leveling the Positive Position ALP

Once the Positive Position ALP is installed, it must be leveled.

To level the Positive Position ALP:

1 Loosen the three leveling screws two full counterclockwise rotations.

2 Load tips to the pod, if tips are not already loaded.

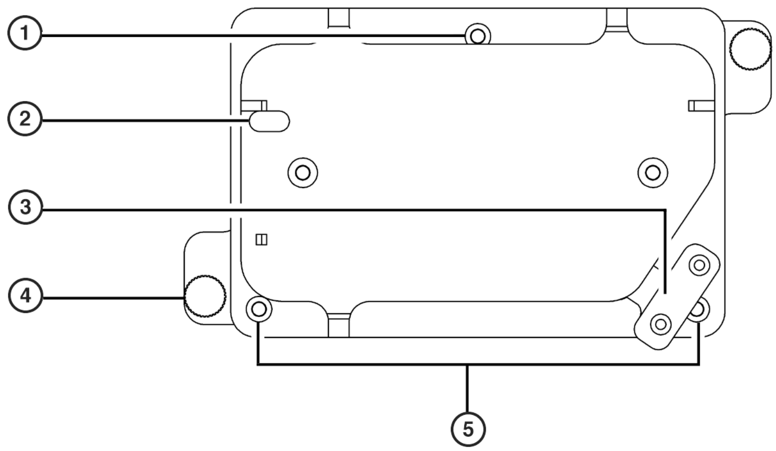
3 Lower tips until slightly above the top of the Positive Position ALP.

4 Level the X axis to the tips using the two X axis leveling screws by turning the screws clockwise one at a time (Figure 19.2 and Figure 19.3).

NOTE Tightening a screw lowers that side of the Positive Position ALP.

5 Level the Y axis to the tips using the Y axis leveling screw by turning the screw clockwise (Figure 19.1 and Figure 19.2).

Figure 19.2 Leveling Screws for the Positive Position ALP (Top-down View)



1. **Y Axis Leveling Screw**
2. **Labware Sensor**
3. **Positive Position ALP Clamp**
4. **Thumbscrew**
5. **X Axis Leveling Screws**

Aligning the Top of the Positive Position ALP with the Multichannel Head or Span-8 Probes

Once the Positive Position ALP is installed and leveled, it must be aligned with the pod accessing it. Proper alignment prevents damage to the pod, head, probes, tips, ALP, and labware.

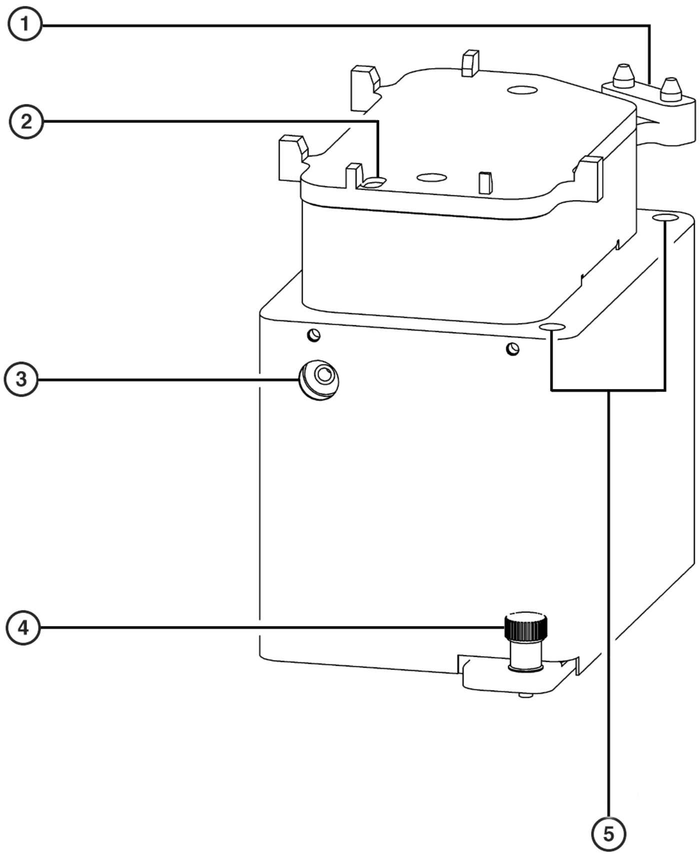
To align the Positive Position ALP:

1. Load tips to the pod if tips are not already loaded.
2. Position a microplate on the top of the Positive Position ALP.
3. Lower tips until slightly above the labware on top of the Positive Position ALP.
4. Verify that the microplate wells align with the tips. If necessary, tighten the rotational adjustment screw using the screwdriver provided to rotate the top of the Positive Position ALP counterclockwise (Figure 19.3).

   OR

   Loosen the rotational adjustment screw using the screwdriver provided to rotate the top of the Positive Position ALP clockwise (Figure 19.3).

Figure 19.3 Rotational Adjustment Screw for the Positive Position ALP (Left Side View)



1. **Positive Position ALP Clamp**
2. **Labware Sensor**
3. **Rotational Adjustment Screw**
4. **Thumbscrew**
5. **X Axis Leveling Screws**

Framing Instructions

When using the Positive Position ALP with high-density labware, the ALP may need to be manually framed using **Manual Teach** to ensure that the tips can access the wells without causing any damage to the tips, probes, pod, or ALP. **Manual Teach** is accessed through **Position Properties** in the **Deck Editor**.

To frame the Positive Position ALP using **Manual Teach**, follow the instructions outlined in specific manual for the instrument.

NOTE When using labware other than 1536-well on the Positive Position ALP, the standard framing procedure using the AccuFrame is usually acceptable. To frame the ALP using the AccuFrame, manually position the AccuFrame against the locating surfaces in the back, left corner of the ALP and refer to the specific manual for the instrument to complete the process.

Using the Positive Position ALP in a Method

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING

Pinch Point! The clamps used to secure a microplate to the Positive Position ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

To use the Positive Position ALP in a method, it must be installed in **Hardware Setup** (refer to CHAPTER 1, *Installing and Configuring ALPs*).

The Positive Position ALP unclamps automatically at the end of a method; however, a **Device Action** step can be used to actuate the clamps in the middle of a method or to verify the presence or absence of labware on the ALP. If access to an unclamped microplate is required, the Positive Position ALP clamps before a pod is allowed to access the microplate. After access to the microplate is completed, the ALP remains clamped until a gripper move, the **Device Action** step, or the end of the method releases the microplate.

NOTE If a light curtain violation occurs while the clamp on the Positive Position ALP is in motion, the motion is completed. The state of the clamps on the Positive Position ALP do not change when the light curtain is violated or during a pause in a method.

NOTE The amount of force applied to accurately position a microplate depends upon the type of microplate placed on the Positive Position ALP. When the Positive Position ALP is used in a method, the force applied by the clamp is determined by the type of labware positioned on the ALP (refer to the *Biomek Software User's Manual*, Chapter 8, *Creating and Modifying Tip and Labware Types*). The force applied to clamp a microplate is a percentage of the total clamping force available.

To configure the **Device Action** step for the Positive Position ALP:

---

1 Insert a **Device Action** step into the method view.

---

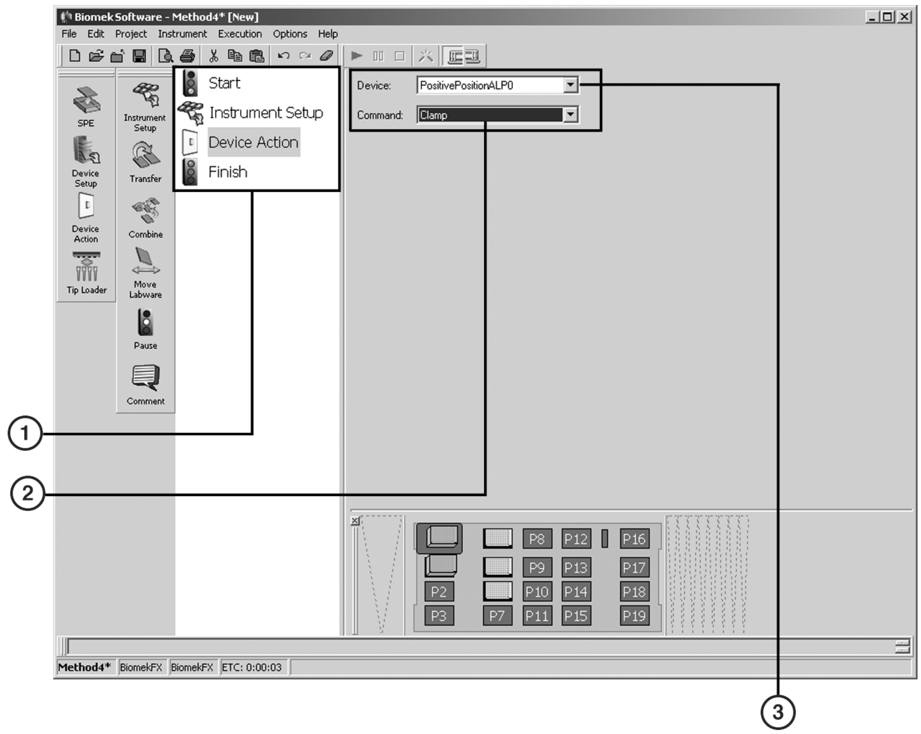
2 From **Device**, select the Positive Position ALP performing the required operation.

OR

Click on the Positive Position ALP in the Current Deck Display to select it. The configuration for the Positive Position ALP appears (Figure 19.4).

NOTE The deck position has a blue border in the Current Deck Display and is displayed to the right of **Device**.

Figure 19.4 Device Action Step for the Positive Position ALP



1. **Method View** — the **Device Action** caption indicates the device and its status.
2. **Device Action Step Configuration** — the **Device Action** step configuration specifies an operation performed on the Positive Position ALP.
3. **Deck Position** — indicates the position of the device performing the action on the deck.

3 In **Command**, indicate the desired action for the Positive Position ALP:

- **Clamp** — tightens the clamp to hold the labware in place.
- **Unclamp** — releases the clamp to allow the labware to be removed from the ALP.
- **VerifyLabware** — verifies that labware is currently on the Positive Position ALP; an error displays and the method stops if no labware is found.
- **VerifyNoLabware** — verifies that there is currently no labware on the Positive Position ALP; an error displays and the method stops if labware is found.

Controlling the Positive Position ALP Outside a Method

To control the Positive Position ALP outside a method, use **Advanced Manual Control** for:

- *Clamping or Unclamping Labware on a Positive Position ALP*
- *Verifying the Sensor on the Positive Position ALP Operates Properly*

NOTE Generally, the only time the sensor is verified is during troubleshooting.

- *Verifying the Positive Position ALP Recognizes a Type of Labware*

Clamping or Unclamping Labware on a Positive Position ALP

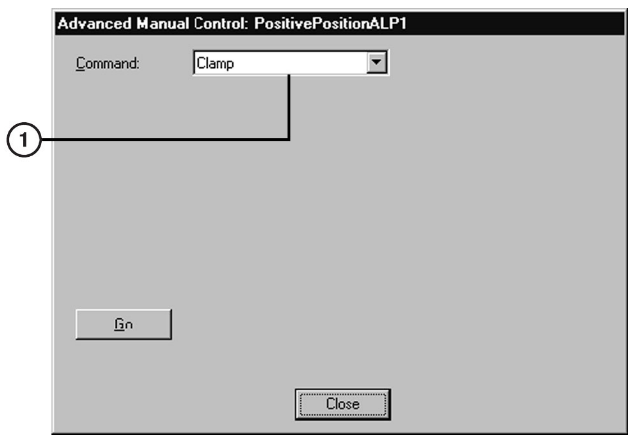
To clamp labware on a Positive Position ALP:

1 Choose **Instrument** > **Manual Control. Manual Control** appears.

2 Choose **Advanced Controls.**

3 Select the desired **Positive Position ALP. Advanced Manual Control** for the selected Positive Position ALP appears (Figure 19.5).

Figure 19.5 Advanced Manual Control for a Positive Position ALP



1. From **Command**, choose **Clamp**, **Unclamp**, **VerifyLabware**, or **VerifiyNoLabware.**

4 From **Command**, choose **Clamp.**

5 Choose **Go.** The clamps actuate.

6 Choose **Close** to close **Advanced Manual Control.**

7 Choose **Exit** to close **Manual Control.**

To unclamp labware from a Positive Position ALP:

1 Choose **Instrument** > **Manual Control. Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Positive Position ALP**. **Advanced Manual Control** for the selected Positive Position ALP appears (Figure 19.5).

4 From **Command**, choose **Unclamp**.

5 Choose **Go**. The clamps disengage.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Verifying the Sensor on the Positive Position ALP Operates Properly

Manual Control may be used to verify the sensor on the Positive Position ALP operates properly. Generally, the only time the sensor is verified is during troubleshooting.

To verify the sensor operates properly:

1 Place a piece of labware on the Positive Position ALP.

2 Choose **Instrument** > **Manual Control**. **Manual Control** appears.

3 Choose **Advanced Controls**.

4 Select the desired **Positive Position ALP**. **Advanced Manual Control** for the selected Positive Position ALP appears (Figure 19.5).

5 From **Command**, choose **VerifyLabware**.

6 Choose **Go.** The Positive Position ALP recognizes the piece of labware unless an **Error** appears (Figure 19.6).

NOTE If the following **Error** (Figure 19.6) appears, the sensor does not recognize the labware present on the Positive Position ALP because the sensor is not operating properly or the ALP does not recognize a specific type of labware.

NOTE Contact a Beckman Coulter Service Engineer if several types of labware are not recognized; the sensor on the Positive Position ALP is not operating properly.

Figure 19.6 Labware Not Found at Sensor

7 Choose **Close** to close **Advanced Manual Control.**

8 Choose **Exit** to close **Manual Control.**

OR

1 Make sure no labware is placed on the Positive Position ALP.

2 Choose **Instrument > Manual Control. Manual Control** appears.

3 Choose **Advanced Controls.**

4 Select the desired **Positive Position ALP. Advanced Manual Control** for the selected Positive Position ALP appears (Figure 19.5).

5 From **Command**, choose **VerifyNoLabware.**

6 Choose **Go**. The Positive Position ALP recognizes no labware is placed on the Positive Position ALP unless an **Error** appears (Figure 19.7).

NOTE If the following **Error** (Figure 19.7) appears, the sensor does not recognize that labware is not present on the Positive Position ALP; the sensor is not operating properly. Contact a Beckman Coulter Service Engineer.

Figure 19.7 Labware Found at Sensor

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

Verifying the Positive Position ALP Recognizes a Type of Labware

Follow the instructions in Section *Verifying the Sensor on the Positive Position ALP Operates Properly*, to verify if the Positive Position ALP recognizes a specific type of labware.

Removing the Positive Position ALP from the Deck

To remove the Positive Position ALP:

1 Turn off power to the Biomek instrument before removing the Positive Position ALP.

2 Unplug the CAN communication cable from the CAN Port on the Positive Position ALP.

3 Loosen the thumbscrews on the base of the ALP.

4 Lift the ALP in an upward motion to clear the locating pins from the deck.

Storage

Return the Positive Position ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the Positive Position ALP to air dry before returning it to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Troubleshooting

Do not attempt to repair the Positive Position ALP without first contacting a Beckman Coulter Service Engineer.

Table 19.1 Troubleshooting the Positive Position ALP

If...	Then...
The Positive Position ALP is not powering up.	Check CAN cable connection. Contact a Beckman Coulter Service Engineer.
The Positive Position ALP is not functioning correctly.	Contact a Beckman Service Engineer. **NOTE** Do not remove the cover(s) for any reason.

CHAPTER 20

Solid Phase Extraction (SPE) Vacuum Manifold ALP

Overview

The Solid Phase Extraction (SPE) Vacuum Manifold ALP (Figure 20.1) is an active ALP used to filter fluid from samples by pulling the fluid from a sample through a filtered microplate, and disposing of the filtered fluid. A user-supplied vacuum supply must be provided.

NOTE The SPE ALP requires a minimum vacuum supply of 20 in. Hg @ 4.5 SCFM (67.7 kPa @ 0.127 m^3/min).

The SPE ALP is required to complete the Plasmid DNA Miniprep process, and is configured by using the **SPE** step from the **Devices** step palette.

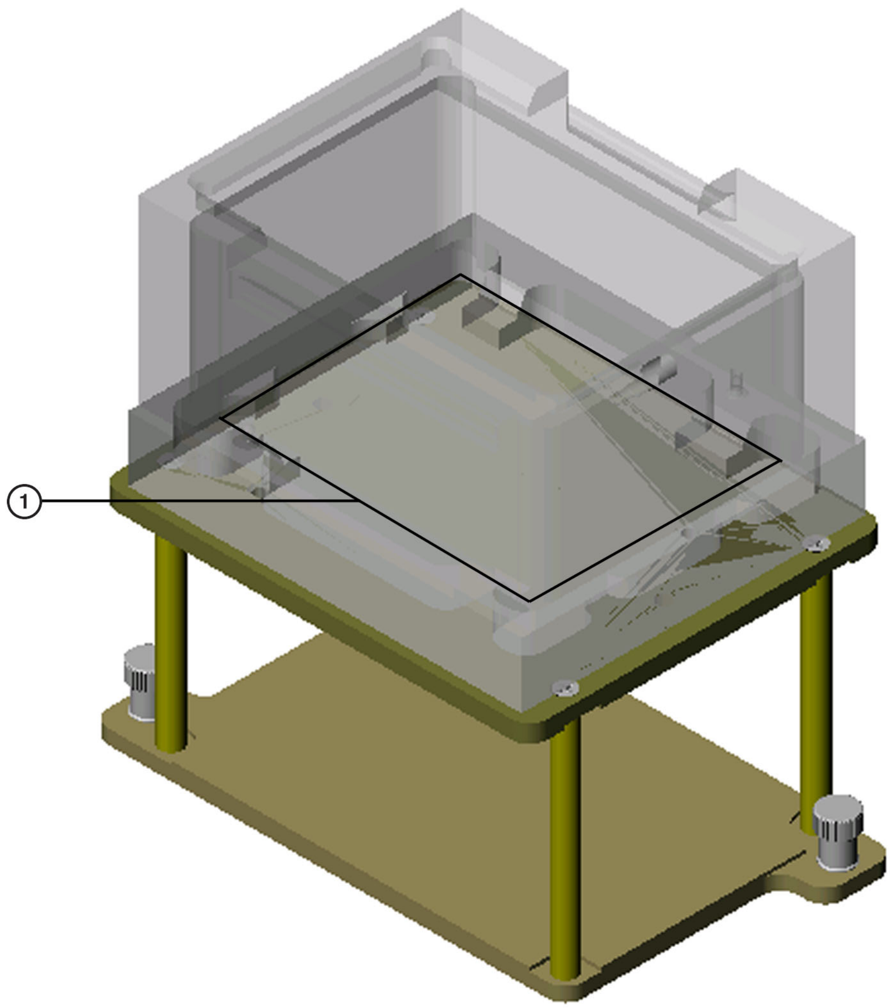
The components of the SPE ALP are stacked on two ALP stands: the SPE ALP Stand and SPE Collar Stand (refer to *Components of the SPE ALP*). The two ALP stands occupy two deck positions on the DNA Preparation Deck Layout and are used simultaneously during a method run.

NOTE Since the gripper fingers must open wide enough to grip the SPE Collar on the SPE Collar Stand and would hit an adjacent ALP, use the 1 x 1 Passive ALP with Indented Sides to allow the position adjacent to the SPE Collar Stand to be retained. The 1 x 1 Passive ALP with Indented Sides allows enough clearance for the gripper to extend and move the SPE Collar without hitting it (refer to CHAPTER 23, *1 x 1 Passive ALP with Indented Sides*).

The sections in this chapter include:

- *Installing the SPE ALP and SPE Collar Stand*
- *Framing Instructions*
- *Using the SPE ALP in a Method*
- *Removing the SPE ALP and SPE Collar Stand*
- *Controlling the Vacuum Valve Unit Inside a Method*
- *Controlling the Vacuum Valve Unit Outside a Method*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 20.1 SPE ALP with Collar



1. When framing the SPE ALP, the AccuFrame rests inside the SPE ALP Base as indicated.

NOTE The interior of the SPE ALP Base is used for framing (refer to *Framing Instructions*). The SPE Collar must be removed to frame the SPE ALP.

Components of the SPE ALP

The components of the SPE ALP are stacked on two ALP stands which are used simultaneously during a method run.

The components of the SPE ALP are:

- SPE ALP Base — connects to the vacuum used during filtration operations; all filtered fluids are drained through the SPE ALP Base.

- SPE ALP Collar — supports the source microplate and encloses the receiver filter microplate during filtration operations; referred to as the **Manifold** in the Biomek Software.

  NOTE There are multiple SPE Collars available for use on the SPE ALP. The specific collar used during a method run is specified by the wizard.

- Filter Microplate — the labware through which fluids are separated from solids in the SPE ALP; referred to as the **Filter Source** and **Receiver Source** in the Biomek Software.
- Filter Holder — a plastic device that holds a filtered microplate to protect it from damage.

NOTE The process of stacking the components of the SPE ALP during a method creates the SPE ALP. The SPE ALP can be assembled and/or disassembled during a method.

The two ALP stands are:

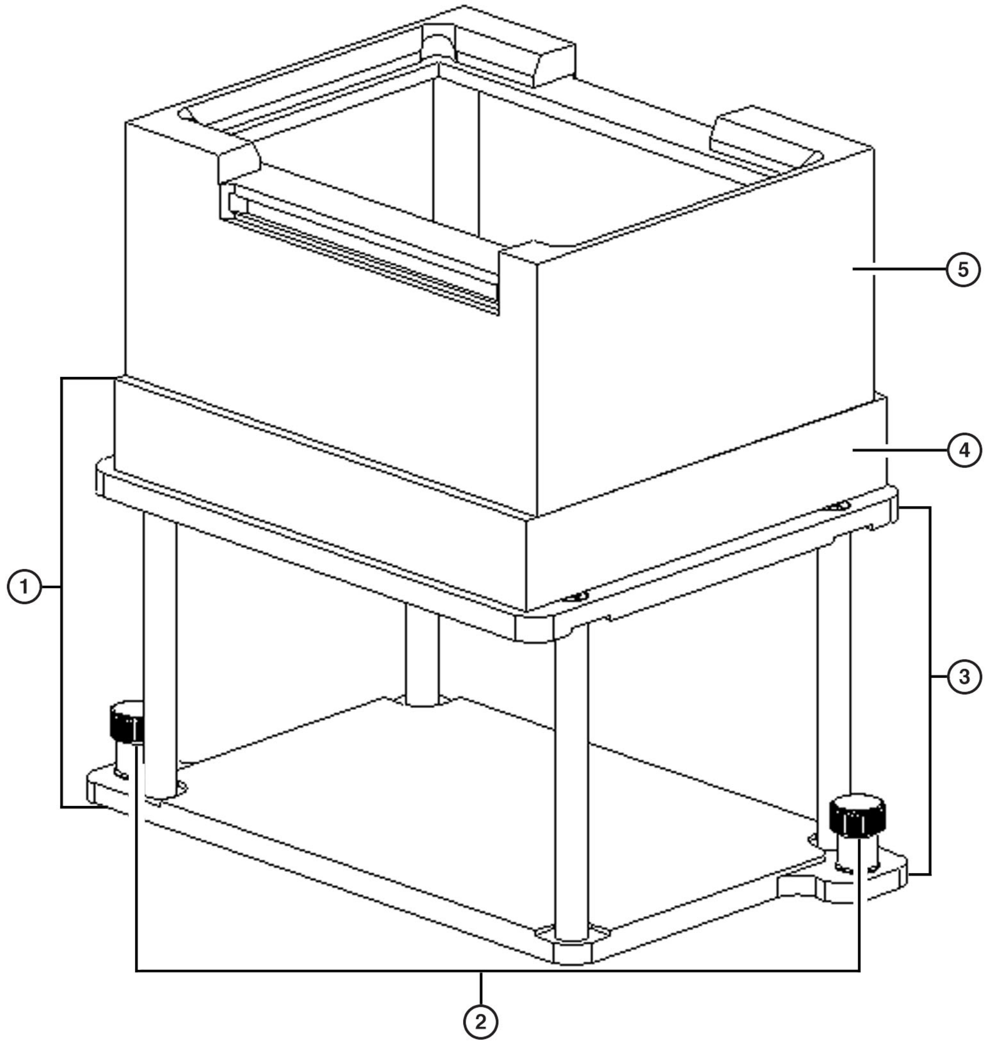
- SPE ALP Stand — supports the SPE ALP Base (Figure 20.2) where filtration occurs and occupies a position in the back row of the Biomek FX deck; the SPE ALP Stack is constructed on the SPE ALP Stand.

  NOTE The SPE ALP is the combination of the SPE ALP Base and the SPE ALP Stand. The SPE ALP Base and the SPE ALP Stand are treated as a single unit (the SPE ALP) in the Biomek Software.

- SPE Collar Stand — supports the SPE Collar (**Manifold** in the software) (Figure 20.3) and occupies a deck position adjacent to the SPE ALP Stand, in the same column.

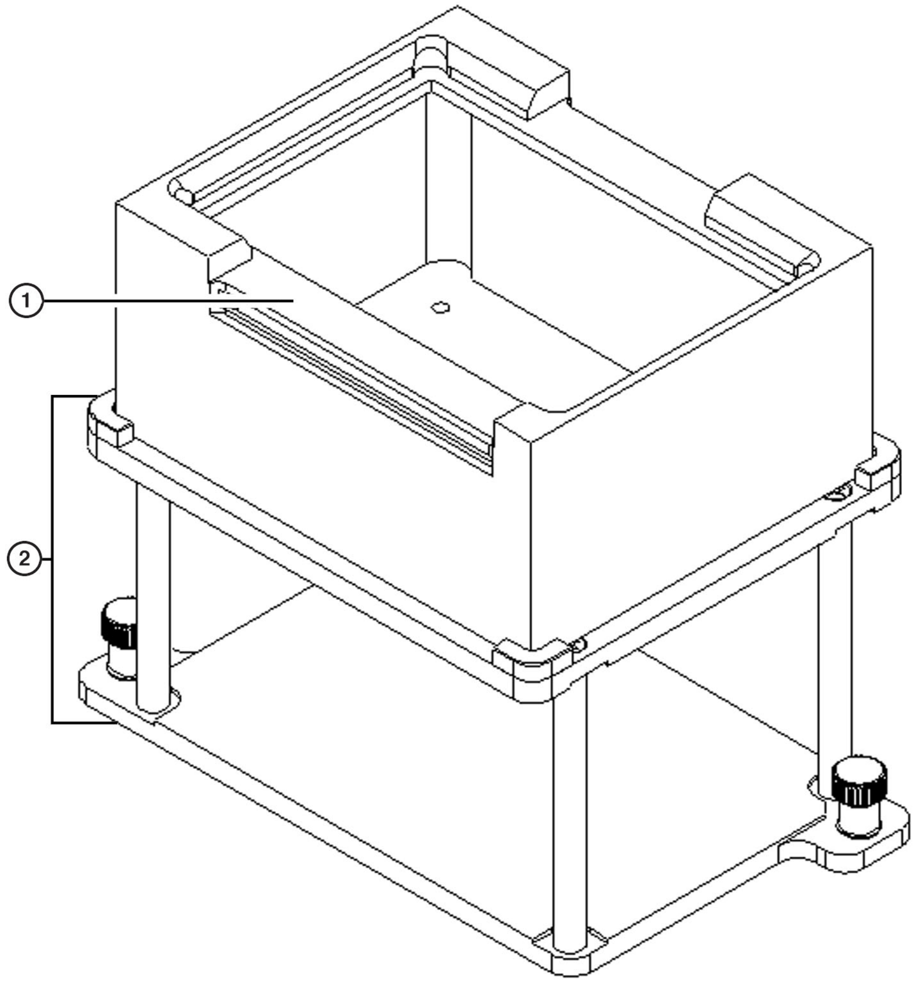
NOTE The two ALP stands occupy two deck positions on the DNA Preparation Deck Layout.

Figure 20.2 SPE Collar (Manifold), SPE ALP Base, and SPE ALP Stand



1. **SPE ALP** — combination of the SPE ALP Base and the SPE ALP Stand.
2. **Thumbscrews**
3. **SPE ALP Stand** — supports the SPE ALP Base.
4. **SPE ALP Base** — the SPE ALP Base connects to the vacuum and all filtered fluids are drained through the SPE ALP Base.
5. **SPE Collar (Manifold)** — referred to as the **Manifold** in the **SPE** step from the **Devices** step palette.

Figure 20.3 SPE Collar Placed on the SPE Collar Stand



1. **SPE Collar (Manifold)** — referred to as the **Manifold** in the **SPE** step from the **Devices** step palette.
2. **SPE Collar Stand**

Installing the SPE ALP and SPE Collar Stand

Installing the SPE ALP includes choosing adjacent deck positions for the SPE ALP and SPE Collar Stand and mounting them to the deck.

NOTE Connect the SPE ALP as recommended by the manufacturer of the vacuum system being used.

Choosing Deck Positions for the SPE ALP and Collar Stand

SPE ALP and the SPE Collar Stand occupy adjacent deck positions. Use the Biomek Software **Deck Editor** to determine available positions on which to install the SPE ALP and Collar Stand.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting the SPE ALP

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To mount the SPE ALP (Figure 20.2):

NOTE The SPE ALP is the combination of the SPE ALP Base and the SPE ALP Stand.

1. Position the SPE ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck.

2. Attach the SPE ALP to the deck using the thumbscrews on the ALP stand (Figure 20.2).

3. Attach a vacuum hose to the SPE ALP as directed by the manufacturer of the vacuum unit.

   NOTE The SPE ALP filtration manifold requires a minimum vacuum supply of 20 in. Hg @ 4.5 SCFM (67.7 kPa @ 0.127 m^3/min).

   NOTE The vacuum hose must run toward the back of the Biomek deck; so, make sure the barbed fitting on the SPE ALP is horizontal to the ALP edge.

   NOTE Make sure the hose routing does not interfere with the operation of the Biomek instrument.

4. Provide a waste container as specified by the vacuum pump manufacturer.

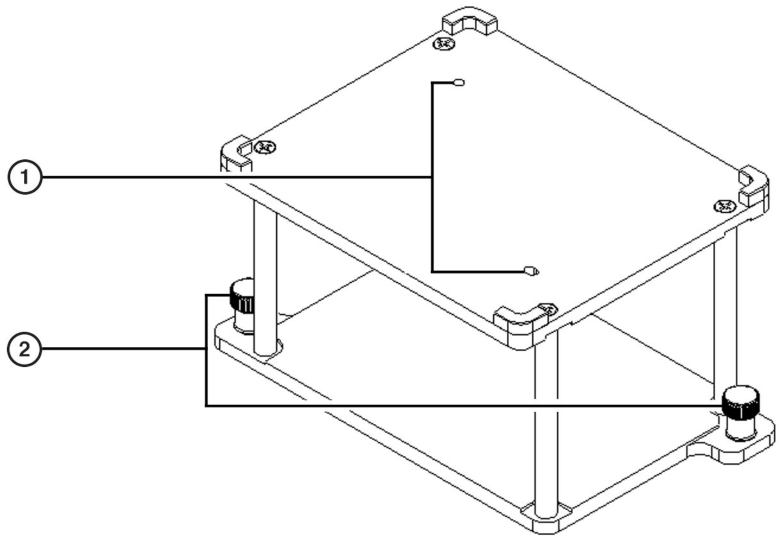
Mounting the SPE Collar Stand

To mount the SPE Collar Stand (Figure 20.4):

NOTE The SPE Collar Stand must be adjacent to the SPE ALP.

1 Position the SPE Collar Stand so the locating pins on the bottom of the stand slip into locating holes on the Biomek deck.

Figure 20.4 SPE Collar Stand Locating Holes and Thumbscrews



1. **Locating Holes**
2. **Thumbscrews**

2 Attach the SPE Collar Stand to the deck using the thumbscrews on the base of the stand (Figure 20.4).

Framing Instructions

Special framing instructions are necessary for the SPE ALP and the SPE Collar Stand.

Special Framing for the SPE ALP

The SPE ALP is framed using the AccuFrame, but not the Framing Tool Adaptor.

To frame the SPE ALP:

1. Attach the SPE ALP to the deck using the thumbscrews on the base of the ALP stand (Figure 20.2).
2. Place the AccuFrame inside the SPE ALP.
3. Frame the ALP according to procedures outlined in the specific manual for the instrument.

   NOTE To use the SPE system, the Beckman pump should be associated with the SPE ALP position. For more information on associating devices with positions, refer to the *Biomek Software User's Manual*.

Special Framing for the SPE Collar Stand

The SPE Collar Stand is framed using the AccuFrame and the Framing Tool Adaptor.

To frame the SPE ALP Collar Stand:

1. Place the Framing Tool Adaptor on the SPE Collar Stand so that the locating pins on the bottom of the Framing Tool Adaptor align with the locating holes on the SPE Collar Stand (Figure 20.5).
2. Turn off power to Biomek instrument before connecting the AccuFrame.

⚠ CAUTION

Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

3 Plug the AccuFrame into an available CAN port on the Biomek tower.

WARNING

Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING

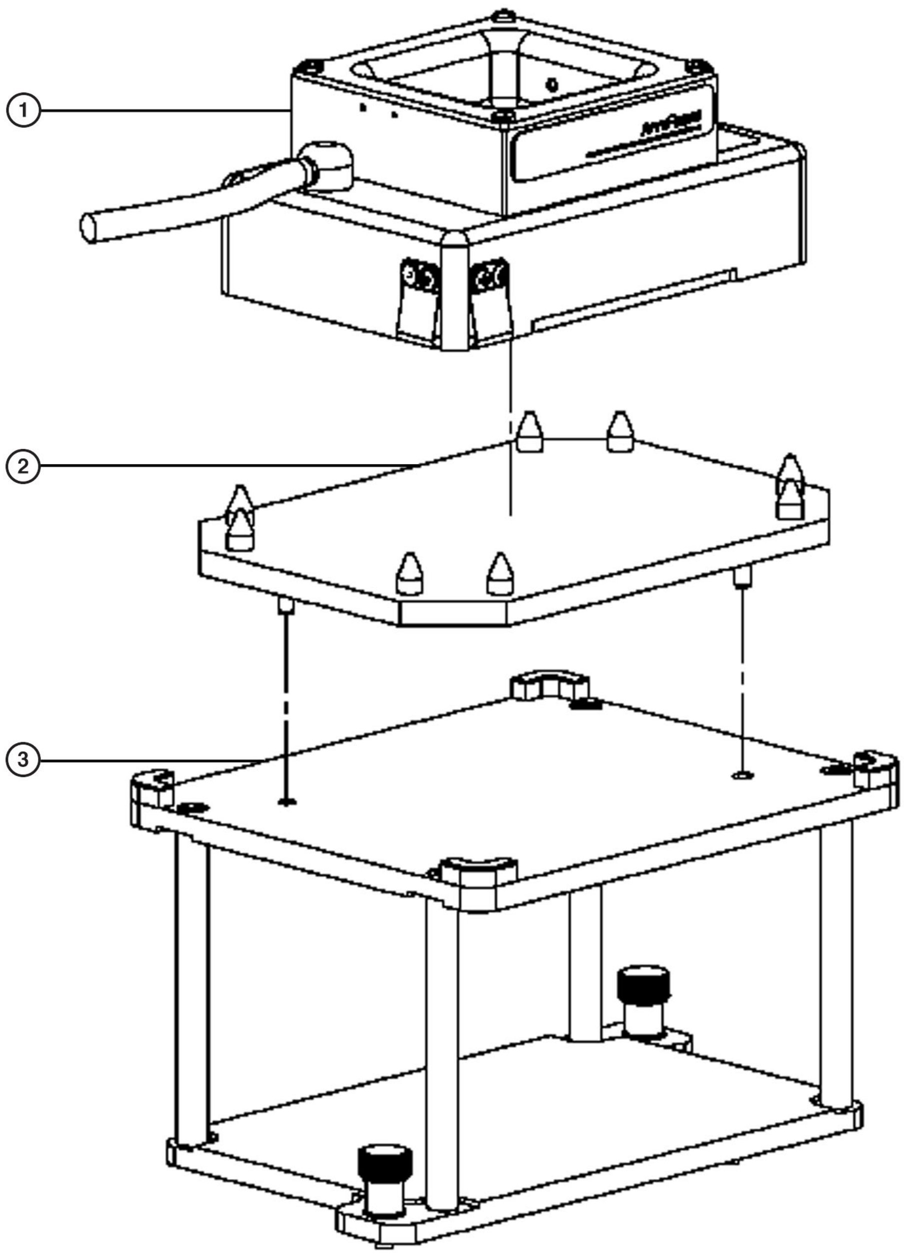
Make sure the AccuFrame cable does not interfere with pod movement.

4 Turn on power to Biomek instrument.

5 Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the Adaptor (Figure 20.5).

6 Frame the SPE Collar Stand according to the instructions outlined in the specific manual for the instrument.

Figure 20.5 Placing the Framing Tool Adaptor and AccuFrame on the SPE Collar Stand



1. **AccuFrame**
2. **Framing Tool Adaptor**
3. **SPE Collar Stand**

Using the SPE ALP in a Method

Using the SPE ALP in a method requires the configuration of labware, such as the filter holder, in the **Instrument Setup** step (refer to the *Biomek Software User's Manual*, Chapter 16, *Instrument Setup Step*) and configuration of the **SPE** step (refer to *Configuring the SPE Step*).

Configuring the SPE Step

The **SPE** step is a convenient way of executing the assembly and disassembly of the SPE ALP system. An **SPE** step must be configured when an SPE ALP is required to complete a method. The configuration for the **SPE** step informs the Biomek Software of the:

- Operation required of the **SPE** step (Figure 20.6)
- Location of the filtered microplate used by the SPE ALP
- Locations of the SPE vacuum manifold and receiver
- Location of the SPE ALP on the deck
- Pod constructing/destroying the SPE stack

NOTE The **SPE** step is for use with a Multichannel Pod only.

NOTE The SPE ALP can only be used on the DNA Preparation Deck Layout and occupies two deck positions.

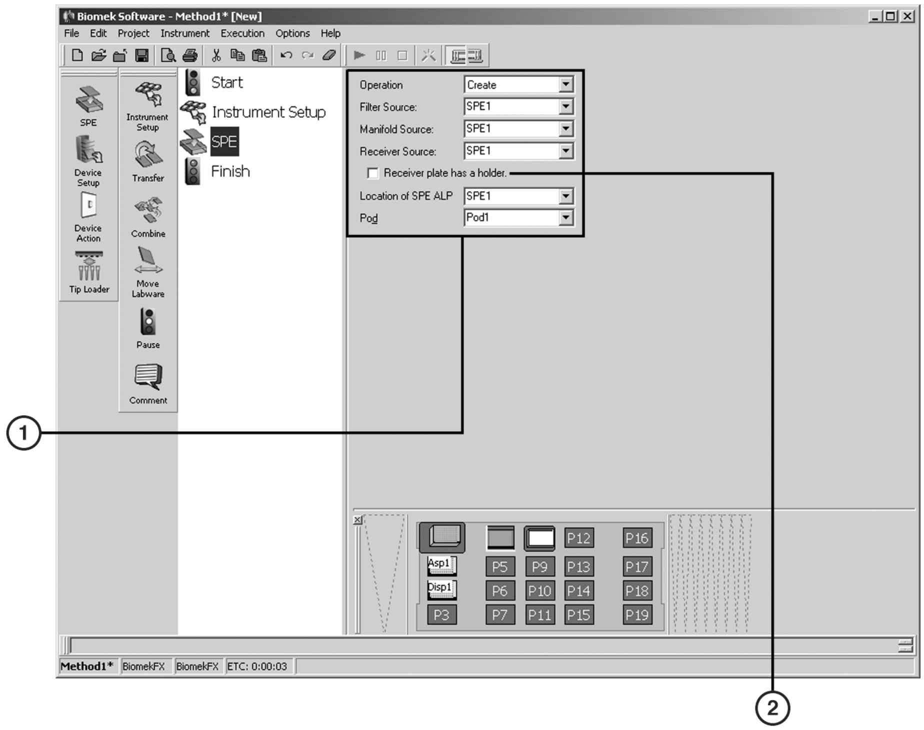
To configure the **SPE** step:

---

1 Insert a 

step into the Method View (Figure 20.6).

Figure 20.6 SPE Step and Configuration



1. **SPE Step Configuration** — the operation performed by the **SPE** step, as well as the position and identity of the components of the SPE ALP are provided in the **SPE** step configuration.
2. **Receiver Plate Configuration**— when the receiver microplate is positioned in a microplate holder, the presence of the holder must be indicated by selecting **Receiver plate has a holder**.

2 Select the **Operation** performed by the SPE ALP from the options listed below:

- **Create** — assembles the various pieces of an SPE stack
- **Destroy** — disassembles an SPE stack

3 Select the location of the **Filter Source** used by the SPE stack.

NOTE The **Filter Source** is the location on the deck of the filtered microplate that is placed on top of the SPE ALP stack.

4 Select the location of the **Manifold Source** for the SPE stack. The **Manifold Source** is the location of the manifold, which is referred to as the collar in the this manual.

5 Select the location of the **Receiver Source** for the SPE stack. The **Receiver Source** is any filtered microplate that is positioned inside the SPE Collar and the SPE ALP. If no receiver microplate is defined, the fluid flows through the source filtered microplate into the SPE ALP Base. The fluid is removed from the base via the vacuum hose.

NOTE **Filter Source**, **Manifold Source**, and **Receiver Source** all change to **Destination** when **Operation** is set to **Destroy**.

6 Select **Receiver plate has a holder** if the receiving microplate is positioned in a filter holder. The filter holder is used to keep the tips of a filtered microplate from touching the base of an ALP stand.

NOTE A filter microplate without a filter holder can be positioned inside a 1 x 1 ALP without damaging the microplate.

NOTE Labware, including the filter holder, is positioned on the Deck Layout in the **Instrument Setup** step.

7 Select the **Location of SPE ALP** on the Biomek deck.

8 Specify the **Pod** accessing the SPE stack.

- **FX** — **Pod** is available only if the Biomek instrument is configured as a dual-pod instrument. **Pod1** is the default for a single-pod Biomek FX system. In a dual-pod Biomek FX system, the pod configured as the default pod is displayed in **Pod**. If the other pod is desired, select the pod from the drop-down list.

9 Select a step that occurs after the **SPE** step or the **Finish** step to validate the step configuration.

Removing the SPE ALP and SPE Collar Stand

To remove the SPE ALP:

1 Remove the vacuum attachment as directed by the manufacturer.

2 Loosen the thumbscrews.

3 Lift the ALP in an upward motion to clear the locating pins from the deck.

To remove the SPE Collar Stand:

1 Loosen the thumbscrews.

2 Lift the SPE Collar Stand in an upward motion to clear the locating holes from the deck.

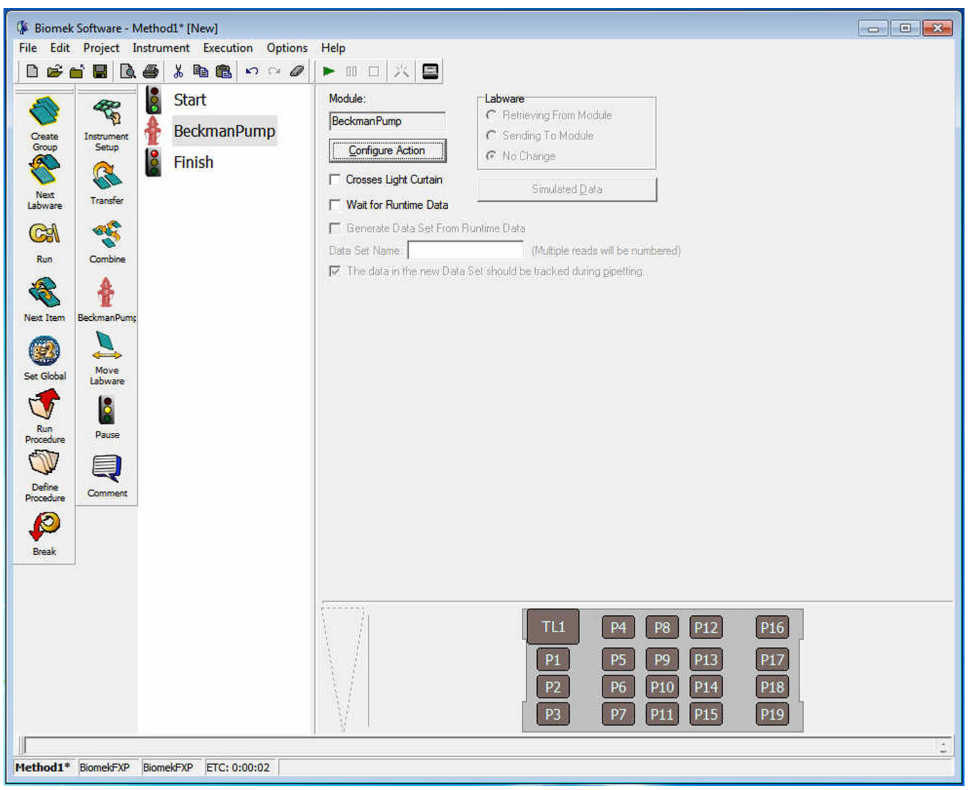
Controlling the Vacuum Valve Unit Inside a Method

The Vacuum Valve Unit can be controlled by the Beckman Pump step in the SILAS step palette immediately after performing the Beckman Pump software installation.

Add the Devices Toolbar. Go to **Options>Palette Builder>SILAS** and drag the **Beckman Pump** step to the **Devices** toolbar.

To turn on the Vacuum Valve Unit for vacuum extraction:

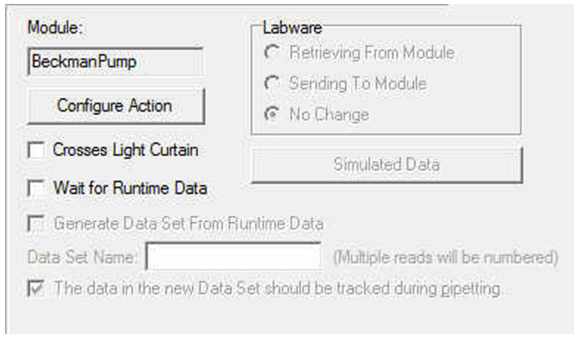
Figure 20.7 Configure action



1 Assemble the SPE Stack.

2 Add a **Beckman Pump** step and press **Configure Action** (Figure 20.8).

Figure 20.8 Configure Action button

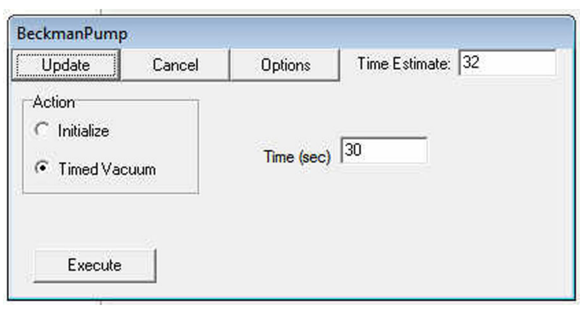


3 Configure the desired action. The following actions are available:

a. **Initialize**— This initializes the vacuum valve and ensures that the vacuum valve unit is connected properly.

b. **Timed Vacuum**— This opens the vacuum valve, waits the specified number of seconds, and then closes the vacuum valve.

Figure 20.9 Timed Vacuum with specified number of seconds



Controlling the Vacuum Valve Unit Outside a Method

To control the Vacuum Valve Unit outside a method, do the following:

1 In **Biomek Editor**, select the **Instrument** Menu bar.

2 Select **Device Editor**.

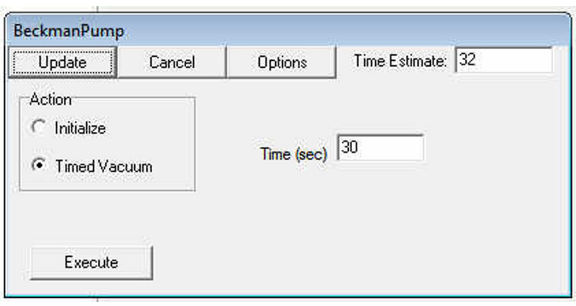
3 Select the **Beckman Pump** in Device. Select **Action Commands**.

4 Configure the desired action. The following actions are available:

a. **Initialize**— This initializes the vacuum valve unit and ensures that the vacuum valve unit is connected.

b. **Timed Vacuum**— This opens the vacuum valve, waits the specified number of seconds, and then closes the vacuum valve.

Figure 20.10 Timed Vacuum with specified number of seconds



5 To execute the action, press **Execute**.

Storage

Return the SPE ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the SPE ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Wash plastic periodically.

Troubleshooting

Do not attempt to repair the SPE ALP without first contacting a Beckman Coulter Service Engineer.

Table 20.1 Troubleshooting the SPE Vacuum Manifold ALP

If...	Then...
The SPE ALP is not applying appropriate vacuum to the microplate.	Verify the vacuum unit has been set up and attached to the ALP as directed by the manufacturer.
The SPE ALP is not functioning correctly.	Contact a Beckman Coulter Service Engineer. **NOTE** Do not remove the cover(s) on the Vacuum Valve Unit for any reason.
Gaskets become worn.	Replace gaskets using the Gasket Replacement Kit (#719404). Follow instructions in the kit.
The Vacuum Valve unit is vacuuming at the beginning of the method, instead of waiting for the SPE stack to be created.	Ensure that the Beckman Pump is associated with the SPE ALP in the Deck Editor.

CHAPTER 21

Span-8 Disposal ALP

Overview

The Span-8 Disposal ALP is a passive ALP that provides a means to dispose of tips during a method. This ALP is designed to dispose of tips used by the Span-8 Pod in one of two ways:

- Span-8 Disposal ALP without Slide — The disposed tips are placed into a waste receptacle positioned inside the Span-8 Disposal ALP base (used for tip disposal only).

  OR

- Span-8 Disposal ALP with Slide — A slide that extends beyond the edge of the Biomek deck is inserted into the Disposal ALP. Tips placed inside the ALP slide down into a receptacle placed below.

NOTE The Span-8 Disposal ALP is shipped so that either of the two options above can be assembled and used.

Earlier versions of the Span-8 Disposal ALP included a slightly different bagging extension; however, when used with Biomek Software 3.2, a new bagging extension must be used. This new bagging extension is included in an upgrade kit (Beckman Coulter Part # A20304). The Span-8 Disposal ALP purchased with Biomek Software 3.2 includes the new bagging extension.

CAUTION

Older versions of the Span-8 Disposal ALP must be modified with the new bagging extension when upgrading to Biomek Software 3.2. Failure to modify the ALP could result in Span-8 Pod crashes.

- **FX** — When the Biomek FX instrument is configured with a Span-8 Pod and a Multichannel Pod, the Span-8 Disposal ALP must be positioned on the Span-8 side of the deck in the outside column.

- **NX-S8** — The Half-Position Disposal ALP is designed to dispose of tips used by the Biomek NX Span-8 instrument (refer to CHAPTER 8, *Half-Position Disposal ALP (NX-S8 only)*).

The sections in this chapter include:

- *Preventive Maintenance*

Span-8 Disposal ALP without Slide

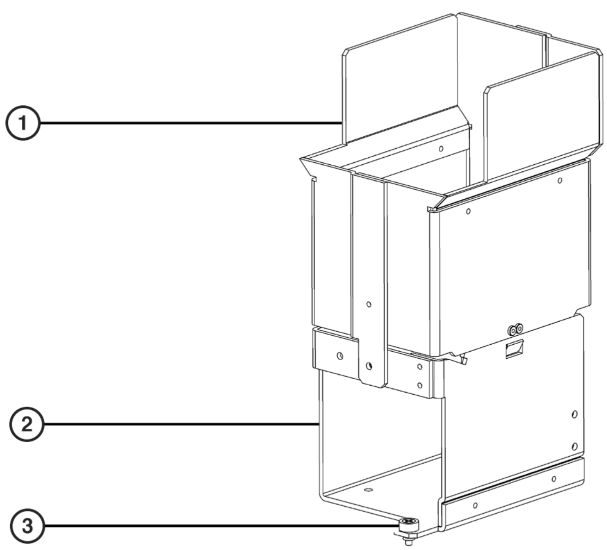
⚠ WARNING

When using the Span-8 Disposal ALP without Slide, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Span-8 Disposal ALP is used as a self-contained waste receptacle, the bagging extension is attached to the ALP base, and a waste bag is mounted inside the Span-8 Disposal ALP (Figure 21.1). The ALP can be used in a standard deck position in the outside columns of the deck and is particularly effective when lab space is at a premium.

NOTE The Span-8 Disposal ALP without Slide is used only for collecting shucked tips.

Figure 21.1 Span-8 Disposal ALP without Slide



1. **Bagging Extension (Used for Span-8 Disposal ALP without Slide)**
2. **Span-8 Disposal ALP Base**
3. **Thumbscrew**

Span-8 Disposal ALP with Slide

The Span-8 Disposal ALP with Slide (Figure 21.2) is positioned on the deck in the outside columns, and extends off the edge of the deck. The slide is directed through the gap between the deck and light curtain (or side safety shield). A trash receptacle is placed on the floor at the end of the slide to catch the waste. The Span-8 Disposal ALP with Slide allows the disposal of as many used tips as the trash receptacle is capable of holding.

⚠ CAUTION

The Span-8 Disposal ALP with Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

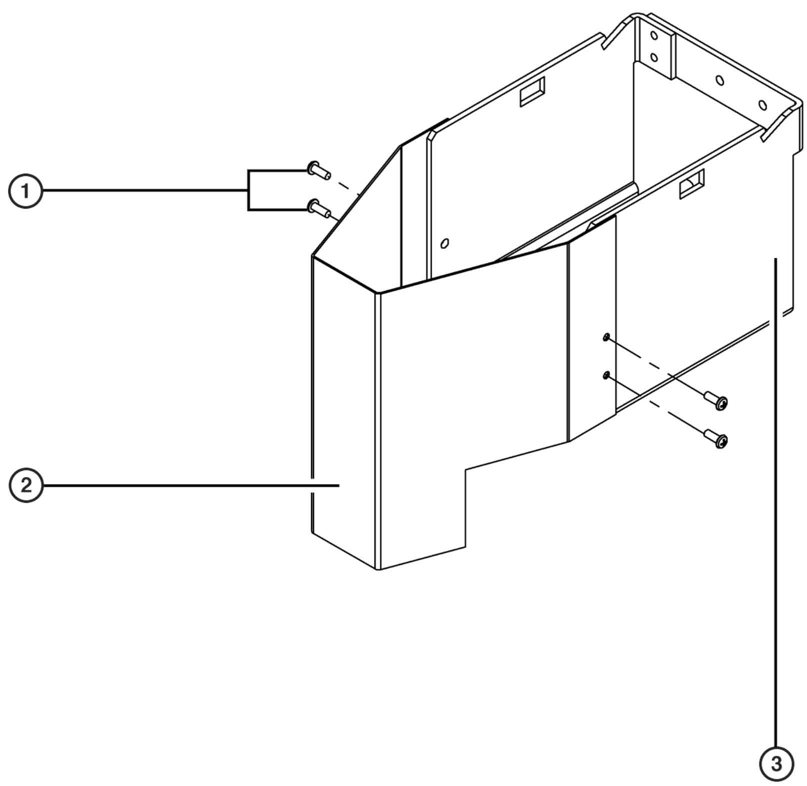
NOTE Span-8 Disposal ALPs with Slide cannot be mounted adjacent to one another on the first three rows of the deck.

The Span-8 Pod can drop disposable tips directly into the Span-8 Disposal ALP with Slide.

NOTE Tips may stick to the slide, which could cause tips to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

NOTE Since the slide of a Span-8 Disposal ALP extends beyond the edge of the Biomek FX deck, the deck must be modified to accommodate the slide. Refer to *Installing Protective Shield Blanking Plate on the Biomek FX*, for more information on modifying the deck to accommodate a Span-8 Disposal ALP with Slide.

Figure 21.2 Span-8 Disposal ALP with Slide



1. **Span-8 Disposal Chute Mounting Screws**
2. **Span-8 Disposal Chute**
3. **Span-8 Disposal ALP Base**

Installing the Span-8 Disposal ALP without Slide

Installing the Span-8 Disposal ALP without Slide includes choosing a deck position and mounting the ALP to the deck.

Choosing a Deck Position for the Span-8 Disposal ALP without Slide

⚠ **CAUTION**

The self-contained Span-8 Disposal ALP without Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

⚠ **CAUTION**

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Span-8 Disposal ALP without Slide can be placed in positions in the outside columns of the Biomek deck.

NOTE Span-8 Disposal ALPs cannot be mounted adjacent to one another in the first three rows on the Biomek deck

When adding a Span-8 Disposal ALP without Slide to the Biomek deck, the ALP must be associated with that deck position in the **Deck Editor**. To associate the Span-8 Disposal ALP without Slide with a deck position in the **Deck Editor**, drag and drop **Span8TipTrash** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck.*

Mounting a Span-8 Disposal ALP without Slide

To mount a Span-8 Disposal ALP without Slide:

---

1 Remove the slide and chute from the Span-8 Disposal ALP. (Refer to *Removing a Span-8 Disposal ALP with Slide*, for specific instructions and diagrams.)

---

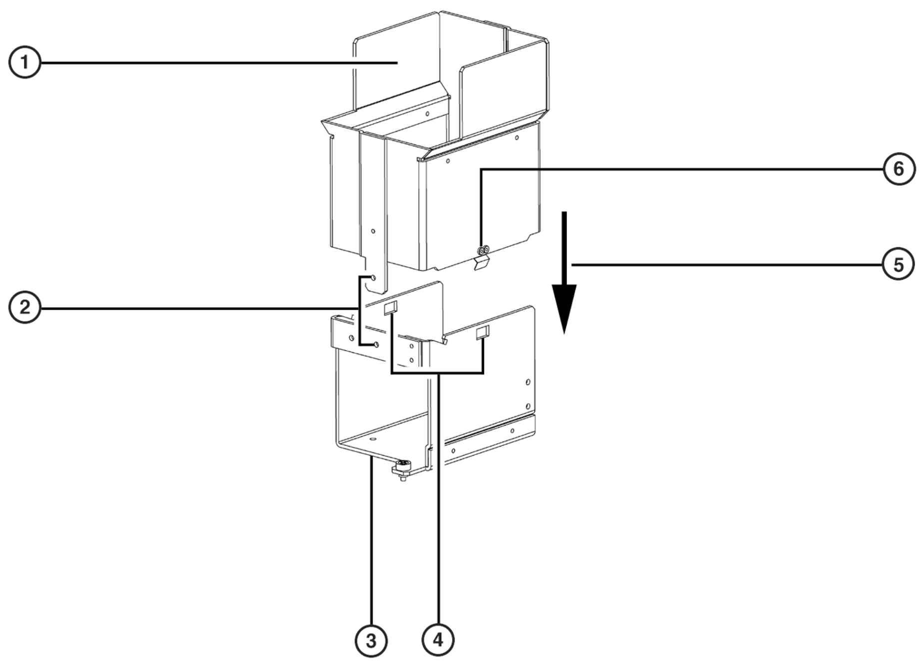
2 Snap the bagging extension onto the Span-8 Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 21.3).

⚠ **CAUTION**

Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

3 Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Span-8 Disposal ALP base and lock into the cutouts (Figure 21.3).

Figure 21.3 Span-8 Disposal ALP without Slide — Exploded



1. **Bagging Extension**
2. **Grounding Tab and Screw** — the screw is inserted through the tab and into the base at this location.
3. **Span-8 Disposal ALP Base**
4. **Cutout for Springs** — the springs must snap through to the inside surface of the base.
5. **Adding Bagging Extension to Span-8 Disposal ALP Base** — apply downward force to snap the springs into the cutouts, and to align the grounding tab so that the grounding screw can be inserted.
6. **Springs** — second spring is on the opposite side of the bagging extension.

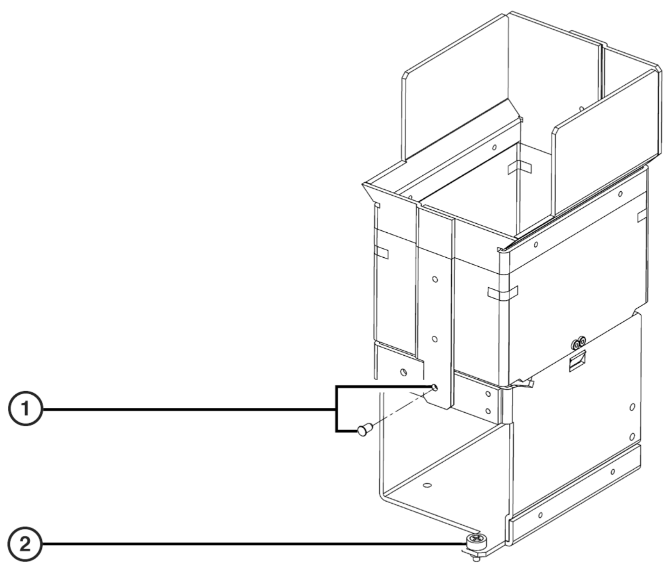
4 Insert a screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Span-8 Disposal ALP base (Figure 21.4).

NOTE This screw is necessary for proper ESD grounding of the ALP.

5 Choose a deck position in the outside column of the deck, then slip the locating pins on the bottom of the Span-8 Disposal ALP into the locating holes of the desired deck position.

6 Fasten the Span-8 Disposal ALP to the deck using the thumbscrews on the base of the Span-8 Disposal ALP (Figure 21.4).

Figure 21.4 Span-8 Disposal ALP without Slide Showing Grounding Tab and Screw



1. **Grounding Tab and Screw** — the screw is inserted through the tab and into the ALP base at this location.
2. **Thumbscrew** — two thumbscrews are used to secure the Span-8 Disposal ALP to the deck. (*The second thumb screw is positioned diagonally to the one shown here.*)

7 Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.

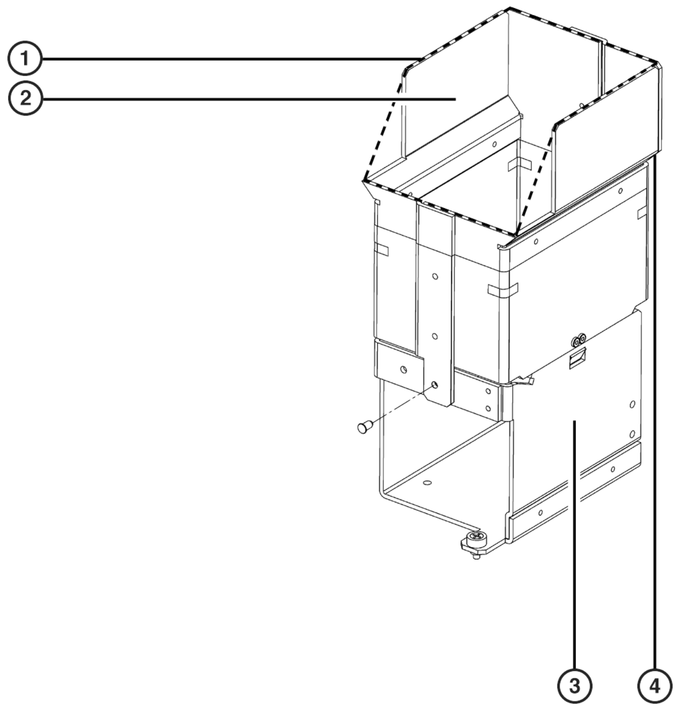
WARNING

Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Span-8 Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

8 Smooth out the bag to allow items to drop directly to the bottom of the bag.

9 To hold the bag in place, stretch the rubber band over the top of the extension and bag and position it in the location shown (Figure 21.5).

Figure 21.5 Span-8 Disposal ALP without Slide Rubber Band Placement



1. **Bagging Extension**
2. **Bag Placement** — to create an opening for the disposed items, place the bag inside the bagging extension using the dashed lines as a guide.
3. **Span-8 Disposal ALP Base**
4. **Rubber Band Placement** — position the rubber band below the widest part of the bagging extension.

10 Pull the bag through the Span-8 Disposal ALP so the opening looks like the photo in Figure 21.6.

Figure 21.6 Span-8 Disposal ALP with Correct Bag Placement

1. **Correct Opening for Disposed Tips**
2. Pull the bag through the ALP to create the correct opening for disposed tips.

Installing the Span-8 Disposal ALP with Slide

Installing the Span-8 Disposal ALP with Slide includes choosing a deck position and mounting the ALP to the deck.

NOTE Since the slide of a Span-8 Disposal ALP extends beyond the edge of the Biomek FX deck, the deck must be modified to accommodate the slide. Refer to *Installing Protective Shield Blanking Plate on the Biomek FX*, for more information on modifying the deck to accommodate a Span-8 Disposal ALP with Slide.

Deck Positions for the Span-8 Disposal ALP with Slide

⚠ CAUTION

The Span-8 Disposal ALP with Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

⚠ CAUTION

Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Span-8 Disposal ALP with Slide can be positioned in the outside columns, and extends off the edge of the Biomek deck.

NOTE When adding a Span-8 Disposal ALP with Slide to the Biomek deck, the ALP must be associated with a deck position in the **Deck Editor**. To associate the Span-8 Disposal ALP with Slide with a deck position in the **Deck Editor**, drag and drop **Span8TrashLeft** or **Span8TrashRight** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*.

Mounting a Span-8 Disposal ALP with Slide

To mount a Span-8 Disposal ALP with Slide:

---

1 Position the disposal chute by lining up the holes in the disposal chute with the threaded holes in the Span-8 Disposal ALP base (Figure 21.7).

---

2 Attach the disposal chute to the Span-8 Disposal ALP base using the four screws supplied (Figure 21.7).

---

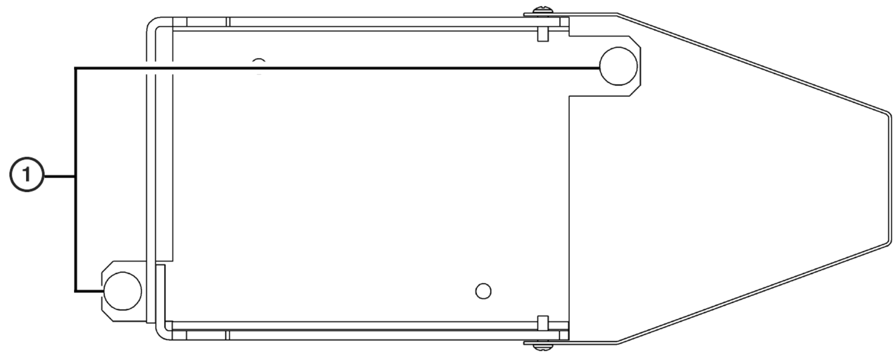
3 Place the Span-8 Disposal ALP in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.

---

4 Slip the locating pins on the bottom of the Span-8 Disposal ALP into the locating holes on the deck.

5 Fasten the Span-8 Disposal ALP to the deck using the thumbscrews on the base of the Span-8 Disposal ALP (Figure 21.7).

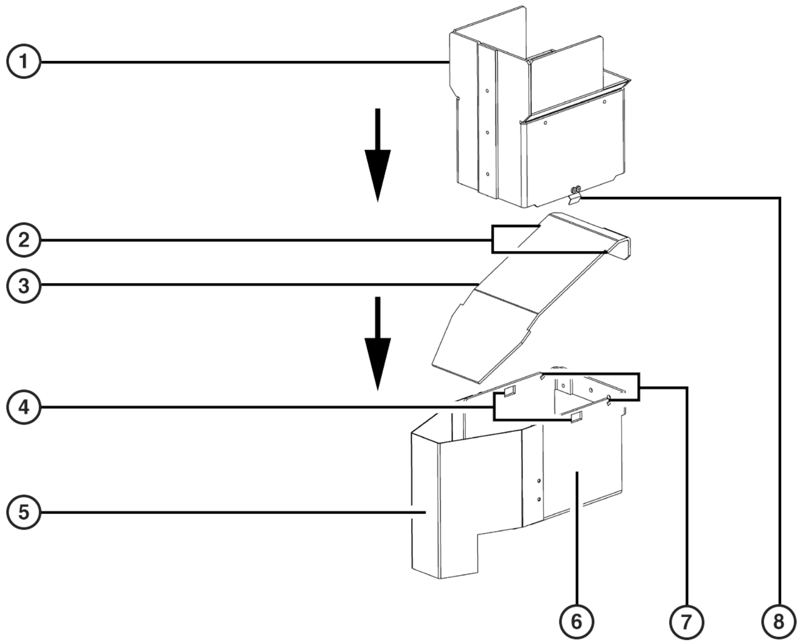
Figure 21.7 Span-8 Disposal ALP with Slide Thumbscrews (Bottom View)



1. **Thumbscrews**

6 Attach the slide to the ALP by lowering the upper tabs into the grooves in the Span-8 Disposal ALP base (Figure 21.8).

Figure 21.8 Attaching the Slide to the Span-8 Disposal ALP



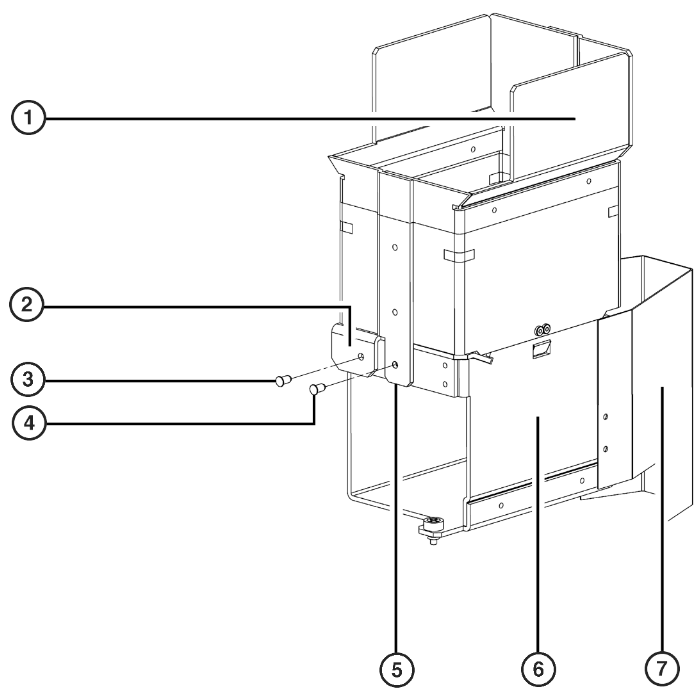
1. **Bagging Extension**
2. **Upper Tabs**
3. **Span-8 Disposal ALP Slide**
4. **Cutout for Springs** — the springs must snap through to the inside surface of the base.
5. **Disposal Chute**
6. **Span-8 Disposal ALP Base**
7. **Grooves for Tabs** — upper tabs slide into the grooves.
8. **Springs** — two springs are used to secure the bagging extension to the Disposal ALP base. (*The second spring is opposite the one shown here*.)

---

7 Insert the ground screw through the tab on the back of the slide and into the threaded hole in the Span-8 Disposal ALP base (Figure 21.9).

NOTE This screw is necessary for proper ESD grounding of the ALP.

Figure 21.9 Span-8 Disposal ALP - Ground Screw Placement



1. **Bagging Extension**
2. **Tab on the Span-8 Disposal ALP Slide**
3. **Ground Screw for the Span-8 Disposal ALP Slide**
4. **Ground Screw for the Span-8 Disposal ALP Bagging Extension**
5. **Grounding Tab on the Span-8 Disposal ALP Bagging Extension**
6. **Span-8 Disposal ALP Base**
7. **Disposal Chute**

8 Snap the bagging extension onto the Span-8 Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 21.9).

CAUTION

Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

9 Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Disposal ALP base and lock into the cutouts (Figure 21.9).

10 Insert the grounding screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Span-8 Disposal ALP base (Figure 21.9).

NOTE This screw is necessary for proper ESD grounding of the ALP.

11 Place a trash receptacle at the end of the disposal chute to catch disposed items.

12 Look down through the disposal chute, or drop a test item into the ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

Installing Protective Shield Blanking Plate on the Biomek FX

WARNING

To reduce risk of personal injury, operate only with all protective shields in place.

When components of the Biomek FX instrument are installed so that they extend beyond the edge of the work table, a protective bottom shield must be installed by the Beckman Coulter Service Engineer to ensure operator protection on the side overhanging the table. This protective bottom shield contains a solid blanking plate and a cutout blanking plate (Figure 21.11).

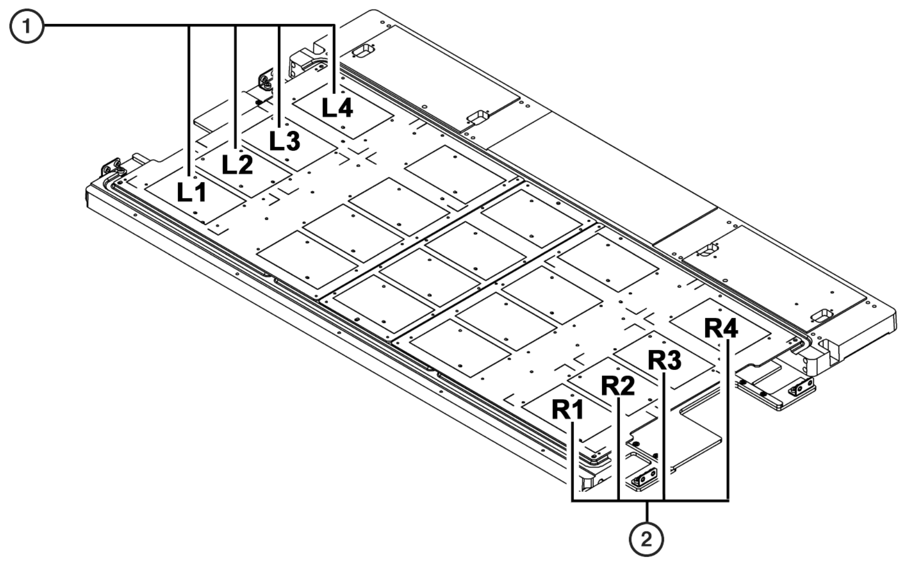
When the Biomek FX instrument does not extend beyond the edge of the work table, the solid blanking plate is installed. To accommodate the slide on a Span-8 Disposal ALP, the solid blanking plate is replaced with the cutout blanking plate. To accommodate the slides of two Disposal ALPs (Multichannel or Span-8), the solid blanking plate and cutout blanking plate are removed, leaving an opening for two slides.

NOTE When the Span-8 Disposal ALP is in deck positions R1, R4, L1, and L4, no modifications to the deck blanking plates are required.

There are eight deck positions available for a Span-8 Disposal ALP with Slide (Figure 21.10):

- L1
- L2
- L3
- L4
- R1
- R2
- R3
- R4

Figure 21.10 Span-8 Disposal ALP with Slide Deck Positions for a Biomek FX



1. **Span-8 Disposal ALP with Slide (Left Positions)**
2. **Span-8 Disposal ALP with Slide (Right Positions)**

Span-8 Disposal ALP with Slide in L2

When a Span-8 Disposal ALP with Slide is installed in L2 on the Biomek FX deck (Figure 21.10), install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

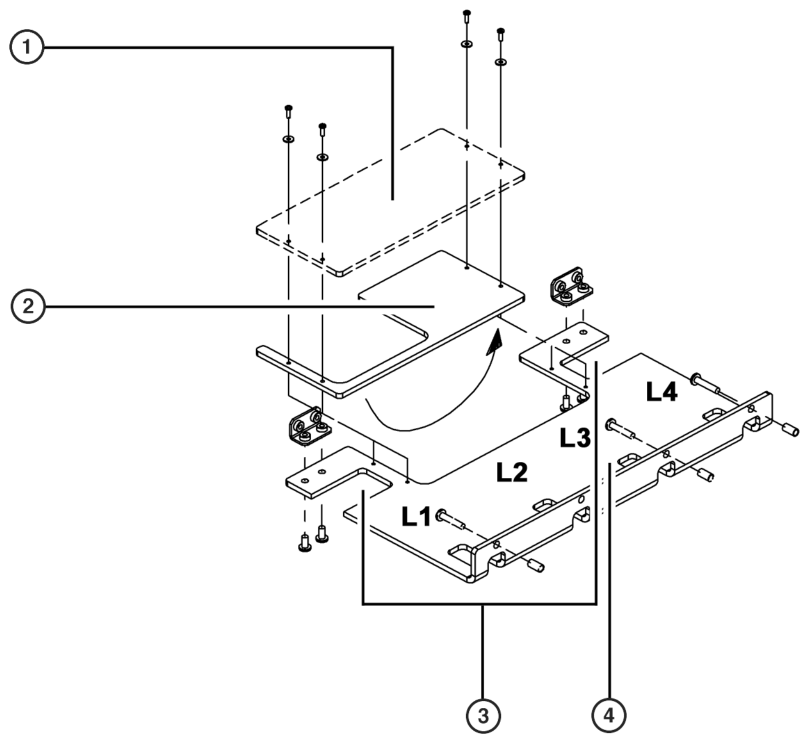
2 Remove the solid blanking plate.

3 Orient the blanking plate cutout as shown in (Figure 21.11).

4 Attach the blanking plate to the bottom shield. This creates an opening next to L2 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Figure 21.11 Left Side Bottom Shield with Solid and Cutout Blanking Plates



1. **Solid Blanking Plate**
2. **Blanking Plate with Cutout** — rotate this blanking plate 180° front to back as required to accommodate the Multichannel Disposal ALP.
3. **Cutout for Span-8 Disposal ALP with Slide in L1 and L4 Positions**
4. **Bottom Shield**

Span-8 Disposal ALP with Slide in L3

When a Span-8 Disposal ALP with Slide is installed in L3 on the Biomek FX deck (Figure 21.10), orient and install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate.

3 Rotate the blanking plate with the cutout 180° from the one shown in Figure 21.11.

4 Attach the blanking plate to the bottom shield. This creates an opening next to L3 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Span-8 Disposal ALPs with Slide in Both L2 and L3

When Span-8 Disposal ALPs with Slide are installed in both L2 and L3:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate. This creates an opening large enough for two slides.

Span-8 Disposal ALP with Slide in R2

When a Span-8 Disposal ALP with slide is installed in R2 on the Biomek FX deck (Figure 21.10), orient and install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

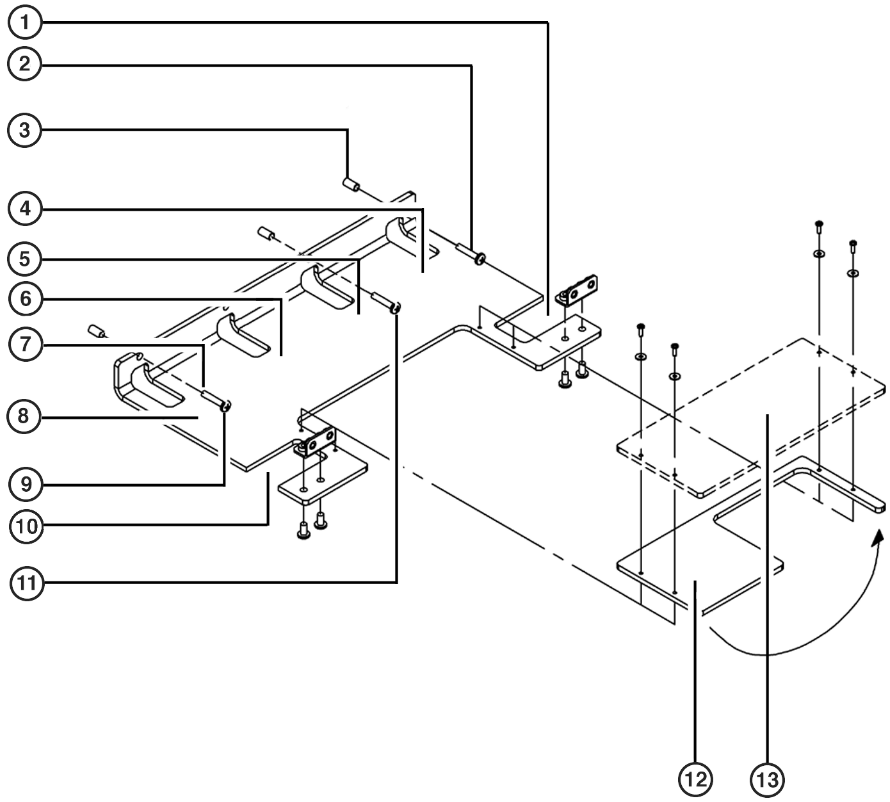
2 Remove the solid blanking plate.

3 Rotate the blanking plate with the cutout 180° from the one shown in Figure 21.12.

4 Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R2 for the slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Figure 21.12 Right Side Bottom Shield with Solid and Cutout Blanking Plates



1. **Cutout for Span-8 Disposal ALP with Slide in R4 Position**
2. **Fastener Location C**
3. **Standoff**
4. **R4**
5. **R3**
6. **R2**
7. **R1**
8. **Bottom Shield**
9. **Fastener Location A**
10. **Cutout for Span-8 Disposal ALP with Slide in R1 Position**
11. **Fastener Location B**
12. **Blanking Plate with Cutout**
13. **Solid Blanking Plate**

Span-8 Disposal ALP with Slide in R3

When a Span-8 Disposal ALP with Slide is installed in R3 on the Biomek FX deck (Figure 21.10), orient and install the blanking plate with the cutout as follows:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate.

3 Orient the blanking plate cutout as shown in Figure 21.12.

4 Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R3 for a slide.

NOTE Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

Span-8 Disposal ALPs with Slide in Both R2 and R3

When Span-8 Disposal ALPs with Slide are installed in both R2 and R3:

1 Remove the four fasteners holding the solid blanking plate.

2 Remove the solid blanking plate. This creates an opening large enough for two slides.

Framing Instructions

No special framing is necessary for the Span-8 Disposal ALP (with or without Slide). Framing the ALP occurred when the deck was framed with the **Shift Deck** command. For more information refer to the specific manual for the instrument.

Removing the Span-8 Disposal ALP without Slide

⚠ WARNING

The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ CAUTION

SPILL HAZARD.

To remove the Span-8 Disposal ALP without Slide:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the safety officer.
3. Loosen the Span-8 Disposal ALP thumbscrews on the base of the Span-8 Disposal ALP.
4. Lift the Span-8 Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

Removing the Bagging Extension

To remove the bagging extension from the Span-8 Disposal ALP:

1. Remove the grounding screw.
2. Grasp the extension firmly with one hand and the base firmly with the other.
3. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
4. Store the extension in a clean, dry, dust-free area.
5. Insert the screw back into the threaded hole on the Span-8 Disposal ALP base.

Removing a Span-8 Disposal ALP with Slide

⚠ CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Span-8 Disposal ALP with Slide:

1. Verify that no labware remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.
2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.
3. Remove the grounding screw from the bagging extension (Figure 21.9).
4. Grasp the bagging extension firmly with one hand and the base firmly with the other.
5. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
6. Insert the grounding screw back into the threaded hole on the disposal base.
7. Remove the grounding screw from the slide.
8. Lift the slide from the base.
9. Insert the grounding screw back into the threaded hole on the disposal base.
10. Loosen the Span-8 Disposal ALP thumbscrews on the base of the Span-8 Disposal ALP (Figure 21.7).
11. Lift the Span-8 Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

12 To detach the chute, remove the four screws attaching the chute to the disposal base and remove the chute.

13 Insert the four screws back into the threaded holes in the disposal base.

Storage

Return the Span-8 Disposal ALPs (with or without Slide) to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the Span-8 Disposal ALPs to air-dry before returning them to their original packing materials.

Preventive Maintenance

WARNING

The Span-8 Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Span-8 Disposal ALP with a soft cloth.

CHAPTER 22

Span-8 Tip Wash ALP

Overview

The Span-8 Tip Wash ALP is a passive ALP. The eight cleaning wells of the Span-8 Tip Wash ALP (Figure 22.1) are used to wash fixed tips on the probes of a Span-8 Pod during a step in a method while the reservoir side of the Span-8 Tip Wash ALP is used to dispose of system fluid used when priming the system and purging the tubing and syringes of air. The Span-8 Tip Wash ALP can be placed in half of any deck position and it can be oriented with its eight cleaning wells on the left or right side of the ALP.

The Span-8 Tip Wash ALP utilizes a flow of system fluid from the off-deck supply container as the wash fluid. The system fluid is pumped through the Biomek instrument and into the Span-8 Tip Wash ALP in one of two ways:

- The pumps of the Biomek FX instrument syphon fluid from the off-deck supply container (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 3, *Supply Container*) to the probes of the Span-8 Pod. The pumps actuate to dispense the system fluid through the tips and into the wash station.

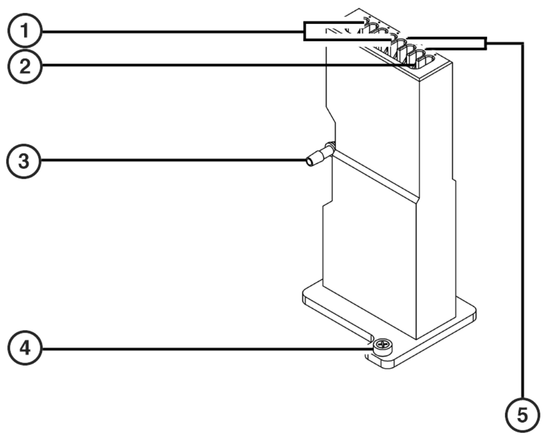
  OR

- The Speed Pump, (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 3, *Speed Pump*), with the pump valves bypassed, accelerates the speed of the system fluid as it passes through the tubing and is dispensed from the tips into the Span-8 Tip Wash ALP. The volume of fluid passing through the tips cleans the inside surfaces of the tips, while the increased speed of the wash fluid raises the fluid level in the eight cleaning wells of the ALP to a height sufficient to clean the outside of the tips positioned in the Span-8 Tip Wash ALP.

Used wash fluid drains from the ALP via a tube connected to the waste port and terminating in an off-deck waste container (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 3, *Waste Container*) via a gravity-fed drainage tube.

The sections in this chapter include:

Figure 22.1 Span-8 Tip Wash ALP



1. **Eight Cleaning Wells**
2. **Reservoir**
3. **Waste Port**
4. **Phillips Mounting Screw**
5. **Eight Framing Points**

Installing the Span-8 Tip Wash ALP

Installing a Span-8 Tip Wash ALP includes choosing the deck position and mounting the ALP to the deck.

Deck Positions for the Span-8 Tip Wash ALP

The Span-8 Tip Wash ALP occupies 1/2 of any deck position, including the 1/2 ALP positions located between the two outside columns of the Biomek deck. The Span-8 Tip Wash ALP can also occupy the remaining 1/2 ALP position that occurs when a Test Tube Rack ALP is installed on the Biomek deck (refer to CHAPTER 26, *Test Tube Rack ALPs*).

If a Span-8 Tip Wash ALP is required for a single-pod Biomek FX Instrument, the ALP can be installed on either half of an unoccupied deck position. The eight cleaning wells can be oriented to the left or right side of the ALP (Figure 22.1).

When the dual-pod Biomek FX instrument has one Multichannel Pod and one Span-8 Pod, it must be installed so the ALP is accessible to the Span-8 Pod without interfering with the other pod. More specifically, if the Span-8 Pod is **Pod1** (left arm), the Span-8 Tip Wash ALP must be mounted on the left half of a deck position, with the eight cleaning wells on the left side of the ALP.

NOTE The Span-8 Tip Wash ALP must be positioned on the Span-8 side of the deck.

NOTE If different types of waste materials must be disposed of separately, two Span-8 Tip Wash ALPs may be installed on the deck.

NOTE When the Span-8 Tip Wash ALP is placed on the left side of a Biomek deck position, the ALP is referred to as the **Span-8WashLeft.** When the Span-8 Tip Wash ALP is placed on the right side of a Biomek FX deck position, it is referred to as the **Span-8WashRight**.

After a deck position on which to physically mount the ALP has been chosen, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting the Span-8 Tip Wash ALP to the Deck

⚠ WARNING

Do not kink the drainage hose.

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ CAUTION

SPILL HAZARD.

To install the Span-8 Tip Wash ALP:

1. Position the Span-8 Tip Wash ALP so the locating pin on the bottom of the ALP slips into a locating hole on the deck.

2. Fasten the Span-8 Tip Wash ALP to the deck using the Phillips mounting screw located on the base of the Span-8 Tip Wash ALP (Figure 22.1).

3. Place the waste container under the lab bench or in an accessible space lower than the Biomek instrument height.

4. Attach the drainage tube to the waste port on the Span-8 Tip Wash ALP (Figure 22.1).

5 Run the opposite end of the drainage tube to the waste container by passing the tube through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the Biomek instrument.

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

6 Cut the drainage tube to the appropriate length to ensure there is no excess that could cause a ‘rise’ or ‘bump’ in the drainage tubes route from the Span-8 Tip Wash ALP to the waste container.

NOTE Since the Span-8 Tip Wash ALP is gravity fed, it is crucial that the drainage tube run down-hill without any rises between the ALP and the waste container.

7 Ensure that the supply container contains the desired system (cleaning) fluid.

Framing Instructions

Special framing instructions using **Manual Teach** are necessary for the Span-8 Tip Wash ALP to ensure that the tips and probes on the Span-8 Pod access the eight cleaning wells of the ALP without causing any damage to the tips, probes, pod, or ALP. Since the eight cleaning wells of the ALP are relatively small, it is crucial that the tips on the probes be framed as accurately as possible. **Manual Teach** is accessed through **Position Properties** in the **Deck Editor**.

To frame the Span-8 Tip Wash ALP:

1 Open the Biomek FX Software by selecting **Start > Programs > Beckman Coulter > Biomek**.

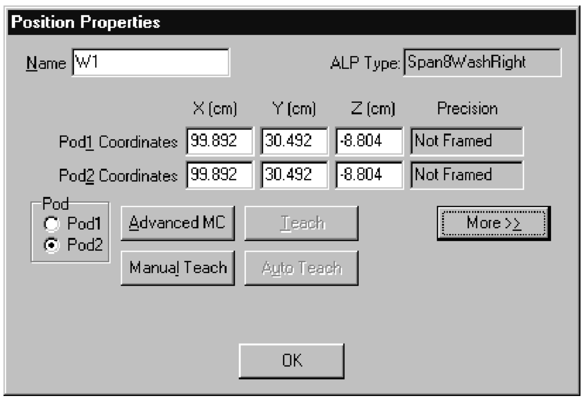
2 Choose **Instrument > Deck Editor**. The **Deck Editor** appears.

3 Add a Span-8 Tip Wash ALP to the deck by selecting either **Span8WashRight** or **Span8WashLeft** from the list of available devices and dragging it to the appropriate deck position.

4 Open **Position Properties** for the Span-8 Tip Wash ALP by double-clicking in the area outlined in the center of the Span-8 Tip Wash ALP. **Position Properties** appear (Figure 22.2).

NOTE Two different sets of properties can appear when double-clicking on the Span-8 Tip Wash ALP: **Position Properties** and **ALP Properties**. **Position Properties** is used to manually frame the Span-8 Tip Wash ALP. To open **Position Properties**, double-click in the area outlined in the center of the Span-8 Tip Wash ALP. A pink outline appears around the 'W' in the center of the ALP when **Position Properties** are being configured. (When configuring **ALP Properties**, a yellow outline appears around the '**W**', a pink outline appears around the entire ALP position, and **ALP Properties** appears.)

Figure 22.2 Position Properties for the Span-8 Tip Wash ALP



5 In **Name**, verify that the Span-8 Tip Wash ALP is assigned a unique name.

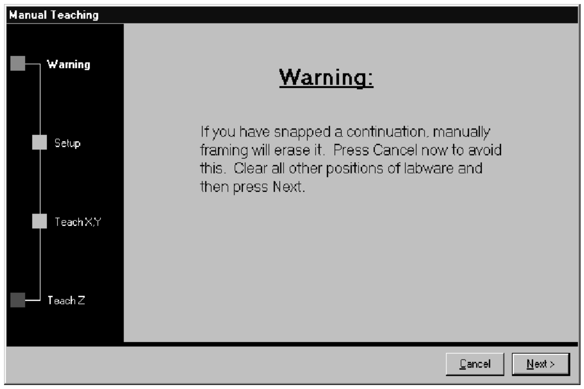
NOTE The software automatically assigns a name beginning with a 'W' and followed by a number; for example, 'W1' and 'W2'.

6 In **Pod**, select the Span-8 Pod used to frame the Span-8 Tip Wash ALP.

7 Choose **Manual Teach. Manual Teaching** opens with a Warning (Figure 22.3).

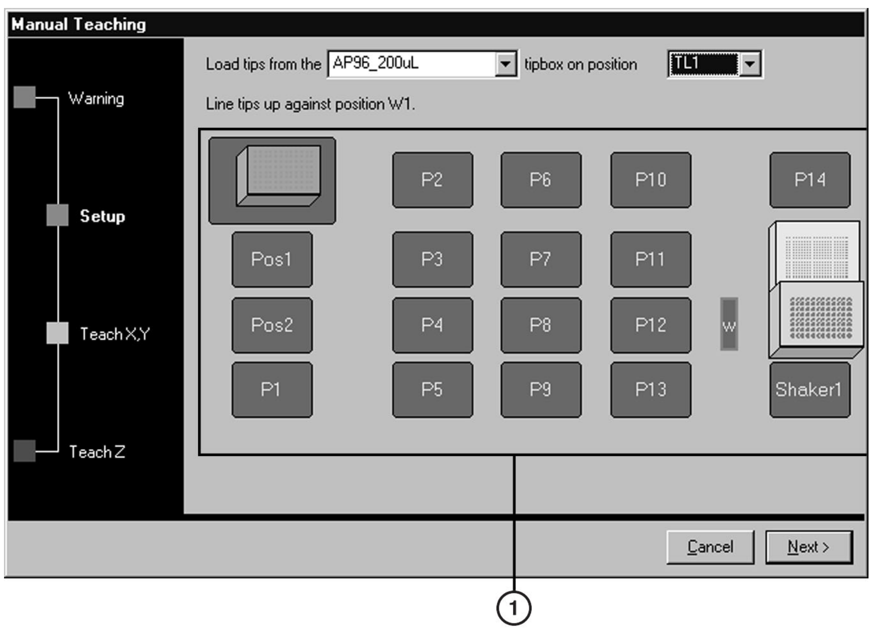
NOTE On the left side of **Manual Teaching**, a list of steps required to complete the teaching process are displayed. As the steps of **Manual Teaching** are accessed, they are highlighted on the left.

Figure 22.3 Manual Teaching (Warning)



8 Choose **Next. Manual Teaching** appears (Figure 22.4)

Figure 22.4 Manual Teaching (Setup)



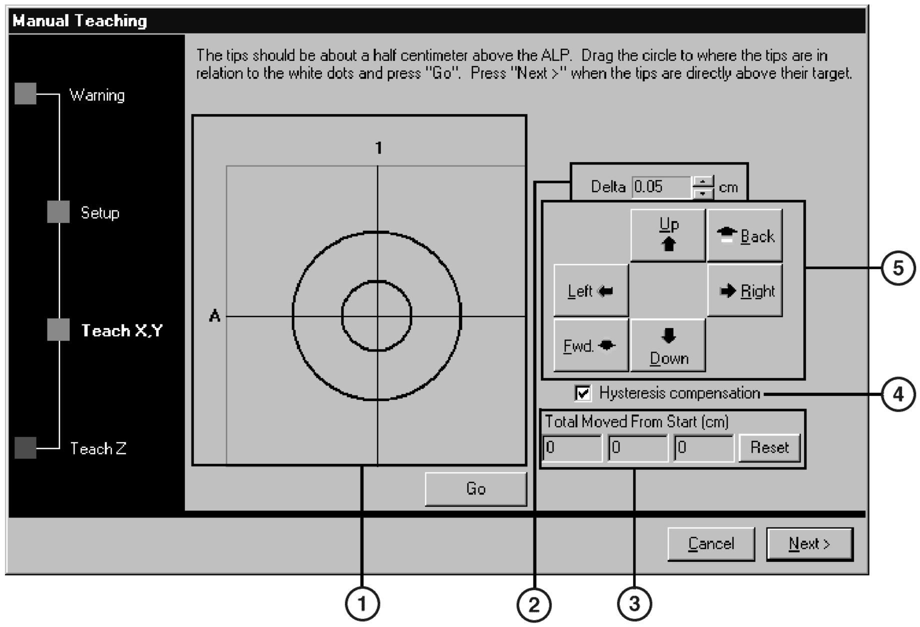
1. **Current Deck Display**

9 If disposable tip mandrels are installed, in **Load tips from the**, verify that the appropriate tips are selected.

10 In **tipbox on position**, select the deck position containing the tipbox by selecting that position in the the **Current Deck Display**.

11 Choose **Next. Manual Teaching** appears (Figure 22.5).

Figure 22.5 Manual Teaching (Teach X,Y)



1. **Graphic Alignment Tool** — the graphic alignment tool is a visual representation of the tip (small circle) and the framing points (large circle). The small circle is moved until it represents the tips position in relation to the framing points on the ALP.
2. **Delta Value** — the magnitude of change applied to the tips each time a directional button is selected, or when the graphic alignment tool is manipulated.
3. **Total Move from Start (cm)** — each time a directional button is selected, the pod moves by the amount shown in **Delta**. The total amount moved in each direction is displayed in **Total Moved From Start (cm)**.
4. **Hysteresis Compensation** — leave **Hysteresis compensation** at the default setting of **On**. This compensates for any variance along the X-axis from the front of the bridge to the back of the bridge. The Biomek instrument determines a pods position in the X-axis based on the position of the bridge at the back of the Biomek instrument.
5. **Directional Buttons** — the directional buttons move the pod by the amount shown in **Delta** with each press of a button

12 To align the tips in the X- and Y-axes with the white framing points on top of the Span-8 Tip Wash ALP (Figure 22.1), lower the tips in the Z-axis until they are approximately 1 cm above the top of the Span-8 Tip Wash ALP.

NOTE Tip height of the pod is set in the next step in the **Manual Teaching** process; therefore, move the pod to any height while manipulating tip alignment with the white framing points.

13 Visually verify the physical position of the tips in relation to the physical position of the white framing points on top of the Span-8 Tip Wash ALP.

14 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 22.5).

NOTE The default **Delta** value is 0.05 cm. If the tips are a considerable distance from the desired location, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the **Delta** value to fine-tune the position (minimum setting is 0.005 cm).

15 Select the **directional button** representing the motion required to physically move the tip into position over the white framing points on the Span-8 Tip Wash ALP (Figure 22.5).

NOTE The directional keys on the numeric keypad can also be used to physically position the tips over the wells of the microplate. The **directional buttons** displayed in the software parallel the keys on the numeric keypad. More specifically, the **Fwd. directional button** correlates to the '1' on the numeric keypad, while **Down** is found on the '2', **Left** is found on the '4', **Right** on '6', **Up** on '8', and **Back** on '9'.

NOTE Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

OR

Using the graphic alignment tool, **Drag the center (small) circle** until it represents the tips physical position in relation to the white framing points on the ALP.

NOTE The large circle represents the position of the white framing points on the top of the Span-8 Tip Wash ALP, while the small circle represents the position of the tips on the Span-8 Pod. The objective is to provide the software with a representation of the tips position in relation to the white framing points on the ALP. The software uses this graphical representation and the **Delta** value to know approximately how far in any direction the tips must move.

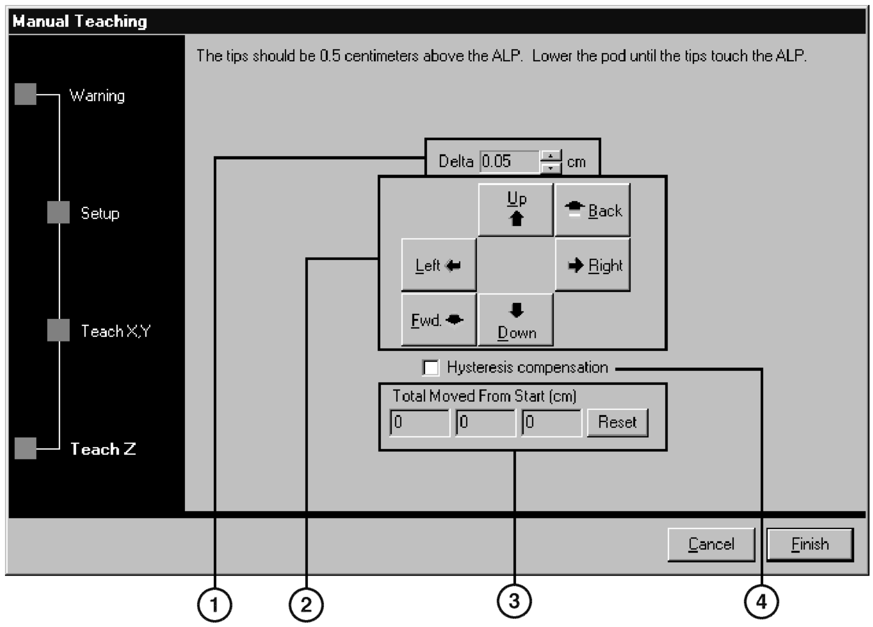
16 Select **Go**. The Span-8 Pod moves in accordance to the **Delta** value and the position of the small circle in relation to the large circle.

NOTE When the move is completed, the small circle resets itself to the center of the large circle. The values displayed in **Total Moved from Start (cm)** changes each time steps 11 thru 16 are completed. If desired, the values in **Total Moved from Start (cm)** can be reset to zero by selecting **Reset**.

17 Visually verify the position of the tips on the Biomek instrument in relation to the white framing points on the top of the Span-8 Tip Wash ALP. If the tips are still not physically positioned above the white framing points, repeat steps 13 through 16 until they are positioned above the white framing points.

18 Choose **Next. Manual Teaching (Teach Z)** appears (Figure 22.6).

Figure 22.6 Manual Teaching (Teach Z)



1. **Delta Value** — the magnitude of change applied to the tips each time a directional button is selected.
2. **Directional Buttons** — the directional buttons move the pod by the amount shown in **Delta** with each press of a button.
3. **Total Move from Start (cm)** — each time a directional button is selected, the pod moves by the amount shown in **Delta**. The total amount moved in each direction is displayed in **Total Moved From Start (cm)**.
4. **Hysteresis Compensation** — leave **Hysteresis compensation** at the default setting of **Off**. It is not necessary to compensate for hysteresis in the Z axis.

19 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 22.6).

NOTE The default **Delta** value is 0.05 cm. If the tips are a considerable distance above the ALP, increase the distance traveled by increasing the **Delta** value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the **Delta** value (minimum setting is 0.005 cm).

20 Select the directional button representing the motion required to physically move the tip into position over the white framing points on the Span-8 Tip Wash ALP.

NOTE Each time a directional button is selected, the pod and tips move the distance specified in **Delta** in the indicated direction.

21 Select **Finish**. The Span-8 Pod moves in accordance to the **Delta** value, **Manual Teaching** closes, and **Position Properties** (Figure 22.2) appears.

22 Choose **OK** to close **Position Properties**.

23 Choose **Save** to close the **Deck Editor**. The Span-8 Tip Wash ALP is framed.

Removing the Span-8 Tip Wash ALP

WARNING

Always wear protective gloves when draining the Span-8 Tip Wash ALP of fluid.

WARNING

The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING

Use an appropriately contained environment when using hazardous materials.

WARNING

Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

CAUTION

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION

SPILL HAZARD.

To remove the Span-8 Tip Wash ALP:

1. Turn the waste port on the Span-8 Tip Wash ALP up so that no fluid from the ALP leaks onto the deck.

2. Detach the drainage tube from the waste port.

3. Raise the drainage tube until the fluid in the tube drains into the waste container.

4. Remove the tubing from the Biomek instrument deck and the waste container.

5. Loosen the Phillips screws on the Span-8 Tip Wash ALP base from the deck.

6. Remove the Span-8 Tip Wash ALP from the deck by lifting until the locating pin clears the locating hole on the deck.

7. Carefully empty the Span-8 Tip Wash ALP of fluids by turning the ALP over and pouring the waste into an approved waste container.

WARNING

Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid. The cleaning wells and reservoir of the Span-8 Tip Wash ALP may contain hazardous chemicals and fluids.

Storage

Return the Span-8 Tip Wash ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE Allow the Span-8 Tip Wash ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer. Also, periodically clean the Span-8 Tip Wash ALP by filling the supply container with a bleach solution and running it through the ALP.

Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 22.1 Troubleshooting the Tip Wash ALP

If...	Then...
The Span-8 Tip Wash ALP is not functioning correctly.	Make sure that the hoses and cables are properly attached and routed to the Tip Wash ALP.
The Span-8 Tip Wash ALP is not draining waste fluid.	Look into the wells and reservoir and verify they are not clogged.

CHAPTER 23

Standard Passive ALPs

Overview

Standard Passive ALPs are open structures that hold labware on the deck during liquid-handling procedures. These ALPs can be mounted on any deck position, and ensure that labware is accessible by the pod at a predetermined height.

Standard Passive ALPs are also used as a base for many active ALPs, such as the Stirring ALP. Certain active ALPs are secured to the Standard Passive ALP stand, mounted on the appropriate deck position, and configured in the **Deck Editor**.

Standard Passive ALPs include:

- 1 x 1 Passive ALP (refer to *1 x 1 Passive ALP*)

  NOTE A 1 x 1 Passive ALP with LLS Plate Option is also available (refer to *1 x 1 Passive ALP with LLS Plate Option*).

- 1 x 1 Passive ALP with Indented Sides (refer to *1 x 1 Passive ALP with Indented Sides*)

  NOTE The 1 x 1 Passive ALP with Indented Sides is placed on the deck next to an SPE Collar Stand with an SPE Collar to preserve a deck position. The indented sides allow enough clearance for the gripper to extend and move the SPE Collar without hitting the ALP.

- 1 x 3 Passive ALP (refer to *1 x 3 Passive ALP*)
- 1 x 5 Passive ALP (refer to *1 x 5 Passive ALP*)

The sections in this chapter include:

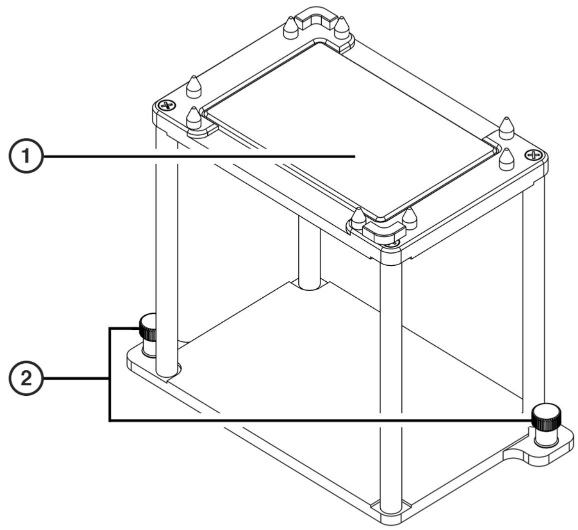
- *Installing Standard Passive ALPs*
- *Framing Instructions*
- *Removing Standard Passive ALPs from the Deck*
- *Storage*
- *Preventive Maintenance*

1 x 1 Passive ALP

A 1 x 1 Passive ALP occupies one position on the deck and holds one piece of labware (Figure 23.1).

NOTE Labware positioned on a 1 x 1 Passive ALP is gripper accessible and stackable.

Figure 23.1 1 x 1 Passive ALP



1. **1 x 1 ALP** — labware position
2. **Thumbscrews**

NOTE The 1 x 1 Passive ALP supports an LLS plate option which improves liquid level sensing and clot detection capabilities in labware positioned on the ALP (refer to *1 x 1 Passive ALP with LLS Plate Option*).

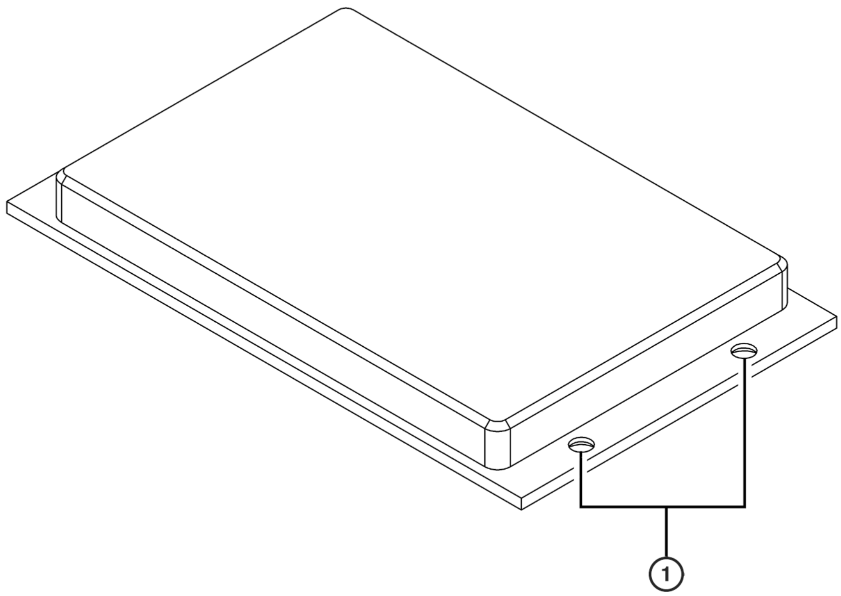
1 x 1 Passive ALP with LLS Plate Option

The 1 x 1 Passive ALP stand supports a Liquid Level Sensing (LLS) plate option (Figure 23.2) which when installed improves liquid level sensing capabilities in labware positioned on the 1 x 1 Passive ALP.

- **FX^{P}**, **NX-S8** — The LLS plate option also improves clot detection capabilities.

NOTE Labware positioned on a 1 x 1 Passive ALP with the LLS plate option installed is gripper accessible and stackable.

Figure 23.2 LLS Plate (Top View)



1. **LLS Plate Mounting Screw Holes** — four mounting screws are used to secure the LLS Plate to the 1 x 1 ALP. (*There are two more screw holes on the opposite side.*)

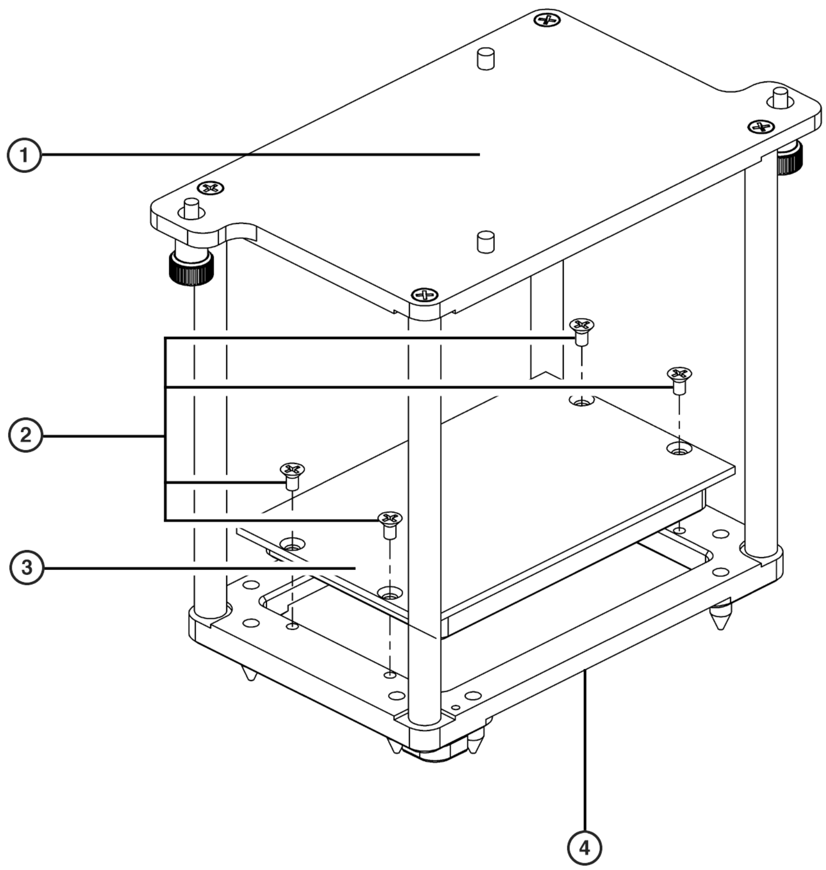
Installing the LLS Plate Option on a 1 x 1 Passive ALP

To install the LLS plate, complete the following:

1 Turn a 1 x 1 Passive ALP upside down.

2 Position the LLS plate upside down in the center of the 1 x 1 Passive ALP stand (Figure 23.3).

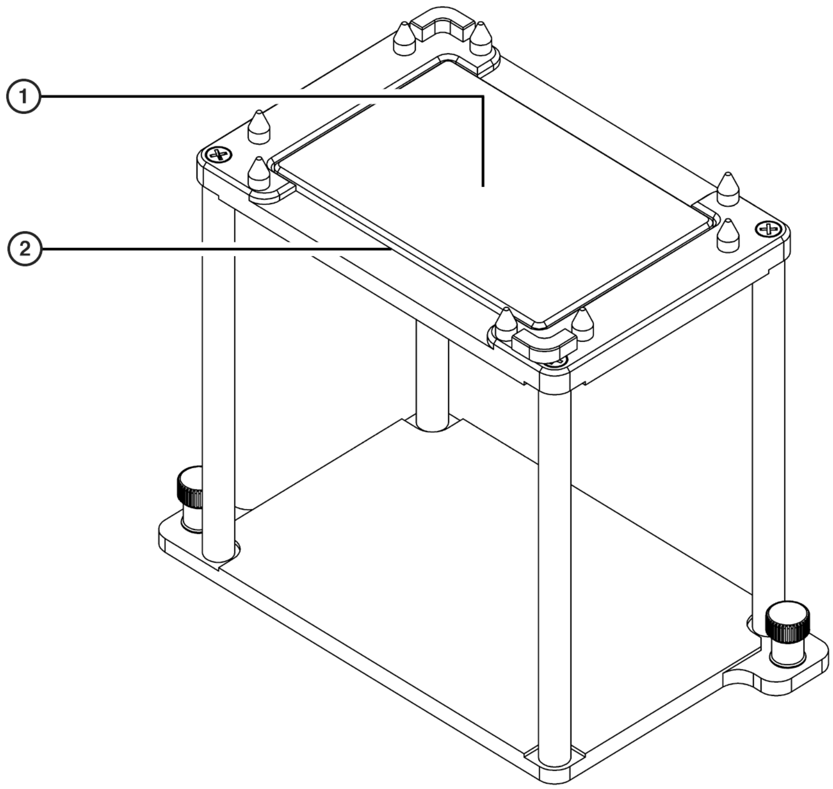
Figure 23.3 Installing an LLS Plate on a 1 x 1 Passive ALP



1. **Bottom of 1 x 1 Passive ALP**
2. **LLS Plate Mounting Screws**
3. **Bottom of LLS Plate**
4. **Top of 1 x 1 Passive ALP**

3 Attach the LLS plate to the 1 x 1 Passive ALP with the four mounting screws provided by turning the screws clockwise. The LLS plate is now installed (Figure 23.4).

Figure 23.4 1 x 1 Passive ALP with the LLS Plate Option Installed

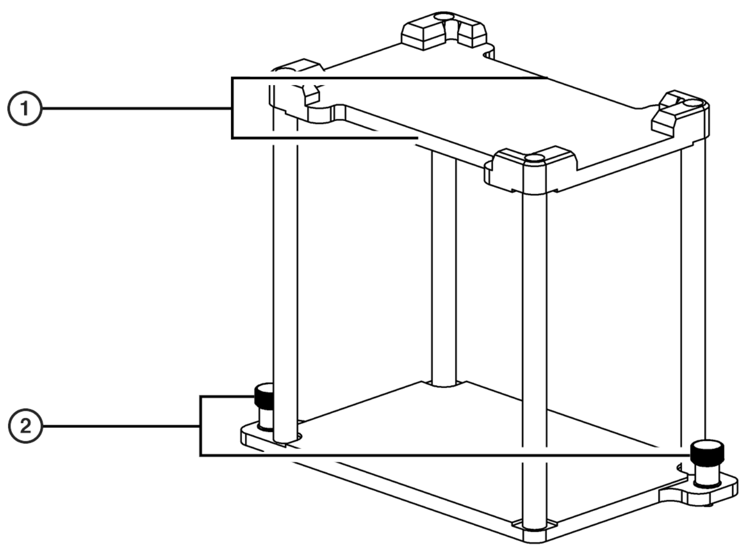


1. **1 x 1 ALP with LLS Plate Option Installed** — labware rests on top of the LLS plate.
2. **Installed LLS Plate**

1 x 1 Passive ALP with Indented Sides

The 1 x 1 Passive ALP with Indented Sides occupies one deck position and is placed on the deck next to an SPE Collar Stand with an SPE Collar. Since the gripper fingers must open wide enough to grip the SPE Collar and would hit the adjacent ALP, the position would be lost without using the 1 x 1 Passive ALP with Indented Sides. This ALP allows enough clearance for the gripper to extend and move the SPE Collar without hitting it.

Figure 23.5 1 x 1 Passive ALP with Indented Sides



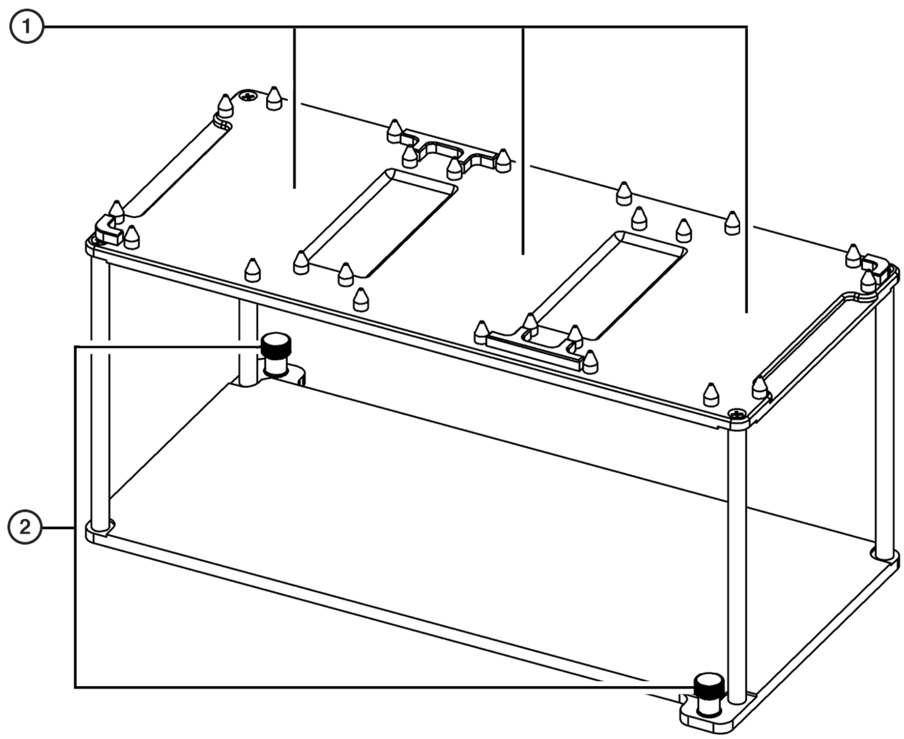
1. **Indented Sides**
2. **Thumbscrews**

1 x 3 Passive ALP

A 1 x 3 Passive ALP occupies three positions on the deck and holds up to three pieces of labware in one column (Figure 23.6).

NOTE Labware positioned on the 1 x 3 Passive ALP is gripper accessible and stackable.

Figure 23.6 1 x 3 Passive ALP



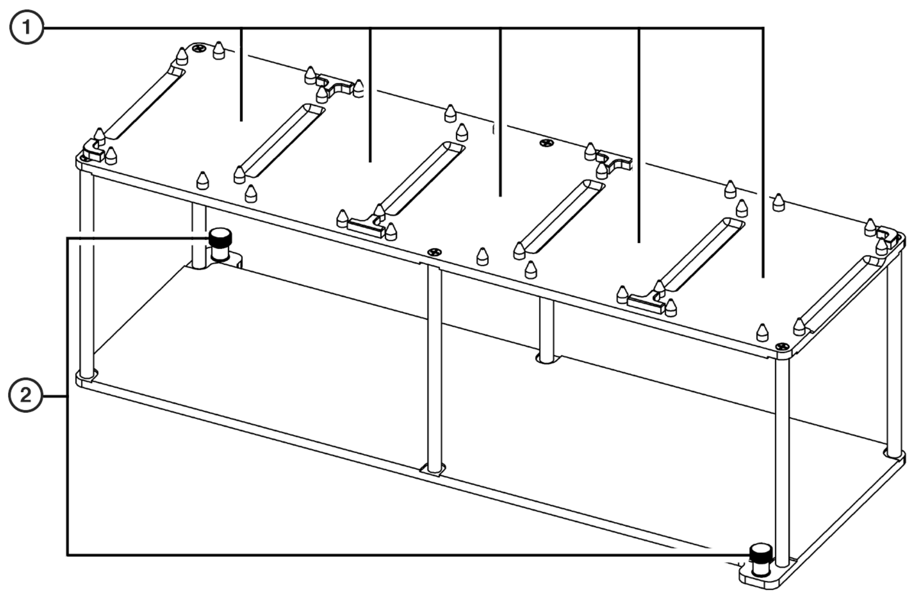
1. **1 x 3 ALP** — labware positions
2. **Thumbscrews** — two thumbscrews are used to secure the 1 x 3 ALP to the deck.

1 x 5 Passive ALP

A 1 x 5 Passive ALP occupies one column on the Biomek FX deck and holds up to five pieces of labware (Figure 23.7).

NOTE Labware positioned on the 1 x 5 Passive ALP is not gripper accessible or stackable.

Figure 23.7 1 x 5 Passive ALP



1. **1 x 5 ALP** — labware positions
2. **Thumbscrews** — two thumbscrews are used to secure the 1 x 5 ALP to the deck.

Installing Standard Passive ALPs

Installing Standard Passive ALPs to the deck includes choosing the deck position and mounting the ALP to the deck.

Choosing a Deck Position

Use the **Deck Editor** to determine where the ALP may be mounted on the deck. Positions capable of supporting the ALP are indicated by dashed lines.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting Standard Passive ALPs to the Deck

To mount Standard Passive ALPs to the deck:

1. Choose an appropriate deck location to mount the ALP to the deck (refer to *Choosing a Deck Position*).

2. Position the ALP on the appropriate deck location so the locating pins on the bottom of the ALP slip into the locating holes on the deck.

   NOTE Use the deck laser etchings as a guide when positioning Standard Passive ALPs on the deck.

3. Fasten the ALP to the deck using the thumbscrews on the base of the Standard Passive ALP.

Framing Instructions

Frame the Standard Passive ALPs according to the instructions in the specific manual for the instrument.

Removing Standard Passive ALPs from the Deck

To remove Standard Passive ALPs from the deck:

1. Remove labware from the ALP manually or through a Biomek method.

2. Loosen the thumbscrews on the base of the Standard Passive ALP.

3. Lift the ALP straight up from the deck until the locating pins are clear of the locating holes.

Storage

Return Standard Passive ALPs to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

NOTE It is desirable to allow the Standard Passive ALPs to air-dry before returning them to the original packing materials.

Preventive Maintenance

WARNING

Standard Passive ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Standard Passive ALPs with a soft cloth.

CHAPTER 24

Stirring ALP

Overview

The Stirring ALP is an active ALP that stirs liquids in a reservoir at an adjustable speed (Figure 24.1). To create the stirring and mixing motion, a caplet-shaped Teflon-coated stir bar (Figure 24.2) is placed in the reservoir. The stir bar follows the movements of a motor-powered magnet located in the base of the ALP. The stirring motion occurs as the stir bar ramps up from a resting (still) state to the configured speed, then ramps back down to a resting state when stirring is completed.

⚠ CAUTION

The Stirring ALP continues to stir during a light curtain violation even though the method stops.

The **Device Action** step is used to configure the Stirring ALP (refer to the *Biomek Software User's Manual*, Chapter 23, *Device Action Step*).

It is possible to pipette from a reservoir on the Stirring ALP. The pipetting operation can occur while the stir bar continues stirring or when the stirring motion has stopped. The pipetting option is also configured with the **Device Action** step.

NOTE When setting the height for pipetting operations, the presence of the stir bar must be taken into consideration. Pipetting operations that do not account for the height of the stir bar could damage the tips.

The sections in this chapter include:

Figure 24.1 Stirring ALP (Side View)

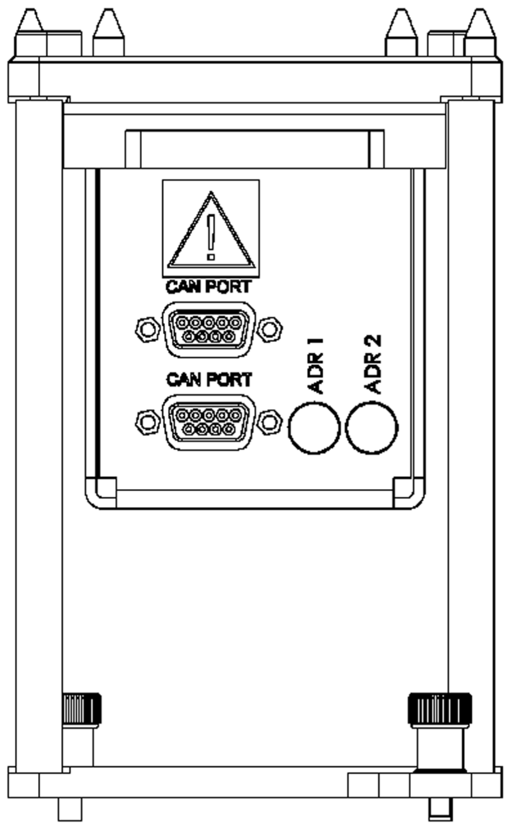
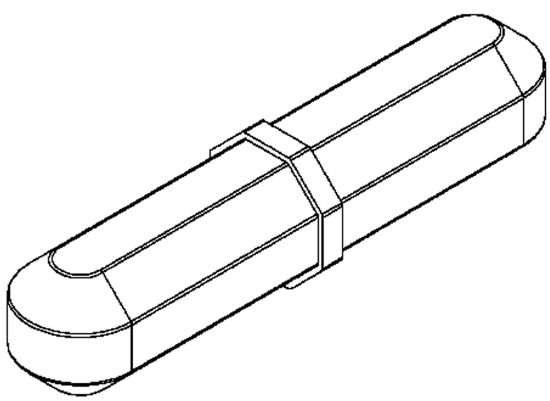


Figure 24.2 Stir Bar



Installing the Stirring ALP

Installing the Stirring ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

Mounting the Stirring ALP to the Deck

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ WARNING

Disconnect main power before connecting or disconnecting CAN cables.

To mount the Stirring ALP:

1. Turn off power to main unit before mounting any ALP.
2. Position the Stirring ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Fasten the Stirring ALP to the deck using the thumbscrews on the ALP.
4. Plug the female end of the CAN communication cable into the male CAN Port on the Stirring ALP.

⚠ CAUTION

A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

NOTE When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5 Plug the other end of the CAN cable into one of the following connectors:

NOTE Make sure the cable routing does not interfere with the operation of the Biomek FX.

- Any female connector labeled “CAN Port” on the main Biomek unit
- Any available female connector labeled “CAN Port” on another Active ALP, creating a ‘chain’ of connected cables

  NOTE A ‘chain’ allows multiple devices to be linked together. The maximum number of devices that can be chained together is three. The chain must plug into the main Biomek unit at some point.

6 Verify the address switch ADR1 is set to ‘2.’

7 If multiple Stirring ALPs are on the deck, change ADR2 to a unique address between zero (0) and F.

NOTE ADR2 is set to a default address of zero (0). If only one Stirring ALP is on the deck, ADR2 should be left at the default setting.

8 Place a reservoir on the ALP.

9 Carefully load the liquid into the reservoir.

10 Carefully place the stir bar in the center of the reservoir.

NOTE When placed into the center of the reservoir correctly, the stir bar self-aligns.

11 Set the stirring speed and ramp time in the software (refer to *Using the Stirring ALP in a Method*). The stir bar ramps up from a resting (still) state to the set speed, and ramps back down when stirring is completed.

Framing Instructions

Frame the Stirring ALP according to the instructions in the specific manual for the instrument.

Using the Stirring ALP in a Method

CAUTION

Adjust the stirring speed using the software. Set the stirring speed only as high as absolutely necessary to avoid splashing.

WARNING

Setting the stirring speed too high, or setting the speed too high with an inadequate amount of liquid in the reservoir, or ramping the stirring speed up too fast in a high viscosity liquid may force the stir bar off center. The stir bar would then have to be reset to the center position.

To use the Stirring ALP in a method, it must be installed in **Hardware Setup** For more information, refer to the specific manual for the instrument.

NOTE Configuration in **Hardware Setup** is not necessary for the Stirring ALP.

The Stirring ALP is controlled and operated through the **Device Action** step in Biomek Software (refer to the *Biomek Software User's Manual*, Chapter 23, *Configuring the Device Action Step for the Stirring ALP (FX, NX only)*). The speed, stirring time, and ramp time are all configured through the **Device Action** step for use in a method.

Controlling the Stirring ALP Outside a Method

To control the Stirring ALP outside a method, use **Advanced Manual Control** to:

- Turn on the Stirring ALP at a particular speed.
- Turn off the Stirring ALP.

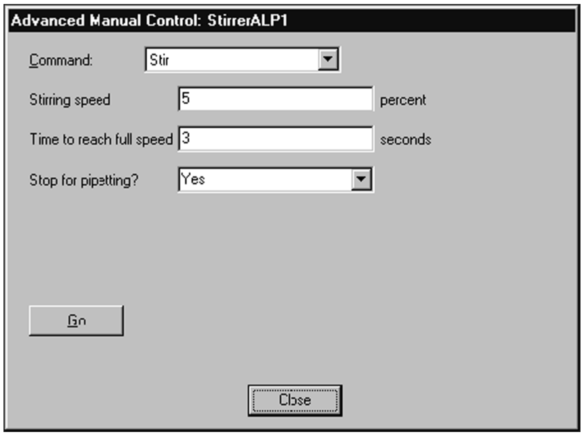
To turn on or adjust the speed of a Stirring ALP:

1 Choose **Instrument > Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Stirrer ALP**. **Advanced Manual Control** for the selected Stirring ALP appears (Figure 24.3).

Figure 24.3 Advanced Manual Control for a Selected Stirring ALP



4 From **Command**, choose **Stir**.

5 Enter a percentage in **Stirring speed**.

NOTE The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6 Enter a time in seconds in **Time to reach full speed**.

7 Choose **Yes** or **No** in **Stop for pipetting?**

8 Choose **Go**.

9 Choose **Close** to close **Advanced Manual Control**.

10 Choose **Exit** to close **Manual Control**.

To turn off a Stirring ALP:

1. Choose **Instrument > Manual Control**. **Manual Control** appears.
2. Choose **Advanced Controls**.
3. Select the desired **Stirrer ALP**. **Advanced Manual Control** for the selected Stirring ALP appears (Figure 24.3).
4. From **Command**, choose **Off**.
5. Choose **Go**.
6. Choose **Close** to close **Advanced Manual Control**.
7. Choose **Exit** to close **Manual Control**.

Removing the Stirring ALP

⚠ **CAUTION**

The reservoir and stir bar may be contaminated following use. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To remove the ALP:

1. Turn off power to main unit before removing the Stirring ALP.
2. Carefully remove the reservoir from the Stirring ALP, being careful not to spill any residual liquid.
3. Unplug the CAN communication cable from the CAN Port on the Stirring ALP.
4. Loosen the mounting screws.

5 Lift the Stirring ALP in an upward motion to clear the locating pins from the locating holes on the deck.

Storage

⚠ CAUTION

Clean the reservoir before storing or filling with another substance.

Return the Stirring ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Stirring ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 24.1 Troubleshooting the Stirring ALP

If...	Then...
The Stirring ALP does not stir.	Turn off power to main unit. Check the electrical connection at the Biomek instrument and the Stirring ALP. If the ALP is connected in a chain, check all connections in the chain. Retry functionality. Check rotary address dial. Contact a Beckman Coulter Service Engineer.
The Stirring ALP is not powering up.	Contact a Beckman Coulter Service Engineer.
The Stirring ALP is not functioning correctly.	Contact a Beckman Service Engineer. **NOTE** Do not remove the cover(s) for any reason.

CHAPTER 25

Storage ALPs (FX-only)

Overview

Storage ALPs allow three extra storage positions on the Biomek FX deck.

Storage ALPs are Standard 1 x 1 or 1 x 3 Passive ALPs that are positioned partially off the left side of a Biomek FX deck using deck positions available through the Storage ALP installation. Once the Standard Passive ALPs are installed on these deck positions, they are considered Storage ALPs and can be used only for storing labware; they are not available for pipetting. However, the extra space available on the deck using Storage ALPs allows other ALPs to be added.

To move labware to and from a Storage ALP, a **Storage ALP Move** step must be used (refer to *Configuring the Storage ALP Move Step*).

NOTE When the Storage ALP installation is run, the Storage ALP deck positions in the **Deck Edito**r and **Storage ALP Move** step are available.

Storage ALPs are installed, removed, stored, and preventively maintained like Standard Passive ALPs. Use the following information from CHAPTER 23, *Standard Passive ALPs*:

- *Installing Standard Passive ALPs*, CHAPTER 23

  NOTE Ensure the correct deck plate holes on the deck are used to allow the Storage ALP to be partially positioned off the left side.

- *Removing Standard Passive ALPs from the Deck*, CHAPTER 23
- *Storage*, CHAPTER 23
- *Preventive Maintenance*, CHAPTER 23

The sections in this chapter include:

- *Configuring Storage ALPs in the Deck Editor*
- *Framing Storage ALPs*
- *Configuring the Storage ALP Move Step*

Configuring Storage ALPs in the Deck Editor

Before Storage ALPs can be used in a method, Biomek Software must know the location of the ALPs on the deck. The software representation of the instrument deck is configured in the **Deck Editor**.

Configuring the **Deck Editor** to use a Storage ALP includes:

- *Adding a Storage ALP to the Deck*
- *Setting Storage ALP Position Properties*

- *Adding Other ALPs to the Deck*

Adding a Storage ALP to the Deck

A new Storage ALP is added to the deck using the **Deck Editor**. The new deck position is named automatically when a Storage ALP is added to the deck.

To add an Storage ALP to the deck:

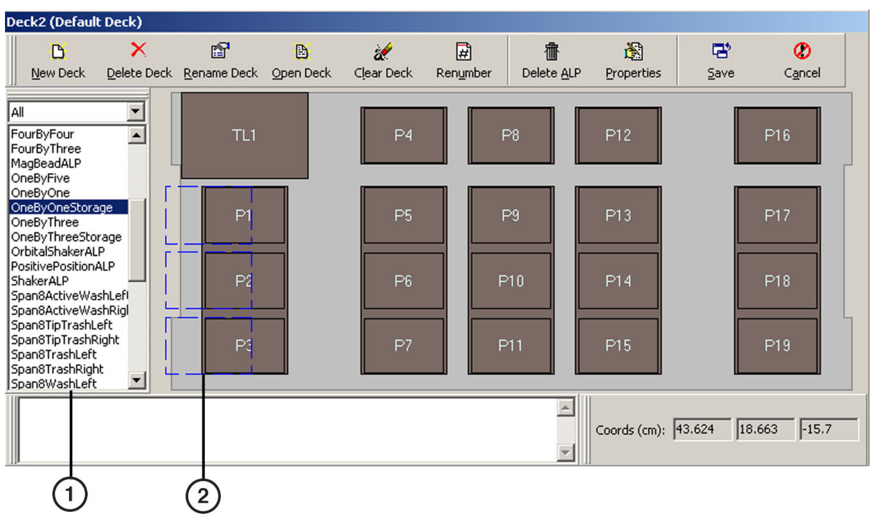
1 From the **Instrument** menu, select **Deck Editor**. **Deck Editor** appears.

2 Click and hold the mouse button on **OneByOneStorage** in the **ALP Types List**. The **Deck Editor** interface moves slightly to the right to indicate the positions on the left of the deck capable of supporting the 1 x 1 Storage ALP (Figure 25.1).

OR

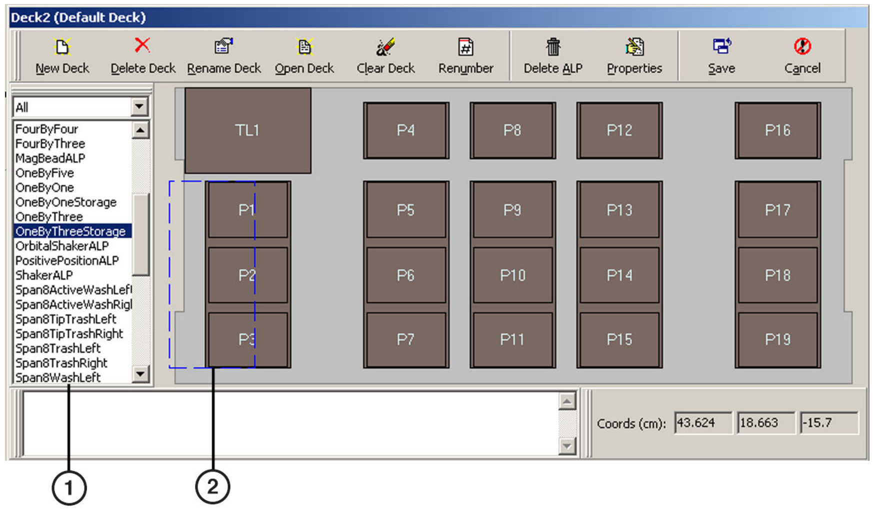
Click and hold the mouse button on **OneByThreeStorage** in the **ALP Types List**. The **Deck Editor** interface moves slightly to the right to indicate the positions on the left of the deck capable of supporting the 1 x 3 Storage ALP (Figure 25.2).

Figure 25.1 1 x 1 Storage ALP Deck Positions on a Biomek FX Deck



1. **ALP Types List**
2. Dashed lines indicate where the 1 x 1 Storage ALP can be placed on the Biomek FX deck.

Figure 25.2 1 x 3 Storage ALP Deck Position on a Biomek FX

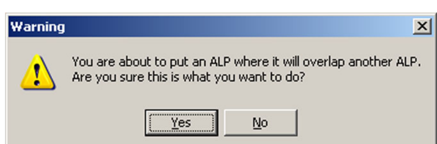


1. **ALP Types List**
2. Dashed lines indicate where the 1 x 3 Storage ALP can be placed on the Biomek FX deck.

3 Drag and drop **OneByOneStorage** or **OnebyThreeStorage** from the **ALP Types List** to one or more of the dashed locations on the deck. The Storage ALP appears and the deck position is named automatically.

NOTE Attempting to place a Storage ALP in a location where another ALP resides results in a **Warning** (Figure 25.3). Choose **No** and delete the currently placed ALP(s) before placing the Storage ALP on the deck. For more information, refer to the *Biomek Software User's Manual*, Chapter 6, *Deleting ALPs and Deck Positions from a Deck.*

Figure 25.3 Warning Indicating that an ALP is About to be Placed in a Position Overlapping Another ALP



Setting Storage ALP Position Properties

After an Storage ALP is placed on the deck, the deck position properties must be set. **Position Properties** include position **Name** and **Per-labware Offsets**, which customize the offsets for specific types of labware.

To set deck position properties:

1 Select the desired Storage ALP deck position on the Deck View of the **Deck Editor**. The selected position is highlighted with a pink border.

2 Select 

from the **Deck Editor** toolbar.

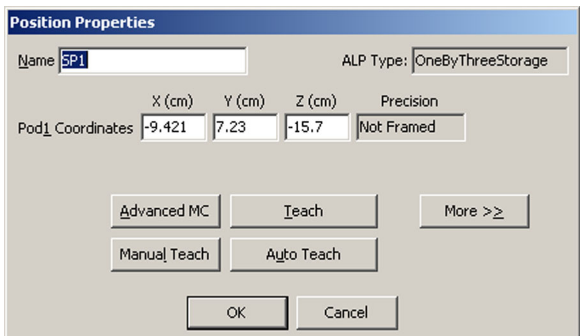
OR

Double-click on the Storage ALP deck position.

OR

Right-click on the Storage ALP deck position and select **Properties** from the menu. **Position Properties** appears (Figure 25.4).

Figure 25.4 Position Properties for a 1 x 3 Storage ALP

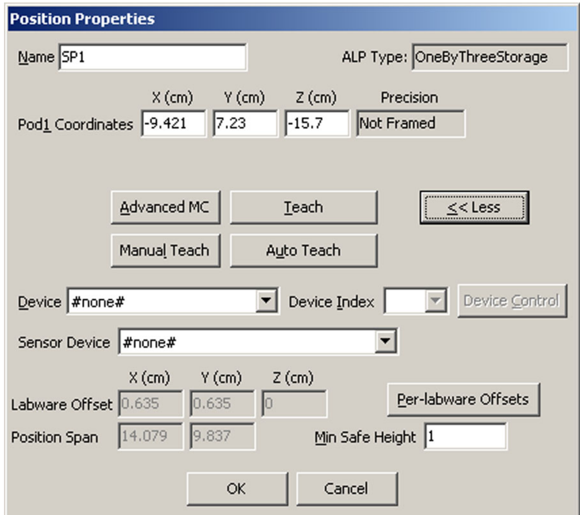


3 In **Name**, rename the deck position, if desired.

4 Specify the **X**, **Y**, and **Z Coordinates** of the position in relation to the pod's home position by teaching the ALP (refer to *Framing Storage ALPs*).

5 Select **More>>** to display device association and labware offset options (Figure 25.5).

Figure 25.5 Position Properties After More Is Chosen



6 If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to the *Biomek Software User's Manual*, Chapter 6, *Changing Per-Labware Offsets*).

7 If necessary, adjust the **Min Safe Height** (refer to the *Biomek Software User's Manual*, Chapter 6, *Setting ALP Properties and Deck Positions*).

8 Choose **OK** to save the position properties and return to the **Deck Editor**.

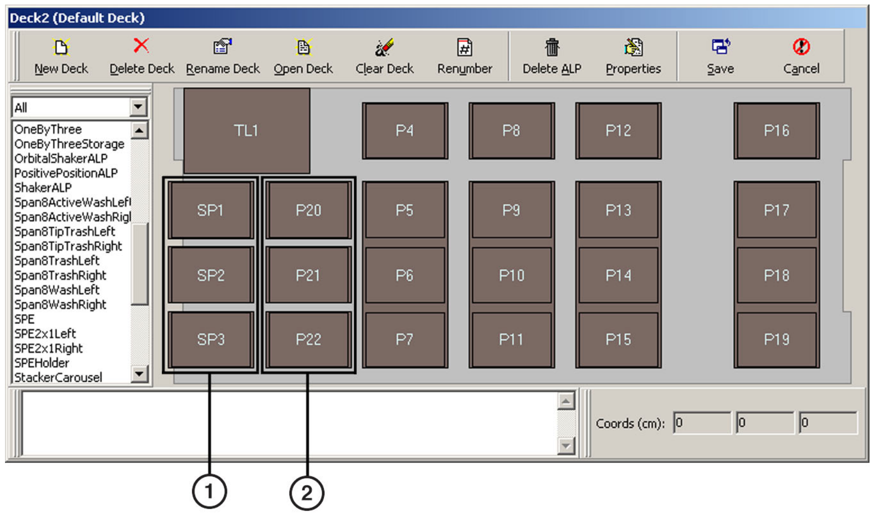
9 Choose **Save** to save changes to save the new deck configuration and close the editor.

Adding Other ALPs to the Deck

Since the Storage ALPs are positioned partially off the left side of the deck, space becomes available for three additional ALPs. Once the deck has been configured for the Storage ALPs, drag and drop other ALPs from the ALP list to the available positions.

Figure 25.6 displays a deck with three Storage ALPs and three Standard 1 x 1 ALPs positioned in the available deck space.

Figure 25.6 Three 1 x 1 Storage ALPs and Three Standard 1 x 1 ALPs Added to a Biomek FX deck



1. Three 1 x 1 Storage ALPs added to the deck
2. Three Standard 1 x 1 ALPs added to the deck

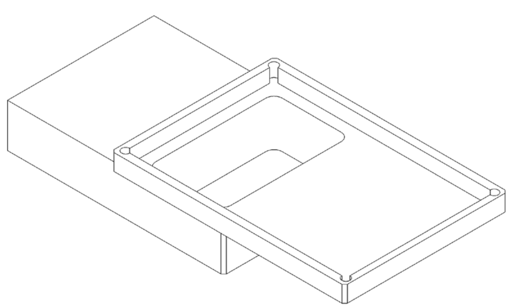
Framing Storage ALPs

Storage ALPs are framed using the AccuFrame and the red Framing Adaptor (Figure 25.7).

To frame a Storage ALP:

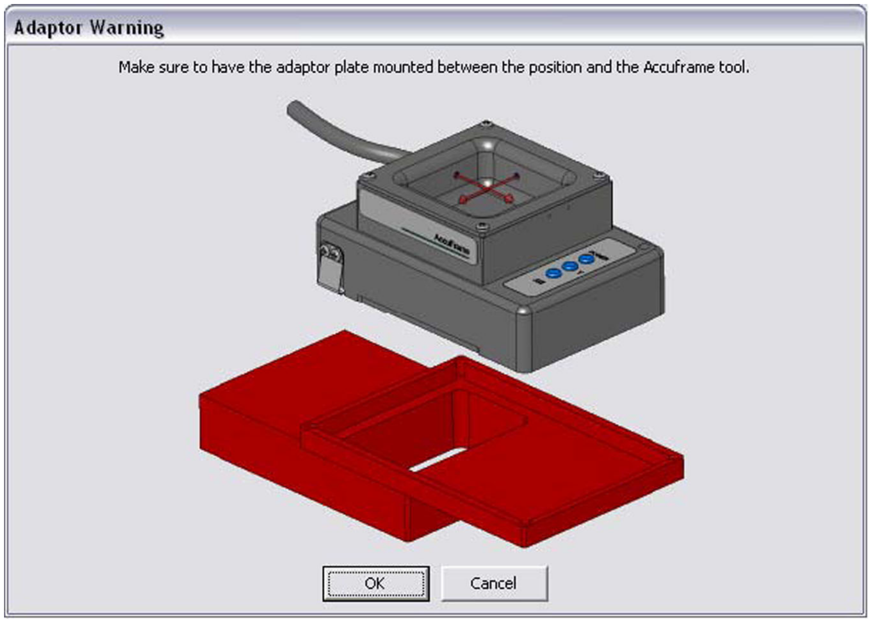
1 Gently mount the Accuframe on the red Framing Adaptor provided with the integration (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 5, *Installing AccuFrame*).

Figure 25.7 Framing Adaptor



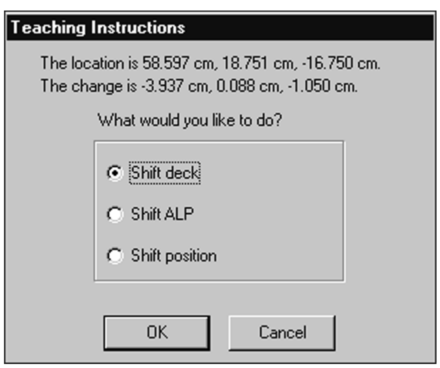
2 Frame the Storage ALP Position with the Multichannel Pod according to the instructions in the hardware manual (refer to the *Biomek® FX and FX^P Laboratory Automation Workstations User's Manual*, Chapter 5, *Framing the Position*). **Adaptor Warning** appears (Figure 25.8).

Figure 25.8 Adaptor Warning



3 Ensure the instructions are followed on the **Adaptor Warning** and choose **OK. Teaching Instructions** appears (Figure 25.9).

Figure 25.9 Teaching Instructions



4 Choose **Shift ALP**.

5 Choose **OK. Position Properties** appears again, and the Storage ALP is framed with the Multichannel Pod.

6 Choose **OK** to close **Position Properties**.

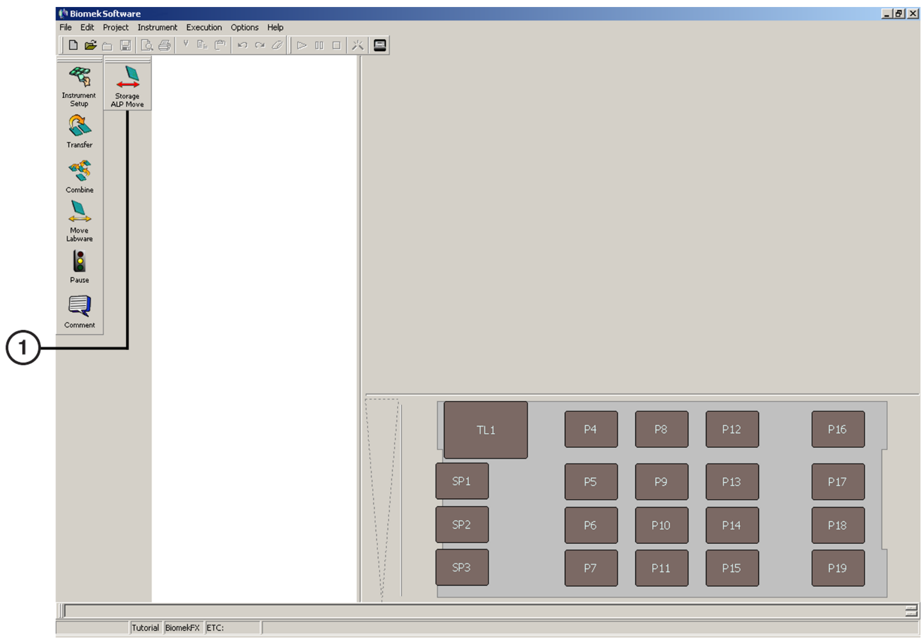
7 Choose **Save** to close the **Deck Editor**.

Configuring the Storage ALP Move Step

The **Storage ALP Move** step is used to move labware to and from the Storage ALPs. This step is available on the **Integrated Devices** step palette when the Storage ALPs are installed (Figure 25.10).

NOTE If the **Storage ALP Move** step is accidentally deleted from the **Integrated Devices** step palette, the Storage ALP installation must be reinstalled.

Figure 25.10 Integrated Devices Step Palette

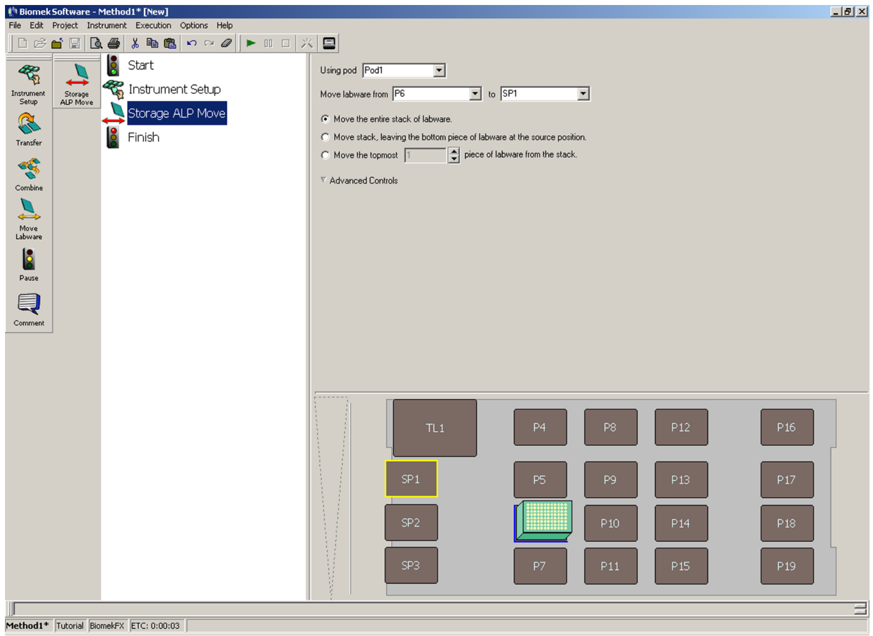


1. **Integrated Devices Step Palette** — the **Storage ALP Move** step appears here, along with steps for any other integrated devices on the workstation.

To configure the **Storage ALP Move** step:

1 To insert a **Storage ALP Move** step into a method, drag and drop **Storage ALP Move** from the Integrated Devices step palette to the Method View (Figure 25.11).

Figure 25.11 Storage ALP Move Step Inserted into the Method View



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2 In **Using Pod**, select the pod to move the labware.

NOTE In **Using Pod**, **Pod1** is the default on a single-pod Biomek FX instrument and the only pod capable of moving labware on or off the Storage ALPs.

---

3 In **Move labware from**, select the position where labware desired to move is located.

---

4 In **to**, select the desired position where the selected labware will be moved.

---

5 The In **Move labware from**, select the position where labware desired to move is located.

---

6 In **to**, select the desired position where the selected labware will be moved.

NOTE Storage ALP position must be chosen in either **Move labware from** or **to**; this step is used only to move labware to or from the Storage ALP.

---

7 Select the desired option for moving stacked labware:

- **Move the entire stack of labware** — moves all labware in the stack; this option should be selected when moving a single unstacked piece of labware.

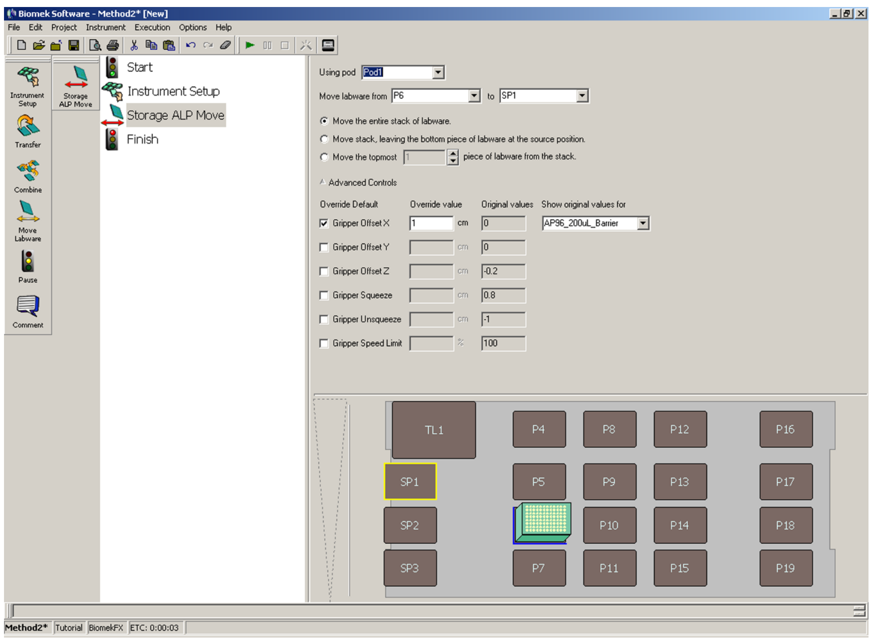
- **Move stack, leaving the bottom piece of labware at the source position** — moves all labware in the stack except for the bottom piece.

  NOTE Selecting **Move stack, leaving the bottom piece of labware at the source position** when the source deck position contains only one piece of labware results in an error.

- **Move the topmost. . .piece(s) of labware from the stack** — moves only the specified number of labware from the top of the stack.

Advanced Controls (Figure 25.12) may be selected to change the offset values for the **Storage ALP Move** step; however, consult with Beckman Coulter Customer Support before changing the values in **Advanced Controls**.

Figure 25.12 Storage ALP Move with Advanced Controls Selected



CHAPTER 26

Test Tube Rack ALPs

Overview

NOTE All information in this chapter referring to the Biomek NX-S8 refers to both the NX and NX^P instruments.

Test Tube Rack ALPs are open-structured passive ALPs that hold test tube racks or septum piercing tube racks on the Biomek deck during liquid-handling procedures. Test Tube Rack ALPs ensure that test tubes are accessible by a Span-8 Pod at a predetermined height.

Test Tube Rack ALPs come in two sizes:

- 1 x 2 — holds up to two racks of test tubes
- 1 x 3 — holds up to three racks of test tubes

Both the 1 x 2 and 1 x 3 Test Tube Rack ALPs can be positioned with the overhang on the left or right of the ALP. When the overhang is to the left of the ALP, the ALP is left facing (Figure 26.1). Conversely, when the overhang is to the right, the ALP is right facing (Figure 26.2).

Test Tube Rack ALPs are mounted in specific deck positions based on the overhangs left or right orientation (refer to *Selecting the Deck Positions for a Test Tube Rack ALP*).

CAUTION

Different sizes of test tubes must not be mixed in one test tube rack. To avoid a collision between the pod and Test Tube Rack ALP, all of the test tubes in the Test Tube Rack must be a uniform height.

NOTE Biomek Software assumes a Test Tube Rack contains one size and type of test tube, not a combination of test tube sizes and types.

Test Tube Rack ALPs support four sizes of Beckman Coulter test tube racks:

- 10 mm (x75 mm)
- 12 mm (x75 mm)
- 13 mm (x100 mm)
- 15.5 mm (x100 mm)

The **NX-S8** and **FX^P** instruments also support two sizes of Beckman Coulter septum piercing tube racks:

- 13 mm (x100 mm)
- 15.5 mm (x100 mm)

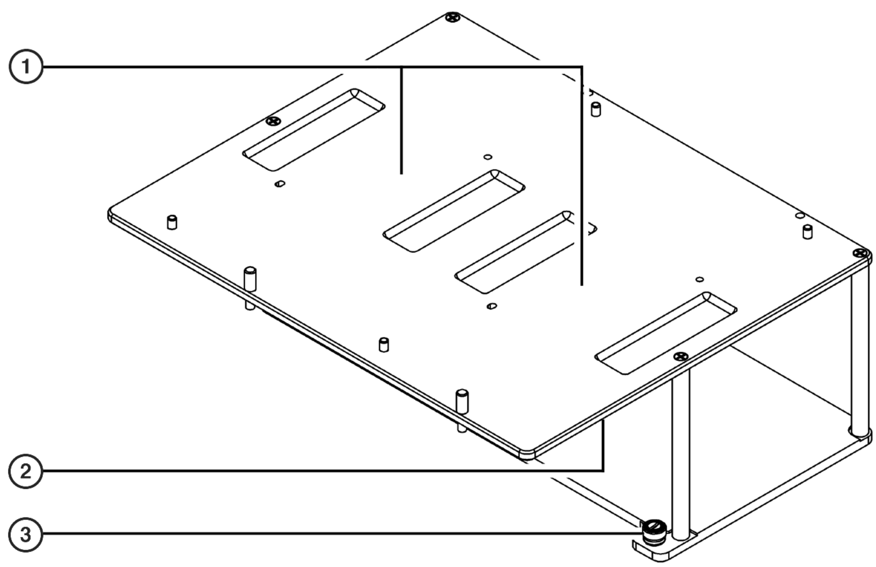
The sections in this chapter include:

- *Installing Test Tube Rack ALPs*
- *Framing Instructions*
- *Adding Test Tube Racks to Test Tube Rack ALPs*
- *Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 & FXP only)*
- *Removing Test Tube Rack ALPs from the Deck*
- *Storage*
- *Preventive Maintenance*

1 x 2 Test Tube Rack ALP

A 1 x 2 Test Tube Rack ALP (Figure 26.1) can hold up to two racks of test tubes. Test tubes and test tube racks are not gripper accessible or stackable.

Figure 26.1 1 x 2 Test Tube Rack ALP (Left Facing)

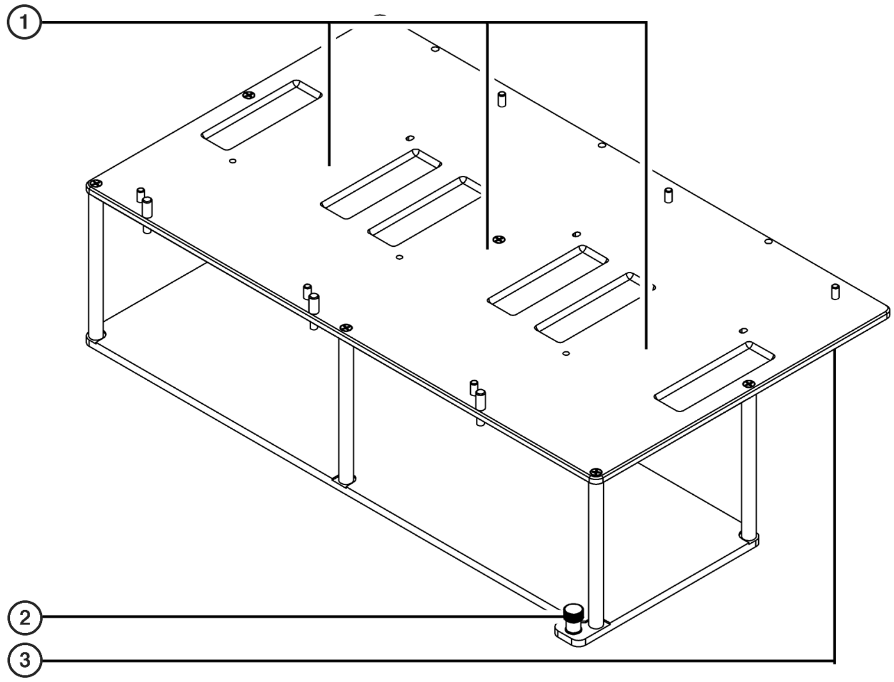


1. **1 x 2 Test Tube Rack ALP (Left Facing)** — labware positions.
2. **Overhang**
3. **Thumbscrew** — two thumbscrews are used to secure the 1 x 2 Test Tube Rack ALP to the deck. (*There is another thumbscrew on the corner diagonal to the one shown here.*)

1 x 3 Test Tube Rack ALP

A 1 x 3 Test Tube Rack ALP (Figure 26.2) holds up to three racks of test tubes. Test tubes and test tube racks are not gripper accessible or stackable.

Figure 26.2 1 x 3 Test Tube Rack ALP (Right Facing)



1. **1 x 3 Test Tube Rack ALP (Right Facing)** — labware positions.
2. **Thumbscrew**
3. **Overhang**

Installing Test Tube Rack ALPs

Installing Test Tube Rack ALPs includes:

- *Selecting the Deck Positions for a Test Tube Rack ALP*
- *Mounting Test Tube Rack ALPs to the Deck*

After installing the Test Tube Rack ALP, test tube racks must be added properly to the Test Tube Rack ALP to use them in a method (refer to *Adding Test Tube Racks to Test Tube Rack ALPs*).

- **NX-S8, FX^{P}** — Septum piercing test tube racks may also be used with Test Tube Rack ALPs (refer to *Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 & FXP only)*).

Selecting the Deck Positions for a Test Tube Rack ALP

Each Test Tube Rack ALP occupies 1½ columns on the deck, although the size of the ALP dictates whether it uses three or four rows on the deck. The deck positions available for a Test Tube Rack ALP are determined by the number of rows occupied by the ALP:

- The 1 x 2 Test Tube Rack ALP uses 3 rows and 1½ columns on the deck.

- The 1 x 3 Test Tube Rack ALP uses 4 rows and 1½ columns on the deck.

Although a Test Tube Rack ALP leaves 1/2 of a column empty, two Test Tube Rack ALPs cannot be placed beside each other so that each one uses 1/2 of the same column. However, a Span-8 Tip Wash ALP can be placed in the 1/2 column remaining next to a Test Tube Rack ALP.

Use the Biomek Software **Deck Editor** to determine where the 1 x 2 Test Tube Rack ALP and 1 x 3 Test Tube Rack ALP can be placed on the Biomek instrument deck. After a deck position on which to physically mount the ALP has been chosen, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting Test Tube Rack ALPs to the Deck

While 1 x 2 and 1 x 3 Test Tube Rack ALPs occupy different positions on the deck they are mounted to the deck using the same instructions (refer to *Mounting Test Tube Rack ALPs to the Deck*).

To mount a Test Tube Rack ALP to the deck:

1. Position the ALP so the locating pins on the bottom of the ALP slip into the locating holes on the deck.

   NOTE Use the laser etchings as a guide when positioning ALPs on the deck.

2. Fasten the ALP to the deck using the thumbscrews on the base of the Test Tube Rack ALP (Figure 26.1 and Figure 26.2).

Framing Instructions

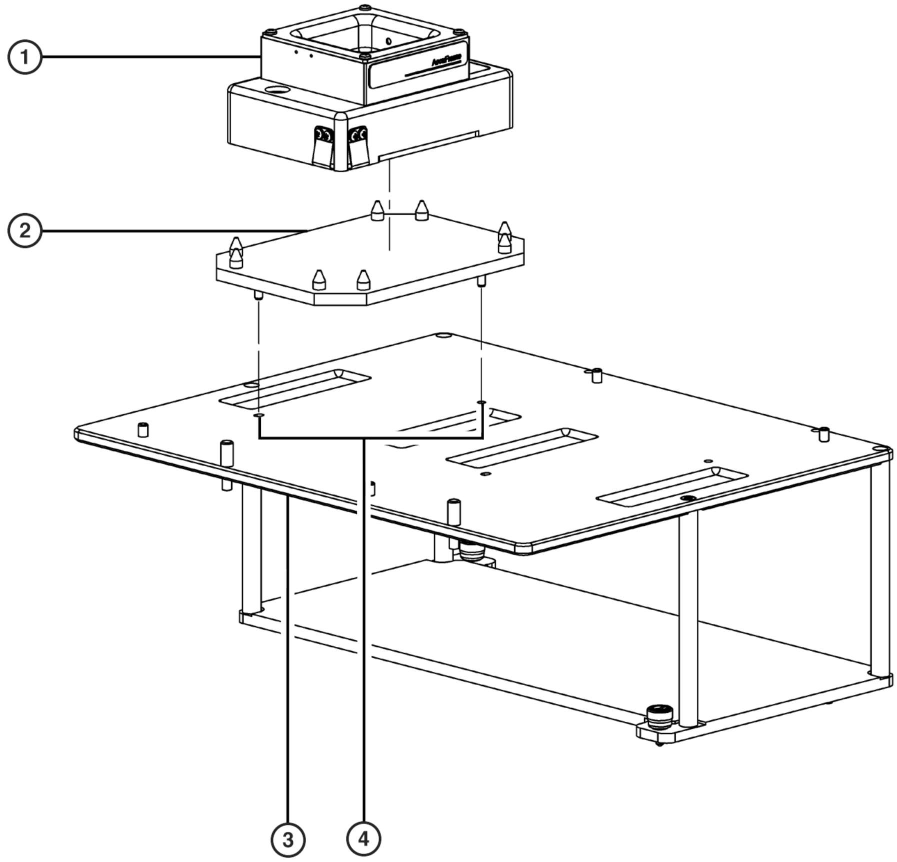
Special framing instructions are necessary for Test Tube Rack ALPs which are framed using the AccuFrame and the Framing Tool Adaptor. Each deck position occupied by a Test Tube Rack ALP can be framed for increased pipetting accuracy; however, framing only one of the positions is generally sufficient.

Both the 1 x 2 Test Tube Rack ALP and the 1 x 3 Test Tube Rack ALP are framed using the following instructions.

To frame a Test Tube Rack ALP:

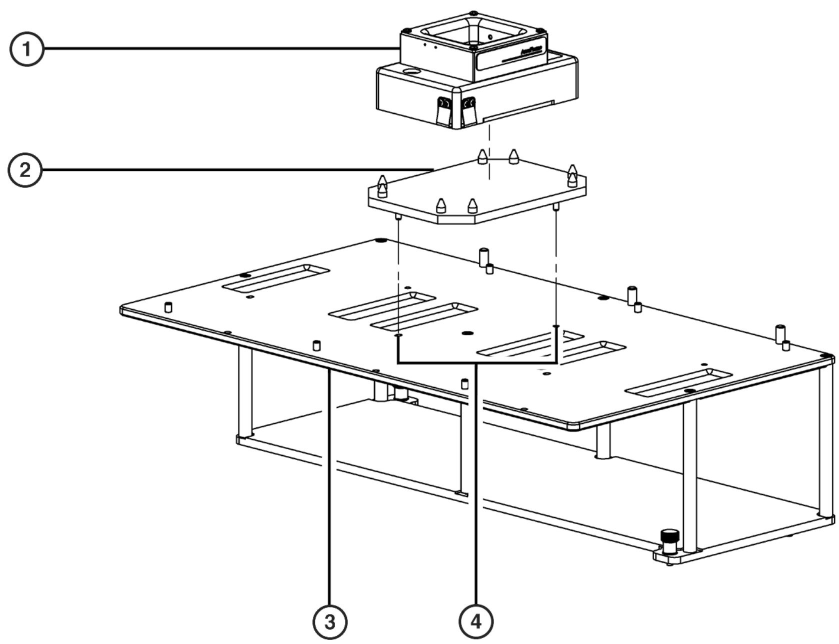
1. Place the Framing Tool Adaptor on the 1 x 2 Test Tube Rack ALP (Figure 26.3) or the 1 x 3 Test Tube Rack ALP (Figure 26.4) so that the locating pins on the bottom of the Framing Tool Adaptor align with the locating holes on the Test Tube Rack ALP.

Figure 26.3 Framing for the 1 x 2 Test Tube Rack ALP (Left Facing)



1. **AccuFrame**
2. **Framing Tool Adaptor**
3. **1 x 2 Test Tube Rack ALP**
4. **Locating Holes**

Figure 26.4 Framing for the 1 x 3 Test Tube Rack ALP (Left Facing)



1. **AccuFrame**
2. **Framing Tool Adaptor**
3. **1 x 3 Test Tube Rack ALP**
4. **Locating Holes**

---

2 Turn off power to main unit before connecting the AccuFrame.

CAUTION

Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

---

3 Plug the AccuFrame into any available CAN port on the Biomek FX tower.

WARNING

Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING

Make sure the AccuFrame cable does not interfere with pod movement.

4 Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the Adaptor (Figure 26.3 and Figure 26.4).

5 Turn on power to main unit.

6 Frame the Test Tube Rack ALP according to the procedures outlined in the appropriate instrument user's manual.

Adding Test Tube Racks to Test Tube Rack ALPs

Test tube racks must be properly added to the Test Tube Rack ALPs so position A1 on the test tube rack is in the front-left corner of a labware position on the Test Tube Rack ALP.

- **NX-S8, FX^P** — Septum piercing tube racks may also be placed on Test Tube Rack ALPs (refer to *Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 & FXP only)*).

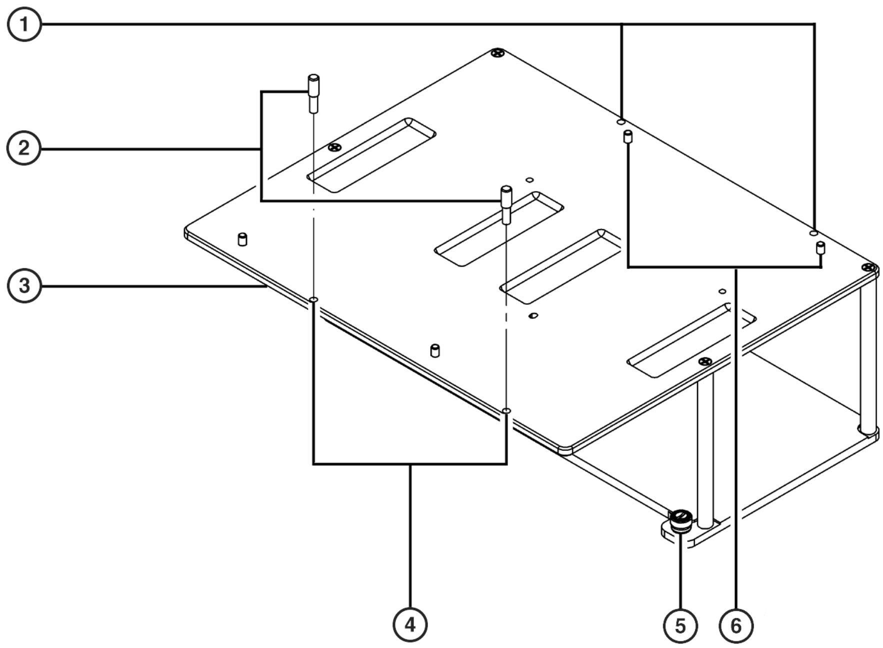
Proper placement of test tube racks on the Test Tube Rack ALPs is ensured by inserting the labware positioning screws in the labware positioning screw holes on the left side of the ALP after the ALP is added to the deck. The labware positioning screws are always on the left side of the ALP, regardless of whether the ALP is left or right facing (Figure 26.5 and Figure 26.6).

NOTE Labware positioning screws must be next to the test tube in position A1 on the test tube rack. Position A1 on a test tube rack must be in the front-left corner of a labware position on the ALP.

To add test tube racks to the Test Tube Rack ALPs:

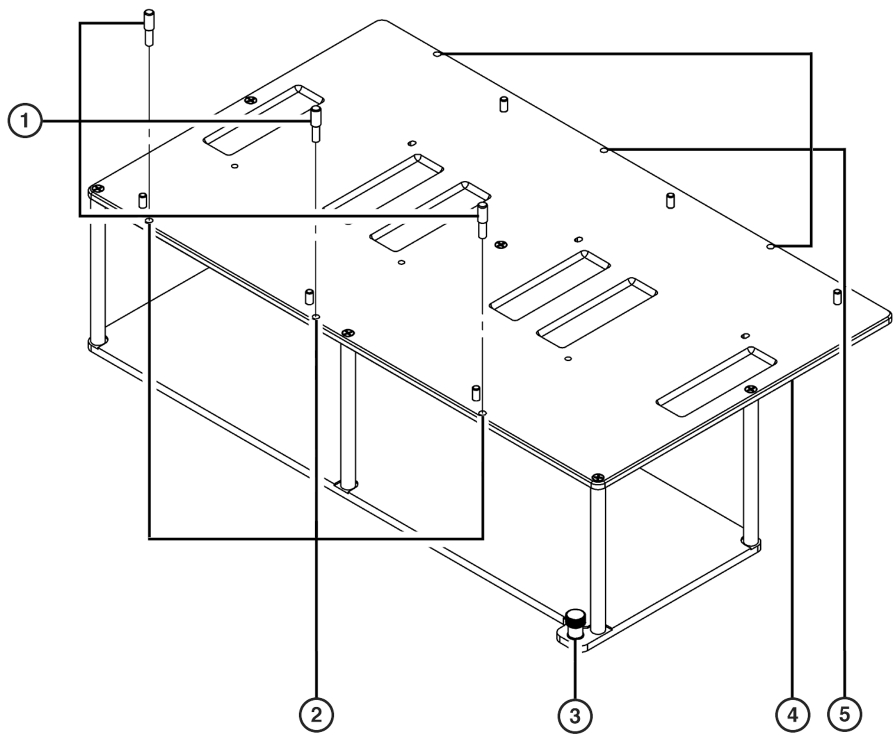
1 Insert the labware positioning screws by screwing them clockwise into the labware positioning screw holes on the left side of the Test Tube Rack ALP (Figure 26.5 and Figure 26.6).

Figure 26.5 Labware Positioning Screws on a 1 x 2 Test Tube Rack ALP (Left Facing)



1. **Labware Positioning Screw Holes**
2. **Labware Positioning Screws** — labware positioning screws must be beside position A1 on the test tube rack.
3. **Overhang**
4. **Labware Positioning Screw Holes**
5. **Thumbscrew** — there are two thumbscrews for each Test Tube Rack ALP.
6. **Locating Pins** — there are two locating pins for each test tube rack, one on the short sides of the tube racks, catty-corner to each other.

Figure 26.6 Labware Positioning Screws on a 1 x 3 Test Tube Rack ALP (Right Facing)



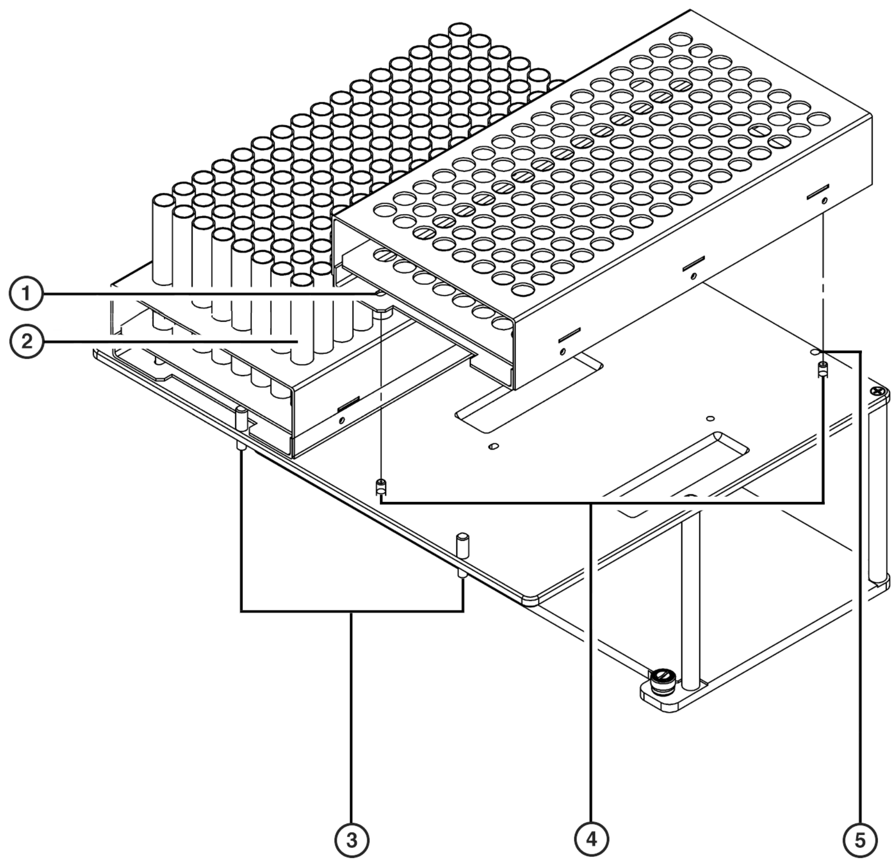
1. **Labware Positioning Screws** — labware positioning screw must always be next to position A1 on the test tube rack.
2. **Labware Positioning Screw Holes**
3. **Thumbscrew** — there are two thumbscrews for each Test Tube Rack ALP.
4. **Overhang**
5. **Labware Positioning Screw Holes**

---

2 Orient the test tube rack so position labeled A1 on the test tube rack is on the front, left side of the ALP (Figure 26.7 and Figure 26.8).

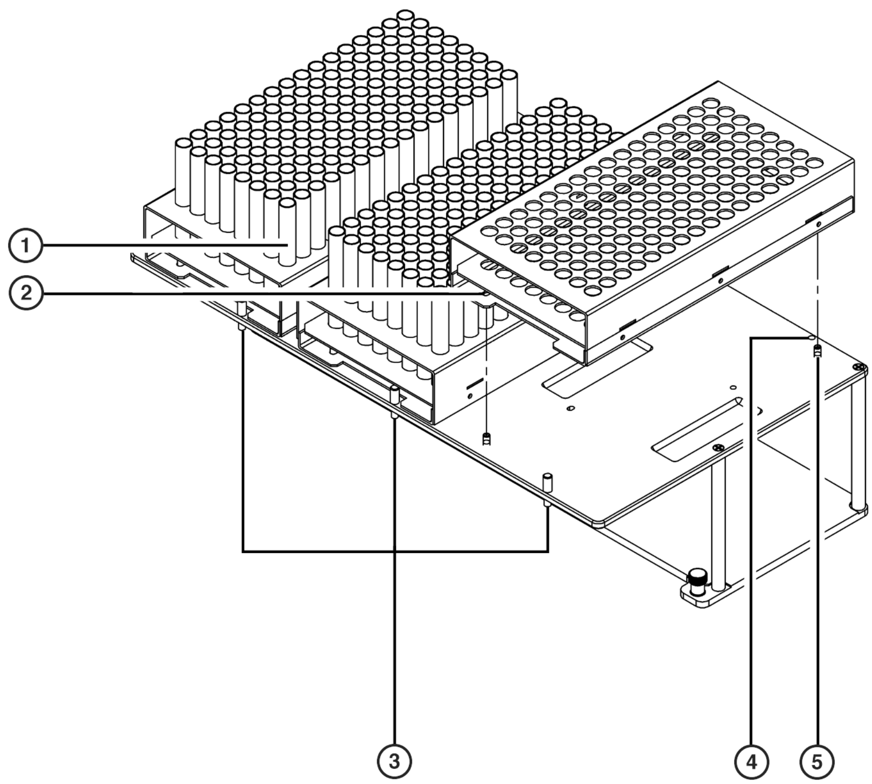
3 Lower the test tube rack so the locating holes in the bottom of the rack slip over the locating pins on the Test Tube Rack ALP (Figure 26.7 and Figure 26.8).

Figure 26.7 Mounting Tube Racks to a 1 x 2 Test Tube Rack ALP (Left Facing)



1. **Test Tube Rack Locating Hole** — there are two locating holes on each test tube rack.
2. **Labware Position A1 on a Test Tube Rack**
3. **Labware Positioning Screws** — the labware positioning screw must be next to labware position A1 on the test tube rack.
4. **Locating Pins** — there are two locating pins for each test tube rack.
5. **Labware Positioning Screw Holes**

Figure 26.8 Mounting Tube Racks to a 1 x 3 Test Tube Rack ALP (Left Facing)



1. **Labware Position A1 on a Test Tube Rack**
2. **Test Tube Rack Locating Hole** — there are two locating holes on each test tube rack.
3. **Labware Positioning Screws** — the labware positioning screw must be next to labware position A1 on the test tube rack.
4. **Labware Positioning Screw Holes**
5. **Locating Pins** — there are two locating pins for each test tube rack.

Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 & FX^P only)

Septum piercing test tube racks must be properly added to the Test Tube Rack ALPs so position A1 on the septum piercing test tube rack is in the front-left corner of a labware position on the Test Tube Rack ALP. A septum piercing adaptor, consisting of two side plates and a top adaptor plate, is attached to the ALP to securely hold and position test tubes for piercing by septum piercing tips.

Adding Septum Piercing Tube Racks

To add septum piercing test tube racks to the Test Tube Rack ALP:

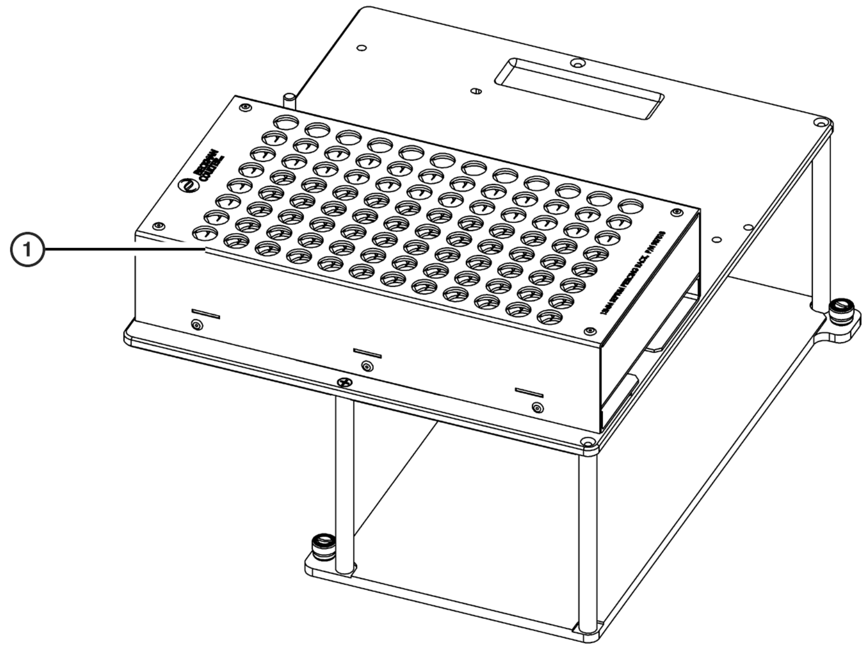
1. If labware positioning screws are installed on the Test Tube Rack ALP, remove them by turning them counterclockwise.

2. Orient the test tube rack so the position labeled A1 on the test tube rack is on the front, left side of the ALP.

3. Lower the test tube rack so the locating holes on the bottom of the rack slip over the locating pins on the Test Tube Rack ALP.

   NOTE If using a partially full tube rack, place an equal number of test tubes on each side of the test tube rack, or add blank test tubes to the opposite side to balance it. This helps to provide a level surface for the septum piercing tips and equalizes the force distribution when the tips press down on the septa-covered tubes.

Figure 26.9 Septum Piercing Tube Rack Positioned on ALP (Left Facing)



1. **Septum-Piercing Test Tube Rack** — position on ALP such that position labeled A1 is to the front and left of the position.

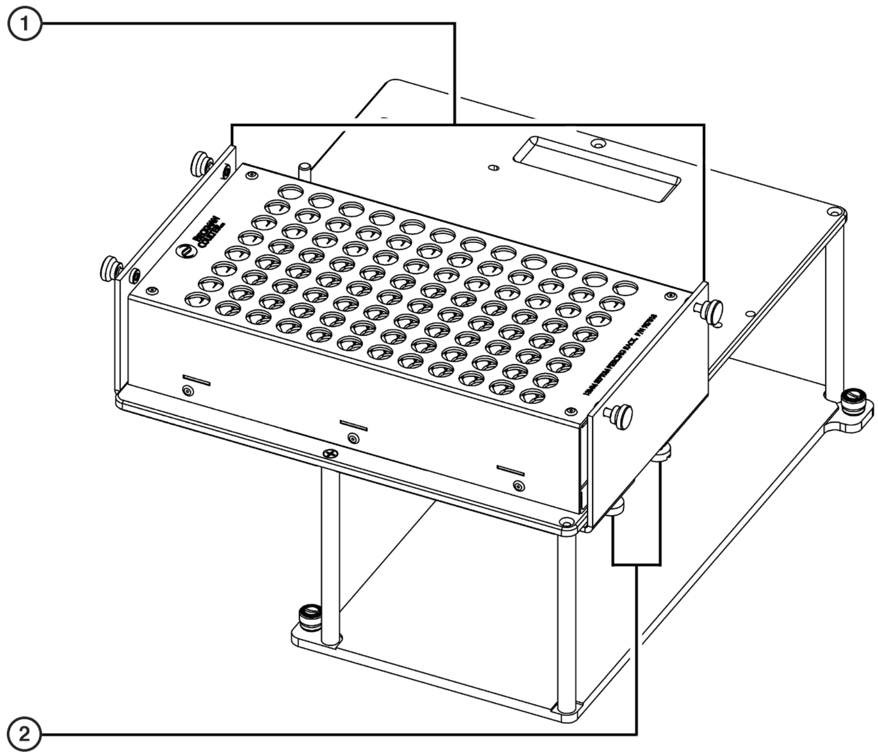
4 Position one of the side plates so that back slotted thumbscrew is aligned with the bottom of the screw hole on the left side of the ALP position.

5 Push up on the slotted thumbscrew to engage the threads with the screw hole and turn the thumbscrew counterclockwise to fasten the side plate to the ALP.

6 Position the other side plate so that the front slotted thumbscrew is aligned with the bottom of the screw hole on the right side of the ALP position.

7 Push up on the slotted thumbscrew to engage the threads with the screw hole and turn the thumbscrew counterclockwise to fasten the side plate to the ALP.

Figure 26.10 Septum Piercing Tube Rack with Side Plates (Left Facing)



1. **Side Plates**
2. **Slotted Thumbscrews** — fasten one of these to screw holes on ALP base.

---

8 Add test tubes to the test tube rack, if necessary. Once the top adaptor plate is installed, it must be removed to add test tubes to the rack.

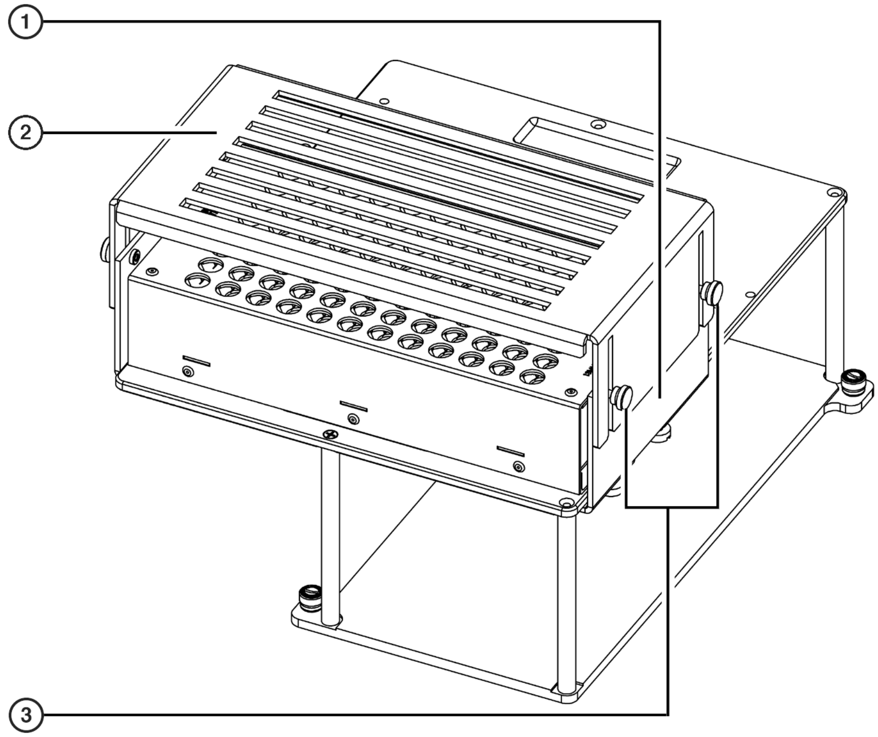
NOTE If using a partially full tube rack, place an equal number of test tubes on each side of the test tube rack, or add blank test tubes to the opposite side to balance it. This helps to provide a level surface for the septum piercing tips and equalizes the force distribution when the tips press down on the septa-covered tubes.

---

9 Place the top adaptor plate above the ALP position so that the four grooves on the adaptor slide over the four thumbscrews on the side plates. It may be necessary to loosen one or more of the thumbscrews to allow the grooves of the top adaptor plate to slide over them.

NOTE If the septum piercing tube rack has not already been placed on the Test Tube Rack ALP position, do so before placing the top adaptor.

Figure 26.11 Septum Piercing Tube Rack with Top Adaptor Plate (Left Facing)



1. **Side Plate** — slide grooves in top plate over the thumbscrews and fasten to secure top adaptor plate.
2. **Top Adaptor Plate** — make sure tubes are centered between the slots.
3. **Thumbscrews** — firmly press on top adaptor plate when fastening.

10 Push the top adaptor plate down until stopped by the top of the test tubes.

11 Make sure the test tubes are centered between the slots of the top adaptor plate. If not, remove the top adaptor plate and repeat steps 7 and 8.

12 When the test tubes are centered in the slots, press firmly down on the top adaptor plate and fasten the four thumbscrews (two on each side plate) to secure it in place.

13 Repeat steps 1 to 10 to place another septum piercing tube rack on the Test Tube Rack ALP.

Removing Septum Piercing Tube Racks

To remove a septum piercing tube rack from a Test Tube Rack ALP:

1 Loosen, but do not remove, the four thumbscrews on the side plates.

2 Lift the top adaptor plate straight up so that the grooves slide completely over the thumbscrews and remove it from the ALP.

3 Carefully lift the test tube rack up off the locating pins and slide it out between the side plates.

Removing Test Tube Rack ALPs from the Deck

To remove a Test Tube Rack ALP from the Biomek deck:

1 Remove test tube racks from the Test Tube Rack ALP.

- **NX-S8, FX^P**— If using a septum piercing test tube rack, the septum piercing adaptor must be removed before removing the test tube rack from the ALP (refer to *Removing the Septum Piercing Adaptor from Test Tube Rack ALPs (NX-S8 & FXP only)*).

2 Loosen the thumbscrews on the base of the Test Tube Rack ALP.

3 Lift the Test Tube Rack ALP straight up from the deck until the locating pins are clear of the locating holes.

Removing the Septum Piercing Adaptor from Test Tube Rack ALPs (NX-S8 & FX^P only)

If using septum piercing on the Test Tube Rack ALP, the septum piercing adaptor must be removed prior to removing test tube racks from the ALP.

To remove the septum piercing adaptor from the Test Tube Rack ALP:

1 Loosen, but do not remove, the four thumbscrews on the side plates.

2 Lift the top adaptor plate straight up so that the grooves slide completely over the thumbscrews and remove it from the ALP.

3 Remove the left and right side plates by turning the slotted thumbscrews clockwise until they disengage from the screw holes on the ALP.

Storage

Return Test Tube Rack ALPs, test tube racks, and septum piercing racks to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

- **NX-S8, FX^P^**— Return the septum piercing adaptor to its original packing materials and store in a dry, dust-free, environmentally-controlled area when not in use.

NOTE It is desirable to allow Test Tube Rack ALPs to air-dry before returning them to their original packing materials.

Preventive Maintenance

WARNING

Test Tube Rack ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Test Tube Rack ALPs with a soft cloth.

CHAPTER 27
Tip Loader ALP

Overview

The Tip Loader ALP (Figure 27.1) is an active ALP that loads disposable tips onto a 96-well head or a 384-well head mounted on a Multichannel Pod. The Biomek system supports up to four tip loaders on the deck at one time; however, only one Tip Loader ALP can function at a time. The Tip Loader is controlled through a Controller Area Network (CAN).

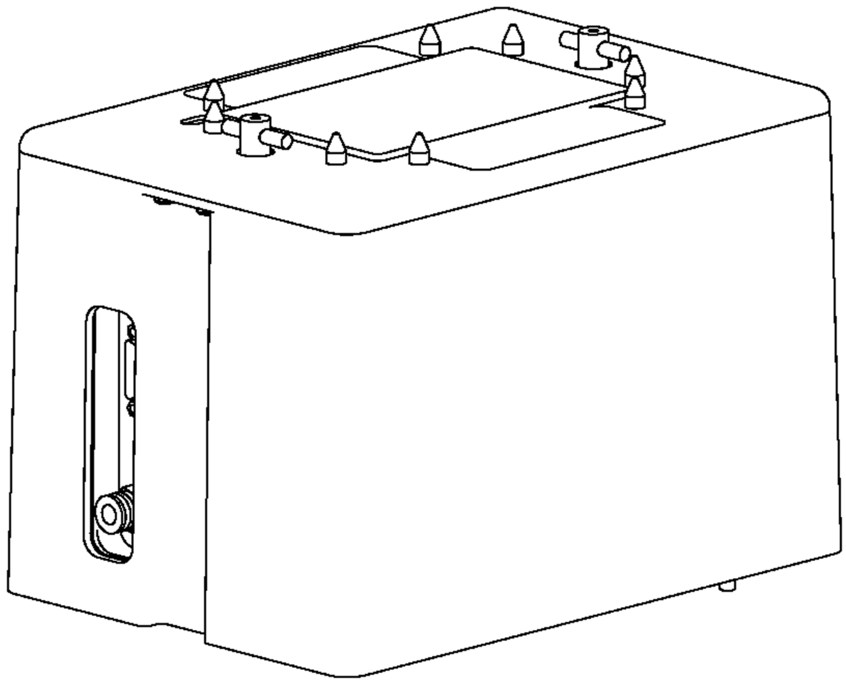
NOTE The Tip Loader ALP supports only Beckman Coulter tip boxes.

NOTE The Tip Loader ALP is only intended to load and unload tips; therefore, no labware other than tip boxes should be placed on the Tip Loader ALP. No pipetting operations are allowed on the Tip Loader ALP.

The sections in this chapter include:

- *Installing the Tip Loader ALP*
- *Framing Instructions*
- *Using the Tip Loader ALP in a Method*
- *Controlling the Tip Loader ALP Locking Rods Outside a Method*
- *Removing the Tip Loader ALP from the Deck*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

Figure 27.1 Tip Loader ALP



Tip Loader Air Requirements

⚠ CAUTION

Clean, dry air must be provided for proper operation of the Tip Loader ALP.

The Biomek instrument requires clean air input of 40 psi. The air is regulated to the air output ports on both towers and increased to meet the 110-115 psi requirement for tip loading. The Tip Loader ALP must be attached to one of the 110-115 psi ports on the inner sides of the Biomek towers to seat tips properly.

Installing the Tip Loader ALP

Installing the Tip Loader ALP on the deck includes choosing the deck position and mounting the ALP to the deck.

Choosing a Deck Position

The size of the Tip Loader limits where it can be positioned on the deck. Since the Tip Loader ALP covers more than one standard deck position, placement is restricted to the outside columns and back row of the Biomek deck. These positions are used in order to leave as many other deck positions available as possible.

NOTE Use the laser etchings as guides when placing the Tip Loader ALP. Because of the size of the ALP, the laser etchings are larger for the Tip Loader ALP than all other ALPs.

NOTE After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek Software User's Manual*, Chapter 6, *Preparing and Managing the Deck*).

Mounting the Tip Loader ALP to the Deck

⚠ WARNING

Use an appropriately contained environment when using hazardous materials.

⚠ WARNING

Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

⚠ WARNING

Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

⚠ WARNING

Disconnect main power before connecting or disconnecting CAN cables.

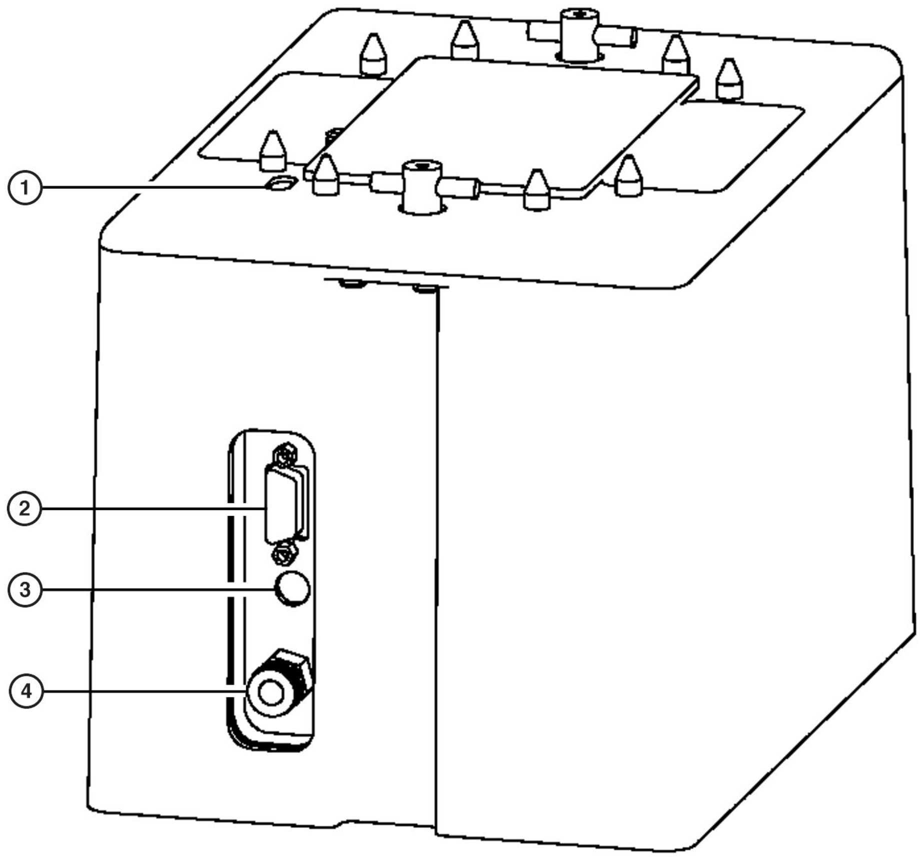
To mount the Tip Loader ALP:

1. Turn off power to main unit before installing any active ALP.

2. Position the Tip Loader ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, and the air input/output aligns horizontally with the ALP edge.

3. Attach the CAN communications cable (Figure 27.2) to the CAN communications Port.

Figure 27.2 Tip Loader ALP Connections



1. **Sensor** — verifies the presence of a tip box.
2. **CAN Communications Port**
3. **Address Switch**
4. **Air Inlet**

---

4 Attach the opposite end of the CAN communications cable to an available CAN Port on the instrument tower or Device Controller.

NOTE Make sure the cable routing does not interfere with the operation of the Biomek FX.

---

5 Verify that the address switch on the outside back of the Tip Loader is preset to zero (0) (Figure 27.2).

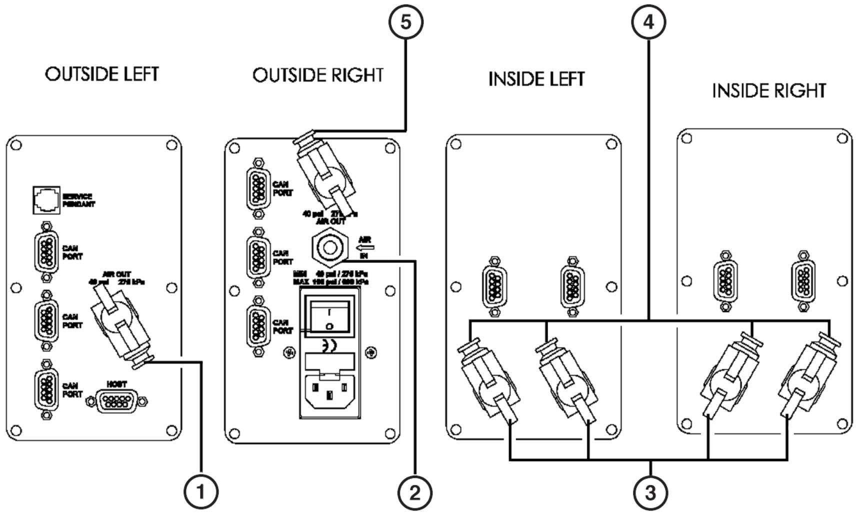
NOTE The default setting for the address switch is zero (0). If only one Tip Loader ALP is on the deck, the address switch should be left at the default setting. If multiple Tip Loader ALPs are on the deck, set (or reset) the address switch to a unique address between one (1) and F.

---

6 Attach the Tip Loader ALP air tubing to a 110-115 psi air port on the inside left or right tower (Figure 27.3).

NOTE Make sure the tube routing does not interfere with the operation of the Biomek instrument.

Figure 27.3 Tip Loader ALP — Pneumatic Connections on the Biomek FX Towers



1. **40 PSI Output Connection**
2. **Air Input Connection**
3. **Valve Handles**
4. **110 PSI Output Connections**
5. **40 PSI Output Connection**

7 Turn on the corresponding air valve.

Framing Instructions

Frame the Tip Loader ALP according to the instructions in the specific manual for the instrument.

Using the Tip Loader ALP in a Method

To use the Tip Loader ALP in a method, it must be installed in **Hardware Setup** (refer to CHAPTER 1, *Installing and Configuring ALPs*).

NOTE Configuration in **Hardware Setup** is not necessary for the Tip Loader ALP.

An understanding of how tips are loaded in a method using the Tip Loader ALP is necessary to ensure tips are properly seated for pipetting operations (refer to *Loading Tips*).

To provide more precise control over tip loading and unloading than other steps using a Tip Loader ALP, such as a **Transfer** or **Load Tips** step, use a **Tip Loader** step. A **Tip Loader** step may be used when performing multiple aspirate and dispense operations with each operation requiring a specific set of tips. Refer to the *Biomek Software User's Manual*, Chapter 23, *Tip Loader Step (FX, NX-MC only)*, for information on configuring a **Tip Loader** step.

Loading Tips

⚠ WARNING

Stay clear of the pinch point when locking rods are moving up into the head/pod.

The force used to apply tips to the head comes from the Tip Loader, not the pod or head.

NOTE Loading tips by hand or using **Manual Control** is not recommended due to inadequate and unequal pressure application.

Tips load onto the pod from a software-issued command, such as in a **Transfer** or **Load Tips** steps, and the Biomek instrument performs the following:

- Places a tip box on the Tip Loader ALP.
- Raises the locking rods and rotates them to lock into the pod.
- Raises the tip box to seat the tips on the mandrels.

  NOTE This process takes a few seconds to seat the tips properly.

- Unlocks and lowers the locking rods.
- Locks the locking rods to hold the empty tip box on the Tip Loader ALP.
- Moves the pod in the Z axis with the tips attached to the head.

Controlling the Tip Loader ALP Locking Rods Outside a Method

NOTE Using **Manual Control** to load tips for a method is not recommended due to inadequate and unequal pressure application.

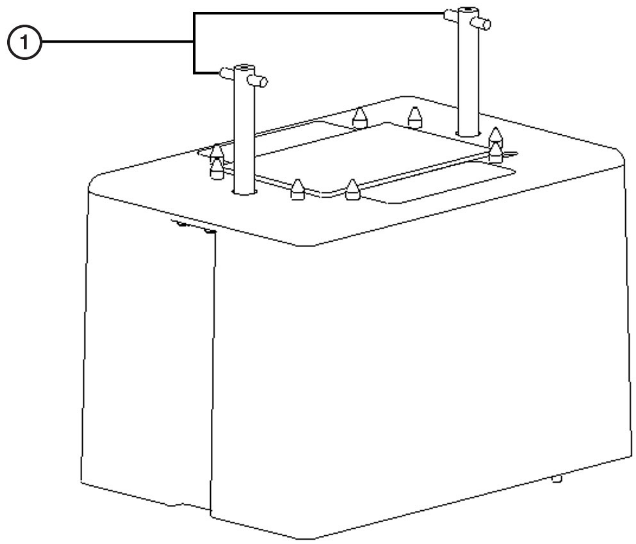
Locking rods are the rods that extend from the Tip Loader ALP (Figure 27.4) and lock onto the pod to assist in tip loading. **Advanced Manual Control** controls the locking rods for a selected Tip Loader ALP in the following manner:

- Extend or retract the locking rods.
- Lock or unlock the locking rods.

To control the locking rods on Tip Loader ALP outside a method, use **Advanced Manual Control** to:

- Troubleshoot the Tip Loader ALP.
- Recover from a failed tip load.

Figure 27.4 Tip Loader ALP with Locking Rods Extended



1. **Locking Rods**

To manually control the locking rods:

1 Choose **Instrument** > **Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Tiploader**. **Advanced Manual Control** for the selected ALP appears (Figure 27.5).

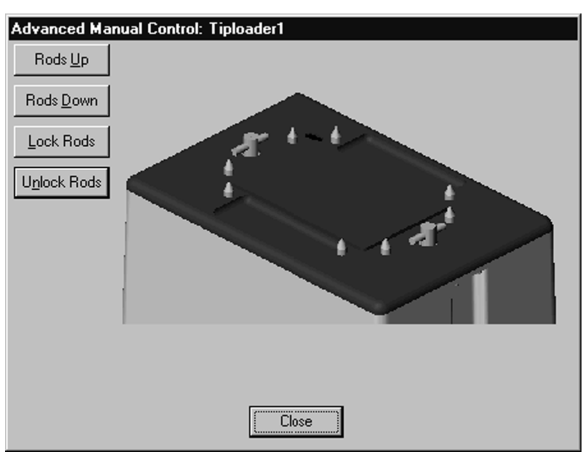


Figure 27.5 **Advanced Manual Control** for a Selected Tip Loader ALP

4 To move the locking rods up, choose **Rods Up.**

OR

To move the locking rods down, choose **Rods Down**.

OR

To move the rods to their locked position, choose **Lock Rods.**

OR

To move the rods to their unlocked position, choose **Unlock Rods**.

5 Choose **Close** to close **Advanced Manual Control**.

6 Choose **Exit** to close **Manual Control.**

Removing the Tip Loader ALP from the Deck

To remove the Tip Loader ALP:

1 Turn off power to main unit before removing any active ALP.

2 Close the air valve where the Tip Loader ALP is attached to the Biomek tower.

3 Detach the air tubing at the unit.

4 Detach the communications cable.

5 Lift the Tip Loader ALP straight up and off of the deck so the locating pins on the bottom of the ALP clear the locating holes on the deck.

Storage

Return the Tip Loader ALP to the original packing materials, and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow the Tip Loader ALP to air-dry before returning it to the original packing materials.

Preventive Maintenance

Clean-up all spills immediately with a soft cloth that has been dampened with appropriate cleaning compound. Keep liquids off the sensor (Figure 27.2).

Troubleshooting

Do not attempt to repair the Tip Loader ALP. Contact a Beckman Coulter Service Engineer for all required repairs.

NOTE The following troubleshooting does not require any removal of covers or repair.

Table 27.1 Troubleshooting the Tip Loader ALP

If...	Then...
The tips are not seating properly.	Check the air supply line for leaks. Check that the device has been framed correctly. Check that the pod is level.
No motion is occurring when a tip load has been requested.	Check the air pressure. Check the communications cable.
Locating pins do not lock into position on the pod.	Re-teach the Tip Loader position to orient the pod to the ALP's location on the deck.

APPENDIX A

Device Controller

Overview

The Device Controller provides a means to control a number of high voltage and low voltage digital outputs, as well as a means to monitor low voltage digital inputs. A Controller Area Network (CAN) interface with a small microcontroller provides control over the output ports.

High voltage devices requiring 110VAC to 220VAC are attached to a Device Controller via a high voltage power outlet, which is supplied through the AC Power Input. Low voltage devices (which use 24V at 100 mA) are supplied via the CAN connection from the Biomek instrument.

NOTE Several ALPs and devices, such as a wash pump or fan, associated with ALPs require an Device Controller to operate.

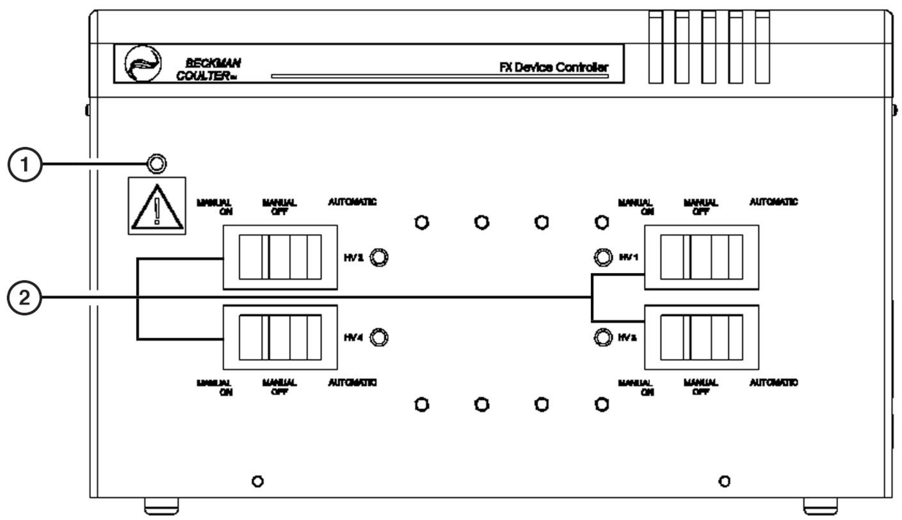
The sections in this appendix include:

- *Installing a Device Controller*
- *Setting Address Switches*
- *Connecting Devices to the Device Controller*
- *Using Advanced Manual Control to Manually Control Device Controllers*
- *Preventive Maintenance*
- *Troubleshooting*

Located on the front of the Device Controller are (Figure A.1):

- Four (4) high voltage channel power switches allowing for **Automatic**, **Manual On**, or **Manual Off** states
- Channel indicator lights
- System indicator light

Figure A.1 Front of Device Controller

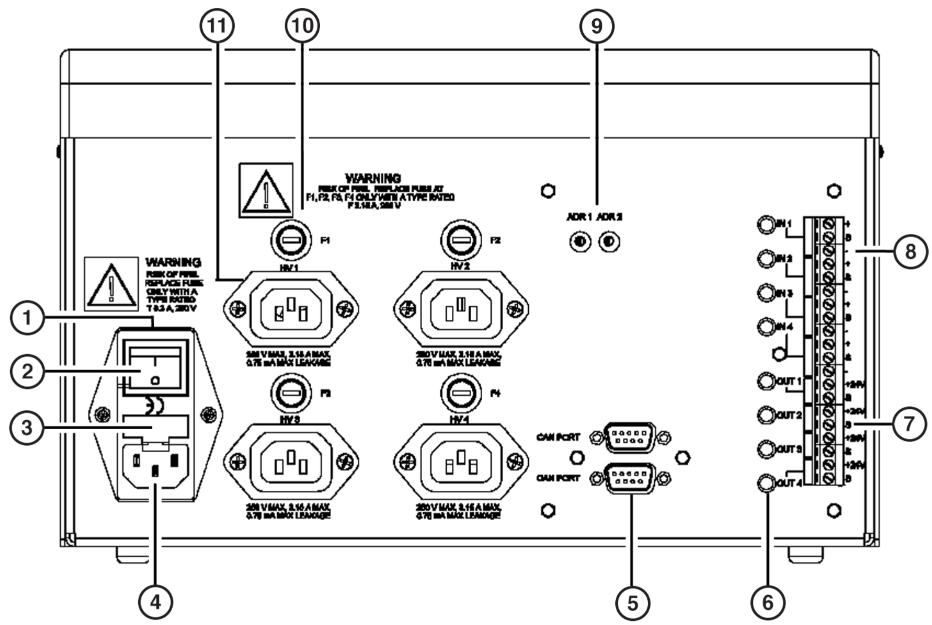


1. **System Indicator Light**
2. **High Voltage Channel Power Switches**

Located on the back of the Device Controller are (Figure A.2):

- On-off switch for AC power input
- Device indicators for digital inputs/outputs
- Power input module
- Two CAN communication ports
- Four high voltage power outputs
- Four accessible fuses, one for each high voltage power outlet
- Four low voltage digital input channels
- Four low voltage digital output channels
- Two address switches

Figure A.2 Back of Device Controller



1. **Power Input Module**
2. **On/Off**
3. **Power Input Fuse Box**
4. **Standard AC Power Input**
5. **Can Ports**
6. **Device Indicators**
7. **Low Voltage Digital Outputs**
8. **Low Voltage Digital Inputs**
9. **Address Switches**
10. **High Voltage Fuses**
11. **High Voltage Power Outputs**

Device Controller Specifications

Specifications for the Device Controller are found in Table A.1

Table A.1 Device Controller Specifications

Item	Description
Environment	Indoor use only
Input Power Requirements *For high voltage output channels HV1-HV4	US/Europe: 110-240VAC, 6.3A, 50/60Hz *US/Europe: 110-240VAC, 3A, 50/60Hz
Dimensions	12 wide x 8 deep x 7.5 high
Weight	5 lbs.
Ambient Operating Temperature	5-30°C (59-86°F)
Humidity Restrictions	<85% @ 30°C (86°F)
Altitude Restrictions	Up to 2000m (6562ft)
Installation Category	Category II
Pollution Degree	2
Input Fuses	US: 250VAC, 6.3 amp, 5x20mm, SLO-BLO, UL approved Europe: 250VAC, 6.3 amp, 5x20mm, SLO-BLO, UL/IEC approved
Output Fuses	US: 250VAC, 3.15 amp, 5x20mm, Fast Acting, UL approved Europe: 250VAC, 3.15 amp, 5x20mm, Fast Acting, UL/IEC approved
Communication to Biomek instrument	CAN

Device Controller manufactured by:

Beckman Coulter, Inc.
250 S. Kraemer Boulevard
Brea, CA 92821

Installing a Device Controller

A Device Controller can be installed anywhere that is convenient for normal operation of the instrument.

WARNING

To prevent electrical shock, use standard electrical precautions when plugging the Device Controller into the power supply.

WARNING

Do not remove the cover of the Device Controller.

WARNING

Turn off power to the Biomek instrument before connecting CAN communication cables.

WARNING

Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

To install a Device Controller:

1. Turn off power to the Biomek instrument before attaching the Device Controller.

2. Using an AC power cord, connect the AC Power Input on the Device Controller to power source.

3. Using the CAN communication cable, connect the Device Controller to the CAN communications port on a tower.

   NOTE Three CAN communications ports are located on each side of the Biomek instrument. When making the decision on which CAN communications port to use, consider the number of CAN communication ports in use and try to even the load.

4. Connect the appropriate devices to the Device Controller.

   NOTE Making the power connection to an ALP varies depending on the ALP. Each ALP has specific input/output power requirements, so each connecting wire is labeled to ensure appropriate connections. Refer to the individual ALP chapters for information on the appropriate connections.

Setting Address Switches

When more than one Device Controller is attached to the system, a separate address must be set for each one to enable the software to identify the Device Controller being used for specific operations. Each address is set using the address switches (Figure A.2).

To set Device Controller addresses:

1 Make sure the power to the Biomek instrument is off.

2 Make sure the power switch on the Device Controller is off (Figure A.2).

3 For the first Device Controller, check to make sure address switch 2 is set to 0.

4 On the first Device Controller, using a flathead screwdriver, turn address switch 1 to 0.

5 On the second Device Controller, turn address switch 1 to 1.

6 Continue setting address switch 1 in increments of 1 for the first 16 Device Controllers on the system.

7 To set addresses for the second 16 Device Controllers used on the system, move address switch 2 to 1. This makes the next 16 addresses available on address switch 1.

8 After setting address switch 2 to 1, set address switch 1 to 0 again to set the address for the next Device Controller on the system.

9 Continue setting address switch 1 in increments of 1 for the next 15 Device Controllers on the system.

NOTE For each 16 addresses set on address switch 1, address switch 2 is moved up an increment of 1 to open the next available set of 16 addresses on switch 1 for use. Continue this incremental process of coordinating both switches for setting addresses for up to 128 Device Controllers; at that point, the settings for the 128th Device Controller would be switch 1 set to F and switch 2 set to 7.

10 After setting the necessary addresses, turn on power to the Biomek instrument.

11 Turn on the Device Controller power switch.

Connecting Devices to the Device Controller

WARNING

To prevent electrical shock, use standard electrical precautions when plugging the Device Controller into the power supply.

WARNING

Turn off power to the Biomek before connecting CAN communication cables.

CAUTION

Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

The main power ON/OFF switch is on the rear of Device Controller. The four ON/OFF switches on the front panel of the Device Controller are for high voltage channels only.

NOTE The Device Controller must be turned on to provide power to attached high voltage devices. The green light on the Device Controller indicates that the Device Controller is on.

Connecting High-Voltage Devices

To use a high voltage device through the Device Controller:

1 Connect power cable of high voltage device into the appropriate plug.

2 Switch channel power switch for the chosen channel to **Manual On**. This applies power to the device.

3 Switch channel power switch to **Automatic**.

NOTE The maximum current allowable per high voltage port is 3.15 amps. The Device Controller can handle a maximum of 6.3 amps, so two ports at 3.15 amps each can be used at any one time.

Connecting Digital Device Outputs

Any device that uses 24V and less than 100 milliAmps of current may be connected to the Device Controller via the digital connections (Figure A.3).

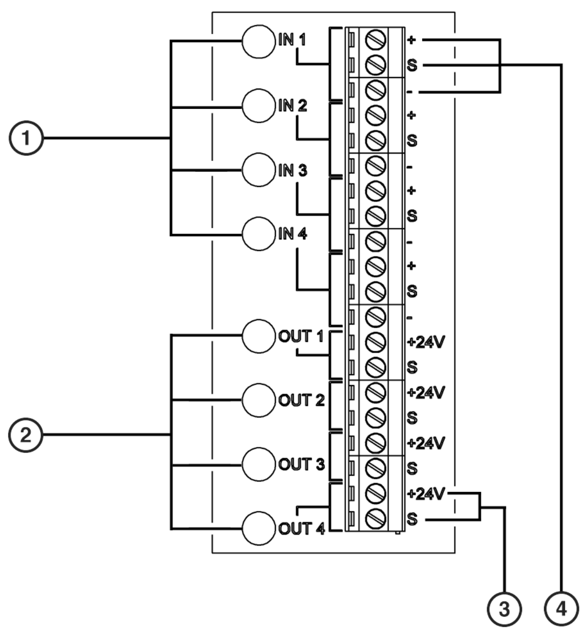
To connect Digital Devices:

1. Turn off system power.

2. Connect the positive wire (+) to the 24V connector on the digital output.

3. Connect the negative wire (-) to the control connector on the digital output.

Figure A.3 Digital Connections - Attach Devices Here



1. **Digital Inputs**
2. **Digital Outputs**
3. **(+), (-)**
4. **(+), S, (-)**

4. Turn power to the system on and test the device.

Connecting Digital Device Inputs

Each Device Controller digital input channel has three connectors Figure A.3.

- Positive (+) — 5V to supply a sensor
- **S** — Signal from the sensor
- Negative (-) — Ground from the sensor

There are two types of input devices:

- Optical switch — uses three connections (+, -, and signal)
- Contact switch — uses two connections (+, -)

Connecting an Optical Switch

To connect an optical switch:

1. Connect the positive (+) wire from the optical switch to the positive (+) connector on the digital input.
2. Connect the ground wire from the optical switch to the negative (-) connector on the digital input.
3. Connect the signal wire from the optical switch to the **S** connector on the digital input.

Connecting a Contact Switch

To connect a contact switch:

1. Connect one lead from the contact switch to the **S** connector on the digital input.
2. Connect the other lead from the contact switch to the negative (-) connector on the digital input.

Using Advanced Manual Control to Manually Control Device Controllers

Use **Advanced Manual Control** for a selected Device Controller to:

- Turn the output channels on or off manually.
- Monitor input channels.

When opened, **Advanced Manual Control** for a selected Device Controller displays which channels are on and which channels are off.

To manually control Device Controller channels:

1 Choose **Instrument** > **Manual Control**. **Manual Control** appears.

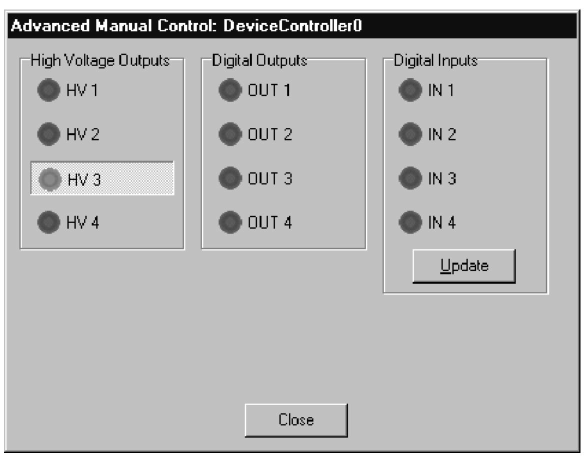
2 Choose **Advanced Controls**.

3 Select the desired **Device Controller**. **Advanced Manual Control** for the selected Device Controller appears (Figure A.4).

4 To toggle a channel off or on, click the button.

NOTE Channels that are on are highlighted with a bright green color.

Figure A.4 **Advanced Manual Control** for a Selected Device Controller with Channel HV3 on



5 When adjustment of channels has been completed as desired, choose **Close**.

NOTE Choose **Update** to view which digital outputs or inputs are on or off.

6 Choose **Close** to close **Advanced Manual Control**.

7 Choose **Exit** to close **Manual Control**.

Preventive Maintenance

Occasional replacement of the fuses may be required. Use the following instructions to replace power input fuse, (refer to *Replacing the Power Input Fuse*) and the high-voltage output fuse, (refer to *Replacing the High-Voltage Output Fuse*).

Replacing the Power Input Fuse

If the Device Controller is connected properly but does not function, check the fuses for possible replacement. The power input contains two fuses, and each high voltage output contains a fuse Figure A.2.

To replace the power input fuse:

1 Turn off the power switch on the Device Controller and unplug the unit.

2 Remove the cover from the fuse box.

3 Using only your fingers, pry the old fuses gently from the fuse box.

4 Insert a new 5X20mm 6.3 Amp Slo-Blow fuse into the fuse box.

5 Plug in the unit.

6 Turn on the power switch.

Replacing the High-Voltage Output Fuse

To replace a high-voltage output fuse:

1 Using a flat-head screwdriver, turn the cover over the fuse 1/2 turn to the left.

2 Take pressure off the cover. The fuse cover and fuse will pop out.

3 Replace the fuse with a 5 x 20mm 3.15 Amp Fast Acting fuse.

4 Place the cover back over the fuse and press in the cover.

5 Turn the cover back 1/2 turn.

Troubleshooting

Troubleshooting techniques for a Device Controller are found in Table A.2.

Table A.2 Troubleshooting a Device Controller

If...	Then...
Power is not transmitted.	Check connections to make sure they are correct and secure.
Power is not transmitted, but connections are correct and secure.	Replace the fuse, (refer to *Replacing the Power Input Fuse*).
The host computer does not recognize the Device Controller.	Make sure the address switch is set to the correct device address, (refer to *Setting Address Switches*).

APPENDIX B

Source/Waste Sensor

Overview

When properly installed and configured in Biomek Software, the Source/Waste Sensor indicates whether a source container is running below a specified level or a waste container is running above a specified level.

The chapter includes the following sections:

Installing a Source/Waste Sensor

Installing the Source/Waste Sensor includes attaching the sensor with the supplied velcro strap to the source or waste container and inserting the sensor cables to the correct Source/Waste Sensor Controller connection. Using CAN communication cables, the controller is connected to the Biomek instrument.

WARNING

Do not place the controller or the source or waste containers on the Biomek instrument deck.

To install the Source/Waste Sensor:

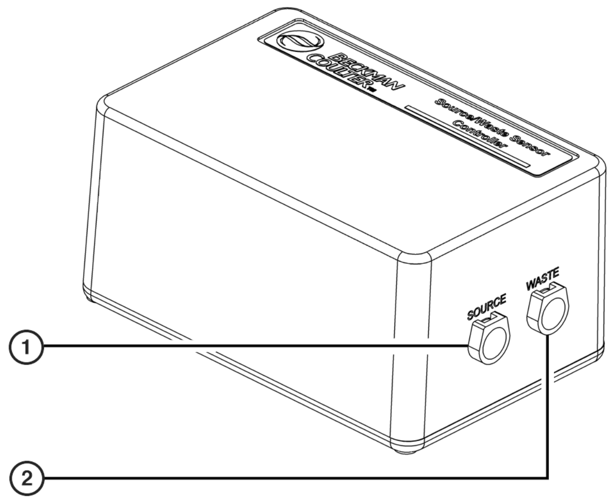
1. Place the source and waste containers at an off-deck location.

2. Place the controller at an off-deck location near the source and waste containers and the Biomek instrument.

3. Plug the source sensor cable into the SOURCE connection (Figure B.1).

4. Plug the waste sensor cable into the WASTE connection (Figure B.1).

Figure B.1 Source/Waste Sensor Controller



1. **Source Connection**
2. **Waste Connection**

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5 Using the supplied velcro strap, secure the sensor to the source container at the desired level. Make sure the face of the sensor is flush to the container and the velcro is pressed against the velcro strap (Figure B.2).

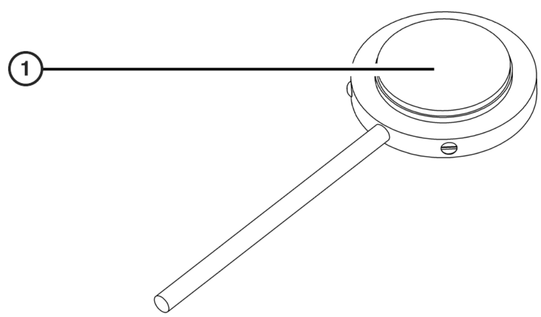
NOTE The sensor should be placed at a low level on the source container in order to indicate when the container is running low.

---

6 If desired, secure the sensor to the waste container at the desired level. Make sure the face of the sensor is flush to the container and the velcro is pressed against the velcro strap (Figure B.2).

NOTE The sensor should be placed at a high level on the waste container in order to indicate when the container is becoming full.

Figure B.2 Source/Waste Sensor



1. **Velcro Attached to the Sensor**

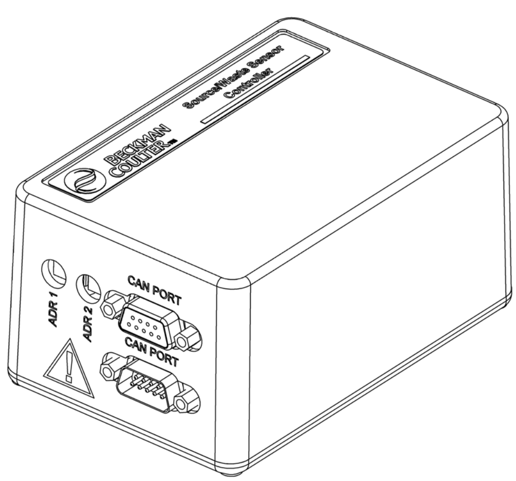
---

7 Plug the male end of the CAN communication cable into the female connector labeled "CAN PORT" on the controller or the female end of the CAN communication cable into the male connector (Figure B.3).

⚠ WARNING

Disconnect main power before connecting or disconnecting CAN cables.

Figure B.3 Source/Waste Sensor Controller



8 Plug the other end of the CAN communication cable into connector labeled **CAN Port** on the Biomek instrument.

9 Verify the ADR1 address switch is set to 1 for the first connection.

10 Set the ADR2 to a unique address between zero (0) and F, for the second connection if a another Source/Waste Sensor is used.

11 Calibrate the sensor, (refer to *Calibrating the Sensor*).

Calibrating the Sensor

Every time a new container or liquid is used, the sensor must be calibrated using the following procedure to ensure it operates properly. This process uses a small supplied screwdriver to turn the adjustment screw on the sensor to determine the sensitivity of the sensor. Turning the screw clockwise increases sensitivity while moving it counterclockwise decreases sensitivity.

To calibrate the sensor:

1 Ensure the face or active surface (Figure B.4) of the sensor is attached to the container.

2 Fill the container with liquid until approximately 75% of the active surface of the sensor is covered.

3 Using the small supplied screwdriver, turn the adjustment screw (Figure B.4) on the sensor counterclockwise until the LED extinguishes.

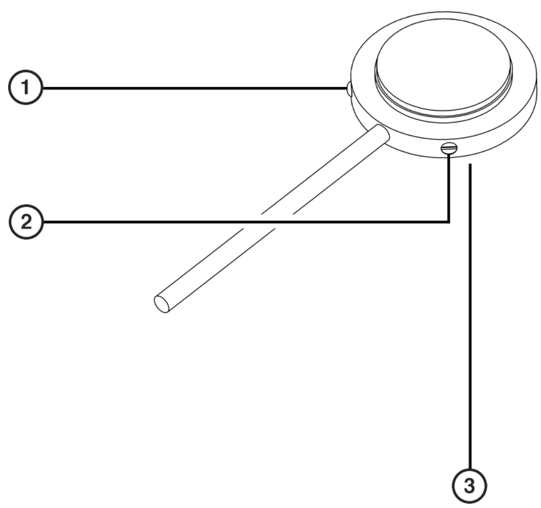
4 Turn the adjustment screw clockwise until the LED turns on again.

5 Slowly move the sensor down the container so that the entire sensor face is below the water level. The LED should remain on.

6 Move the sensor back up the container until approximately 75% of the active surface is covered.

7 Using the supplied screwdriver, turn the adjustment screw clockwise one full rotation.

Figure B.4 Sensor



1. **LED**
2. **Adjustment Screw**
3. **Face or Active Surface on the Other Side of Sensor**

Using the Source/Waste Sensor in a Method

To use the Source/Waste Sensor in a method, it must first be installed in **Hardware Setup,** (refer to CHAPTER 1, *Installing an ALP in Hardware Setup*).

There are two ways in which the Source/Waste Sensor may be used with Biomek Software:

- Using the **Device Setup** step — to allow the sensor to check the levels of liquids of source or waste containers at specific times in a method, (refer to *Using the Device Setup Step*).
- Associating the sensor with a wash ALP — to allow the sensor to check the levels of source or waste containers going into or out of a wash ALP, (refer to *Associating the Source/Waste Sensor with a Wash ALP*).

Using the Device Setup Step

Use the **Device Setup** step to use the Source/Waste Sensor in a method to check the level of liquids at a specific time in the method, (refer to the *Biomek Software User's Manual*, Chapter 23, *Configuring the Device Action Step for a Source/Waste Sensor (FX and NX only)*).

If during the execution of the **Device Setup** step, the sensor indicates the supply container is too low or the waste container is too high, an error message appears, (refer to *Error Messages for the Source/Waste Sensor*).

Associating the Source/Waste Sensor with a Wash ALP

The Source/Waste Sensor also may be associated with a wash ALP or any ALP that uses a pump to allow the sensor to monitor the liquid level of the source and waste containers going into and out of the wash ALP. This association is made in the **Deck Editor** usually when the wash ALP is framed.

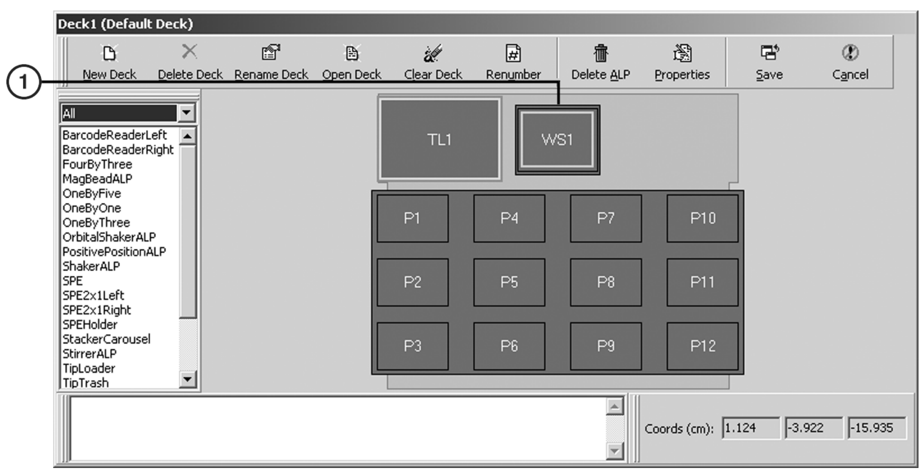
The association allows the sensor to monitor the liquid levels of the containers used with the wash ALP whenever the ALP is used in a method, such as through a **Transfer** or **Wash Tips** step.

If while associated with a wash ALP, the sensor indicates the supply container is too low or the waste container is too high, an error message appears, (refer to *Error Messages for the Source/Waste Sensor*).

To associate the sensor with a wash ALP:

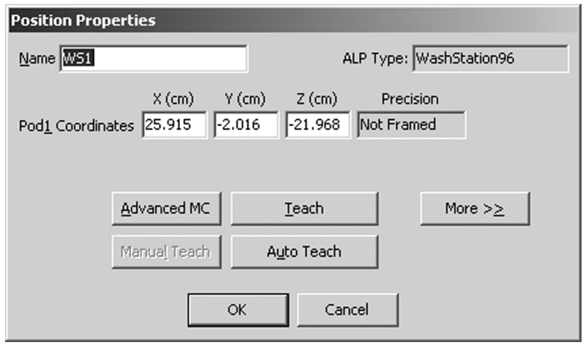
1 In the **Deck Editor**, double-click the selected wash ALP (Figure B.5). **Position Properties** for the ALP appears (Figure B.6).

Figure B.5 Deck Editor with Wash ALP



1. **Wash ALP**

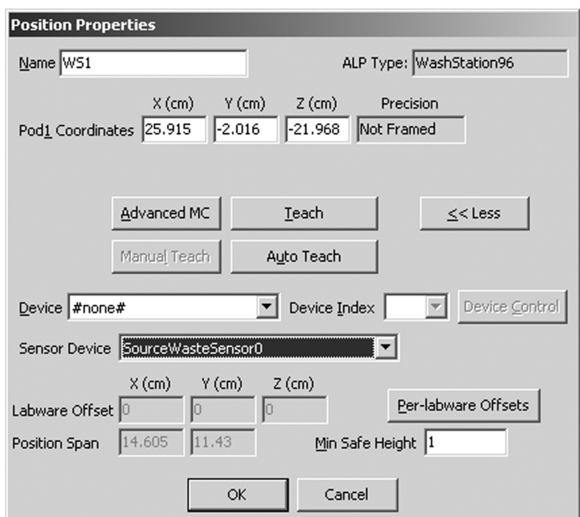
Figure B.6 Position Properties for Selected Wash ALP



2 Choose **More** (Figure B.6). An expanded **Position Properties** appears.

3 In **Sensor Device**, choose the specific Source/Waste Sensor to associate with the wash ALP (Figure B.7).

Figure B.7 SourceWasteSensor Selected in Sensor Device

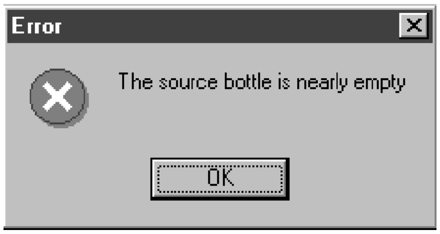


4 Choose **OK.** The sensor is associated with that wash ALP and monitors the liquid levels of the supply or waste containers of the ALP.

Error Messages for the Source/Waste Sensor

If the Source/Waste Sensor is properly installed, associated, and configured in a method when the source container is running low or the waste container is running high, an error message similar to the following appears (Figure B.8).

Figure B.8 Source/Waste Sensor Error



Controlling the Source/Waste Sensor Outside a Method

To control a selected Source/Waste Sensor outside a method, use **Advanced Manual Control** to:

- Check the Source Sensor.
- Check the Waste Sensor.

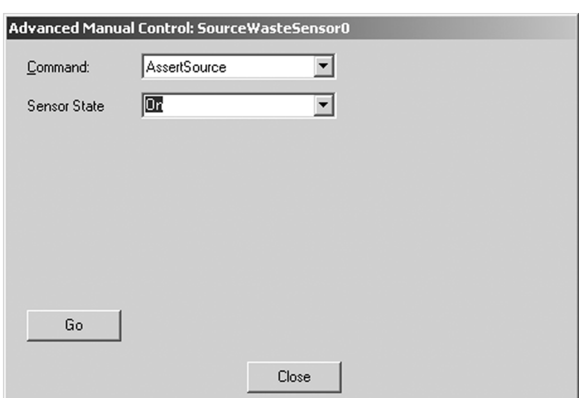
To manually control the Source/Waste Sensors:

1 Choose **Instrument** > **Manual Control**. **Manual Control** appears.

2 Choose **Advanced Controls**.

3 Select the desired **Source/Waste Sensor**. **Advanced Manual Control** for the selected Source/Waste Sensor appears (Figure B.9).

Figure B.9 **Advanced Manual Control** for a Selected Source/Waste Sensor



4 In **Command**, choose one of the following:

- **AssertSource** — checks the source container sensor for the presence of liquid.
- **AssertWaste** — checks the waste container sensor for the presence of liquid.

5 In **Sensor State**, set the desired sensor action:

- **On** — generates an error when liquid is not detected.
- **Off** — generates an error when liquid is detected.

6 Choose **Go**. The command is executed.

7 Choose **Close** to close **Advanced Manual Control**.

8 Choose **Exit** to close **Manual Control**.

Preventive Maintenance

The Source/Waste Sensor requires minimal maintenance. Observe the following guidelines:

- Periodically inspect the velcro strap for wear.
- Wipe any spills on the sensor immediately.
- Calibrate the sensor every time a new container or liquid is used to ensure it is operating properly, (refer to *Calibrating the Sensor*).

Troubleshooting

Troubleshooting techniques for a Source/Waste Sensor are found in Table B.1.

Table B.1 Troubleshooting a Source/Waste Sensor

If...	Then...
Sensor is not sensing.	Check connections to make sure they are correct and secure.
Sensor is not sensing, but connections are correct and secure.	Calibrate the sensor, (refer to *Calibrating the Sensor*).
No errors are generated even though waste container is full or source container is empty.	Associate the sensor with the appropriate deck position.

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