Instructions for Use

Biomek i-Series

Automated Labware Positioners,
Accessories, & Devices

PN B54477AC
March 2018

Beckman Coulter, Inc.
250 S. Kraemer Blvd.
Brea, CA 92821 U.S.A.

BECKMAN COULTER

Biomek i-Series Automated Labware Positioners, Accessories, & Devices Instructions for Use
PN B54477AC (March 2018)

Trademarks

Contact Us

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

- World wide, find us via our website at *www.beckman.com/support/technical.*
- In the USA and Canada, call us at 1-800-369-0333.
- Outside of the USA and Canada, contact your local Beckman Coulter Representative.

EC REP
Beckman Coulter Eurocenter S.A.
22, rue Juste-Olivier
Case Postale 1044
CH - 1260 Nyon 1, Switzerland
Tel: +41 (0) 22 365 36 11

Original Instructions

Revision History

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 updates, go to www.beckman.com and download the most recent manual or system help for your instrument.

Initial Issue, 03/17
Software version 5.0

Issue AB, 09/17
Software version 5.1– Changes or additions were made to CHAPTER 4, Framing Instructions.

Issue AC, 03/18
Software version 5.1– Changes or additions were made to *Introduction*, *Biomek i-Series ALPs*; *Introduction*, *Supported Biomek FX^P/NX^P ALPs*; CHAPTER 8, *Solid Phase Extraction (SPE) Vacuum Filtration System*; CHAPTER 11, Mounting Plate Types.

Note: *Changes that are part of the most recent revision are indicated in text by a bar in the margin of the amended page.*

Safety Notice

Overview

Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to operate the instrument and/or ALP. 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 us.

Beckman Coulter, Inc. urges its customers and employees to comply with all national health and safety standards such as the use of barrier protection. This may include, but is not limited to, protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this or any other automated laboratory instrumentation.

⚠ WARNING

If the equipment is used in a manner not specified by Beckman Coulter, Inc., the protection provided by the equipment may be impaired.

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

All Dangers, Warnings, and Cautions in this document include an exclamation point, framed within a triangle.

The exclamation point symbol is an international symbol which serves as a reminder that all safety instructions should be read and understood before installation, use, maintenance, and servicing are attempted.

⚠ 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.

Instrument Safety Precautions

⚠ WARNING

Risk of operator injury if:

- **All covers and panels are not closed and/or secured in place prior to and during instrument operation.**
- **The integrity of safety interlocks and sensors is compromised.**
- **You contact moving parts.**
- **You mishandle broken parts.**
- **Covers and panels are not opened, closed, removed and/or replaced with care.**
- **Improper tools are used for troubleshooting.**

To avoid injury:

- **Keep covers and panels closed and/or secured in place while the instrument is in use.**
- **Take full advantage of the safety features of the instrument. Do not defeat safety interlocks and sensors.**
- **Acknowledge and act upon instrument alarms and error messages.**
- **Keep away from moving parts.**
- **Report any broken parts to your Beckman Coulter Representative.**
- **Use the proper tools when troubleshooting.**

⚠ CAUTION

Risk of data loss or system failure. The Automation Controller is configured to automatically obtain updates when connected to the internet. Upon notification of these updates, perform a system reboot as soon as possible. The system is configured to avoid automatic restart to avoid loss of data and/or samples; however, this leaves the system vulnerable to cybersecurity threats. Ensure updates are addressed in a timely manner.

⚠ CAUTION

Risk of data loss or system failure. The system is configured to prevent auto-play when external media is inserted, such as a DVD or USB drive. Do not change settings related to automatic updates, anti-virus, firewall, or auto-play to avoid compromising the system.

⚠ CAUTION

System integrity could be compromised and operational failures could occur if:

- **This equipment is used in a manner other than specified. Operate the instrument as instructed in the Product Manuals.**
- **You introduce software that is not authorized by Beckman Coulter into your automation controller. Operate your system's automation controller only with software authorized by Beckman Coulter.**
- **You install software that is not an original copyrighted version. Only use software that is an original copyrighted version to prevent virus contamination.**

⚠ CAUTION

If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, if it is not presently under a Beckman Coulter Service Maintenance Agreement, Beckman Coulter cannot guarantee that the product is fitted with the most current mandatory engineering revisions or that you will receive the most current information bulletins concerning the product. If you purchased this product from a third party and would like further information concerning this topic, contact us.

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 us for any servicing of equipment requiring the removal of covers or panels.

DANGER

To reduce the risk of electrical shock, the instrument uses a three-wire electrical cord and plug to connect it to earth-ground. Make sure that the matching wall outlet receptacle is properly wired and earth-grounded.

NOTE On ALPs powered through an AC line, the appliance coupler is considered the disconnect device. Ensure the appliance coupler remains accessible.

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) outlets.

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:** 11 mW
- **Wavelength:** 670 nm

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 and
- That 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 the 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.

Chemical and Biological Safety

If a hazardous substance such as blood is spilled onto the instrument, ALPs, or accessories, clean up the spill by using a 10% bleach or ethanol solution, or use your laboratory decontamination solution. Then follow your laboratory procedure for disposal of hazardous materials. If the instrument, ALPs, or accessories need to be decontaminated, contact us.

⚠ WARNING

Risk of chemical injury from bleach. To avoid contact with the bleach, use barrier protection, including protective eyewear, gloves, and suitable laboratory attire. Refer to the Safety Data Sheet for details about chemical exposure before using the chemical.

⚠ WARNING

California Proposition 65:

This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

⚠ WARNING

Before running with chemistry or any biological samples, new labware types will require testing to determine if labware offsets are necessary to move to or from an ALP, or to access the labware during pipetting operations while positioned on an ALP. If you do not do the required testing, the labware could crash and the contents could spill if the offset is incorrect.

Normal operation of the instrument and/or ALP 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 solutions' containers prior to their use.**
- **Dispose of all waste solutions according to your facility's waste disposal procedures.**
- **Operate the instrument and/or ALP 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 the instrument and any other external devices attached or used during operation of the instrument. Refer to the applicable user's manual for specific information on using the instrument or device.

NOTE For Safety Data Sheets (SDS/MSDS) information, go to the Beckman Coulter website at **www.beckman.com**.

Moving Parts

⚠ WARNING

Risk of personal injury. To avoid injury due to moving parts, observe the following:

- **Never attempt to physically restrict any of the moving components of the instrument.**
- **Keep the instrument work area clear to prevent obstruction of the movement.**
- **Keep covers and panels closed and/or secured in place while the instrument is in use.**
- **Do not block the light curtain.**

Cleaning

Observe the cleaning procedures outlined in this manual and the *Biomek i-Series Instructions for Use* (PN B54473). Prior to cleaning equipment that has been exposed to hazardous material:

- Contact the appropriate Chemical and Biological Safety personnel.
- Review the *Chemical and Biological Safety* section (above).

Maintenance

Perform only the maintenance described in the appropriate User's Manual for the Biomek i-Series instrument. Maintenance other than that specified in the appropriate User's Manual should be performed only by a Beckman Coulter Representative.

IMPORTANT It is your responsibility to decontaminate components of the instrument and/ or ALP before requesting service by a Beckman Coulter Representative 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.

CE Mark

CE

A "CE" mark indicates that a product has been assessed before being placed on the market, and has been found to meet European Union safety, health, and/or environmental protection requirements.

RoHS Notice

European RoHS

A “CE” mark indicates that a product has been assessed before being placed on the market, and has been found to meet European Union safety, health, and/or environmental protection requirements.

China RoHS

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.

ALPs Labels

Additional ALPs labels and their respective meanings are located in the table below.

Name	Label	Meaning
Ground Symbol		The Ground Symbol signifies the location of the ground connection (inlet receptacle to the chassis), which is considered the Protective Earthing Terminal.
Hot Surface Label		Warns of a potential burn hazard.
Manufacturing Labels		Located next to this symbol is the contact information for the EC (European Commission) representative.
		The company name.
		The Manufacturer Symbol indicates the name and address of the manufacturer.
		Date of Manufacture Symbol indicates the date that the product was manufactured in the YYYY-MM-DD format.

Contents

Illustrations

Tables

Introduction

Overview

Automated labware positioners (ALPs), accessories, and devices are removable and interchangeable platform structures that are attached to the Biomek i-Series workspace. This manual provides information on configuring and using these platform structures with Biomek i-Series instruments.

The following sections contain information on where to locate instructions for your specific ALP:

- *Biomek i-Series ALPs*
- *Supported Biomek FXP/NXP ALPs*

NOTE Unless otherwise noted, all information in this manual refers to both the Biomek i5 and Biomek i7 instruments.

Biomek i-Series ALPs

Instructions for using Biomek i-Series ALPs are provided in this manual. Generally, the individual chapters provide the following information:

- Overview of the ALP
- Choosing the Deck Position for the ALP
- Mounting instructions
- Framing instructions
- Removing the ALP
- Storage
- Preventive maintenance

Biomek i-Series ALPs are described in the following chapters:

- CHAPTER 1, *Static ALPs* — These ALPs, which hold labware in place, include the following sizes:
  - 1 x 1
  - 1 x 3
  - 1 x 5
- CHAPTER 2, *Test Tube Rack ALP* — This ALP holds one high-density test tube rack in place on the Biomek i-Series deck.
- CHAPTER 3, *Fly-By Bar Code Reader* — The Fly-By Bar Code Reader scans bar code labels applied to labware.

- CHAPTER 4, *Trash ALP* — The Trash ALP provides a means to dispose of trash during a method. When the slide is attached, it can be used to dispose of tip boxes and labware; when the slide is not attached, it is used with a bin for tip disposal only.
- CHAPTER 5, *Span-8 Active Wash ALP* — The Span-8 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 Span-8 Active Wash ALP from a source reservoir to a waste reservoir.
- CHAPTER 6, *Span-8 Wash Station ALP* — The Span-8 Wash Station ALP is a passive ALP. The eight cleaning wells of the Span-8 Wash Station ALP 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 Wash Station ALP is used to dispose of system fluid used when priming the system and purging the tubing and syringes of air.
- CHAPTER 7, *Multichannel Wash Station ALPs* — The 96-Channel Wash Station ALP and 384-Channel Wash Station ALP are active ALPs that wash tips on the deck. The 96-Channel Wash Station ALP, used with a 96-Channel Head, has 96 cleaning wells, while the 384-Channel Wash Station ALP, used with the 384-Channel Head, has 384 cleaning wells.
- CHAPTER 8, *Solid Phase Extraction (SPE) Vacuum Filtration System* — The Solid Phase Extraction (SPE) Filtration ALP 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.
- CHAPTER 9, *Circulating Reservoir/Tip Box ALP* — The Circulating Reservoir/Tip Box ALP is an active ALP that conserves space on the deck by allowing a tip box or other labware to sit on top of a circulating reservoir, where a continuous supply of solvent, buffer, or reagent is provided.
- CHAPTER 10, *Heating and Cooling ALP* — The Heating and Cooling ALP is an active ALP that enables heating or cooling for items such as 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 that circulates cold or hot fluid through the ALP.

Supported Biomek FX^P/NX^P ALPs

Biomek FX^P/NX^P ALPs that can be used with Biomek i-Series instruments are listed below. The ALPs operate in the same manner as they did on Biomek FX^P/NX^P instruments; however, to use the on-deck ALPs on Biomek i-Series instruments, a mounting plate is required. The mounting plate serves as an adapter between the two different ALP mounting styles, the Biomek i-Series mounting style, which uses pins and screws, and the Biomek FX^P/NX^P type, which used threaded fasteners. CHAPTER 11, *Mounting Plates*, provides instructions for using the mounting plate with Biomek FX^P/NX^P ALPs.

- 96-Channel Tip Wash
- 384-Channel Tip Wash
- Circulating Reservoir/Tip Box
- Cytomat 2C[a,b]
- Cytomat 6001[a,b]
- Cytomat Microplate Hotel[a,b]
- Conveyor ALP, Long and Short[b]
- Heating and Cooling
- Device Controller[a] (See **NOTE** below.)
- Orbital Shaker (See **NOTE** below.)
- Positive Positioner (See **NOTE** below.)
- Drainable/Refillable Reservoir[c] (See **NOTE** below.)
- Shaking Peltier
- Static Peltier
- Solid Phase Extraction (SPE) Vacuum Filtration System

a. These are off-deck ALPs, and therefore do not require mounting plates.
b. Instructions for these ALPs/mounting plates are provided in the *Biomek i-Series Cytomat ALP and Devices User's Manual*, **PN B91265**.
c. Does not require a mounting plate, as it is placed on a Static 1 x 1 ALP.

NOTE Instructions for installing the labware positioners (Static ALPs) and mounting plates required for using these ALPs on Biomek i-Series instruments are located in the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use*, **PN B54477**. Instructions for using these ALPs are located in the *Automated Labware Positioners (ALPs) Instructions for Use*, **PN 987836**.

CHAPTER 1

Static ALPs

Overview

Static ALPs are open structures that hold labware in place during liquid-handling procedures. These ALPs ensure that labware is accessible by the pod at a predetermined height.

Static ALP sizes include the following:

- *Static 1 x 1 & Tip Load 1 x 1 ALP*
- *Static 1 x 3 ALP*
- *Static 1 x 5 ALP*

The sections listed below provide general instructions for using Static ALPs.

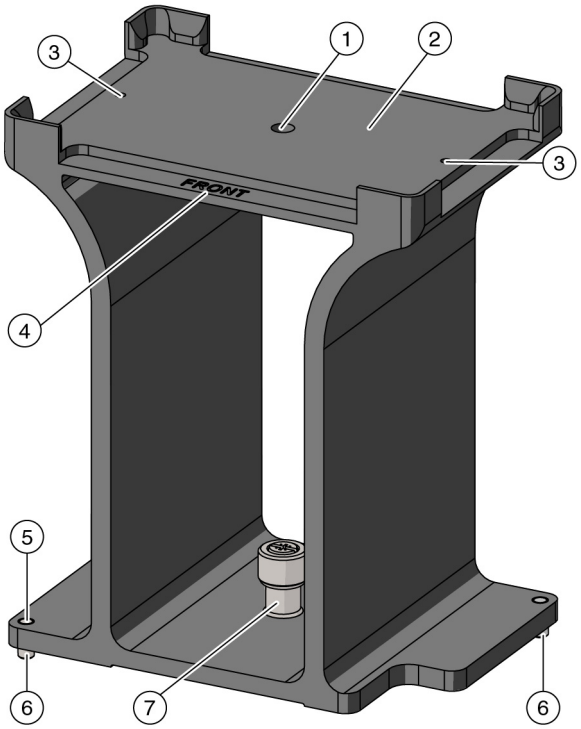
- *Installing Static ALPs*
- *Framing Instructions*
- *Removing Static ALPs from the Deck*
- *Storage*
- *Preventive Maintenance*

Static 1 x 1 & Tip Load 1 x 1 ALP

A Static 1 x 1 ALP occupies one position on the deck and holds one piece of labware (Figure 1.1). When the Tip Load Adapter is placed on the ALP, the Static 1 x 1 ALP is converted to a Tip Load 1 x 1 ALP, enabling the instrument to load tips onto a Multichannel pod from that location.

NOTE Labware positioned on a Static 1 x 1 ALP is gripper-accessible and stackable.

Figure 1.1 Static 1 x 1 ALP



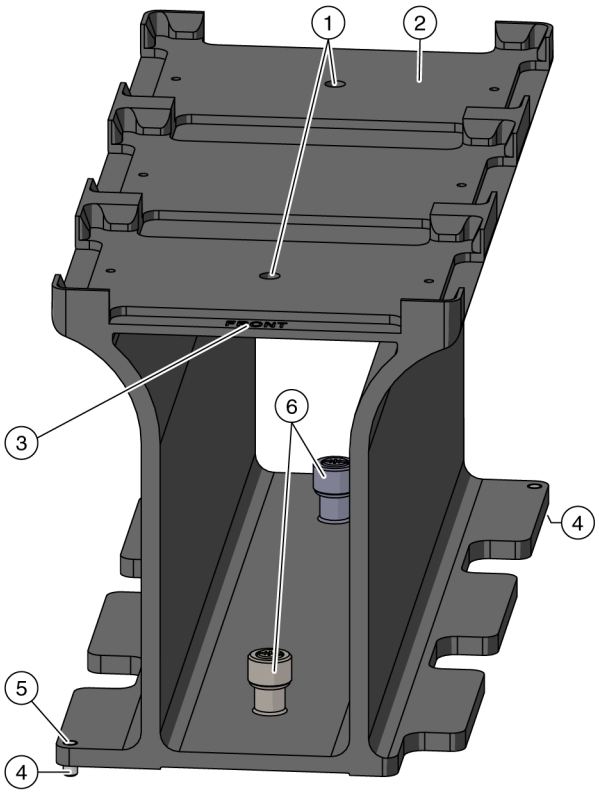
1. **Screwdriver Entry Hole**
2. **Labware Position** *or* location for placing the **Tip Load 1 x 1 ALP adapter** (shown in Figure 1.6)
3. **Threaded Holes** for Tip Load Adapter screws
4. **FRONT** label: The ALP is properly oriented when the **FRONT** label is located on the front side of the instrument.
5. **Pointing Feature** (frontmost mounting pin)
6. **Mounting Pins**
7. **Captive Screw**

Static 1 x 3 ALP

A Static 1 x 3 ALP occupies three positions on the deck and holds up to three pieces of labware in one column (Figure 1.2).

NOTE Labware positioned on the Static 1 x 3 ALP is gripper-accessible and stackable.

Figure 1.2 Static 1 x 3 ALP



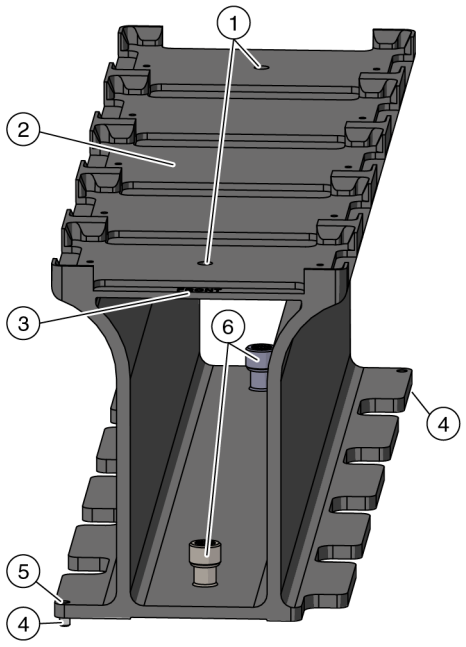
1. **Screwdriver Entry Holes**
2. **Labware Position** (3 total)
3. **FRONT** label: The ALP is properly oriented when the **FRONT** label is located on the front side of the instrument.
4. **Mounting Pins**
5. **Pointing Feature** (frontmost mounting pin)
6. **Captive Screws**

Static 1 x 5 ALP

A Static 1 x 5 ALP occupies one column on the Biomek i-Series deck and holds up to five pieces of labware (Figure 1.3).

NOTE Labware positioned on the Static 1 x 5 ALP is gripper-accessible and stackable.

Figure 1.3 Static 1 x 5 ALP



1. **Screwdriver Entry Holes**
2. **Labware Position** (5 total)
3. **FRONT** label: The ALP is properly oriented when the **FRONT** label is located on the front side of the instrument.
4. **Pointing Feature** (frontmost mounting pin)
5. **Mounting Pins**
6. **Captive Screws**

Installing Static ALPs

Installing Static ALPs on the deck includes choosing the deck location and then mounting the ALP to the deck. Installation instructions are provided in the sections below.

Choosing a Deck Position and Adding the ALP to the Deck Editor

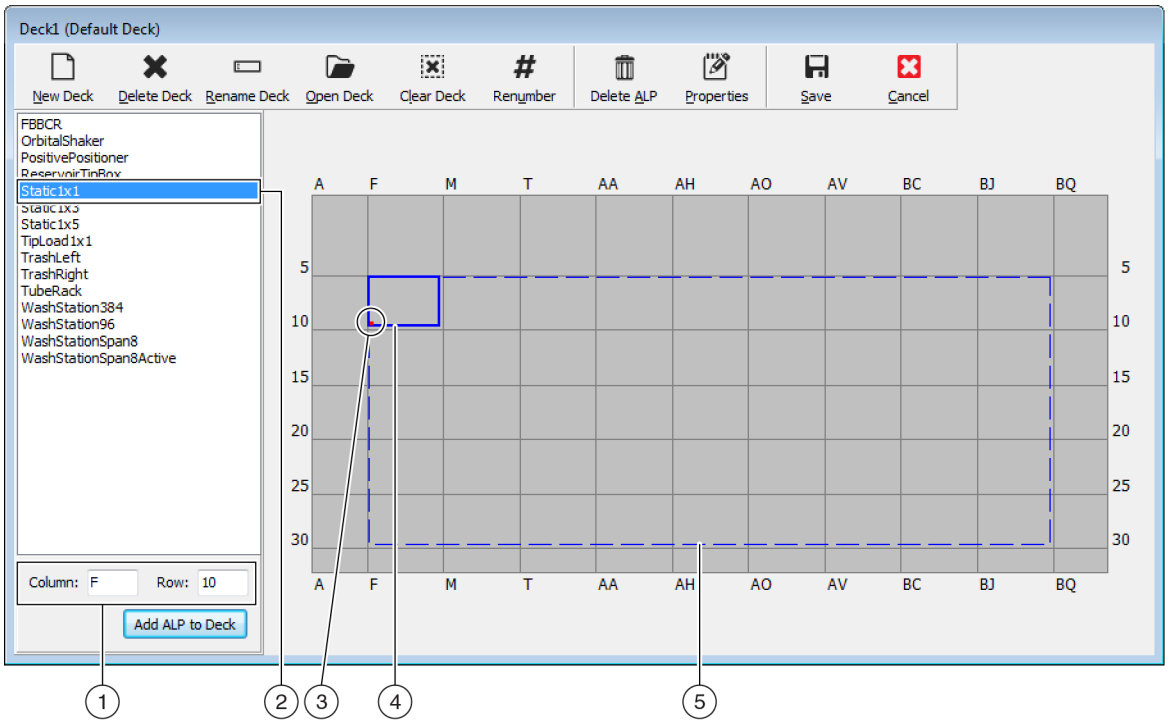
To choose a deck position and add the ALP to the **Deck Editor:**

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the appropriate Static ALP in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP. In Figure 1.4, the **Static1x1** ALP was selected on a cleared Biomek i7 instrument deck; other options for static ALPs include the **Static1x3**, **Static1x5**, and the **TipLoad1x1**.

Figure 1.4 Area Capable of Supporting the Static 1 x 1 ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 1.1, Figure 1.2, or Figure 1.3.

IMPORTANT Static ALPs must be mounted with the pointing feature on rows **10**, **15**, **20**, **25** or **30** only. These locations ensure each captive screw on the base of the ALP is located directly over a tapped hole, which provides ample space to allow for a secure hold for the tightened screw.

IMPORTANT ***If using a dual-pod Biomek i7 instrument***…

It is recommended that **TipLoad1x1** ALPs are positioned as far to the outside of the deck as possible to limit the impact of the **X Range Padding** buffer, which is specified in **Hardware Setup** (refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474, for additional information).

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting Static ALPs to the Deck

To mount a Static ALP to the deck:

1 Place the Static ALP on the selected deck location so that the mounting pins on the bottom of the ALP slip into the mounting holes on the deck. Make sure to align the pointing feature to the exact coordinates (**Column**/**Row**) used to configure the ALP in the **Deck Editor**.

2 Firmly press down on the ALP until the mounting pin is fully seated.

3 Tighten the captive screw(s) to secure the ALP to the deck by completing the following step(s):

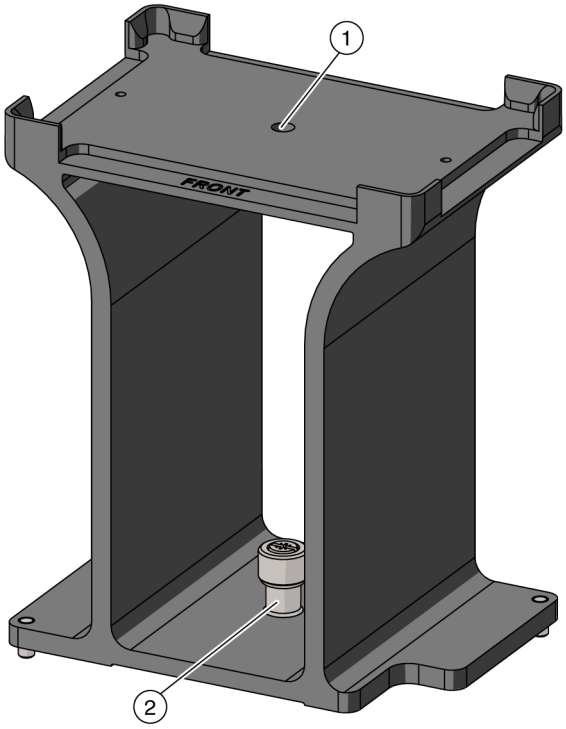
- ***If the captive screw can be accessed by hand:*** Hand tighten the captive screw at the base of the ALP (Figure 1.5) by turning the head clockwise until it can no longer be turned.

  OR

- ***If the captive screw cannot be accessed by hand:***
  - Lower the supplied #2 Phillips head screwdriver through the entry hole into the slot on the head of the captive screw, located at the base of the ALP (Figure 1.5).
  - Ensure the screw is secured into position.
  - Turn the screw clockwise until it cannot be tightened any further.

If necessary, repeat the procedure above for any additional captive screws on the ALP.

Figure 1.5 Securing the ALP to the Deck



1. Entry hole for the screwdriver.
2. Captive Screw

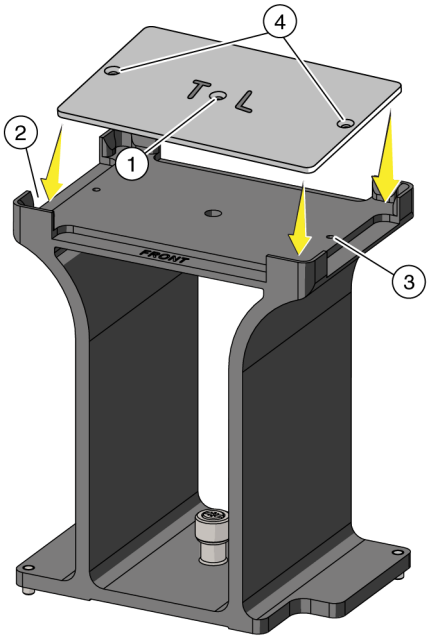
---

4 If mounting the Tip Load 1 x 1 ALP:

a. Place the adapter marked **TL** on top of the ALP, fitting it between the side notches, making sure the two screw holes on the adapter align with the thumbscrew holes on the ALP body (Figure 1.6).

b. Place the flathead Phillips screws into the countersunk holes on the adapter and tighten them with a #1 Drive Phillips screwdriver; this secures the adapter to the ALP, ensuring that tip boxes are properly reinforced for loading tips using the Multichannel pod.

Figure 1.6 Installing the Adapter on the Tip Load 1 x 1 ALP



1. Tip Load 1 x 1 ALP Adapter
2. The adapter fits between the notches of the ALP body.
3. M3 Threaded Hole on the ALP — For flathead Phillips screw on the ALP.
4. Countersunk holes on the Adapter — For flathead Phillips screw on the adapter.

Framing Instructions

Frame the Static ALPs according to the instructions in the *Biomek i-Series Hardware Reference Manual* (PN B54474).

NOTE Framing can be completed with or without the Tip Load Adapter installed.

Removing Static ALPs from the Deck

To remove a Static ALP from the deck:

1 Remove labware from the positioner manually or through a Biomek method.

2 Remove the captive screw by completing the appropriate step:

- ***If the captive screw can be accessed using your hand***: Using your fingers, turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

  OR

- ***If you cannot access the captive screw using your hand***: Insert the screwdriver into the hole on the top of the ALP and turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

Repeat the above procedure for any additional captive screws on the ALP.

3 Lift the positioner straight up from the deck until the mounting pins are clear of the mounting holes.

Preventive Maintenance

⚠ WARNING

Risk of contamination. ALPs might be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Static ALPs with a soft cloth.

Storage

Clean the ALP as instructed in *Preventive Maintenance*, and then store it upside down (pins up) in a dry, dust-free, environmentally-controlled area.

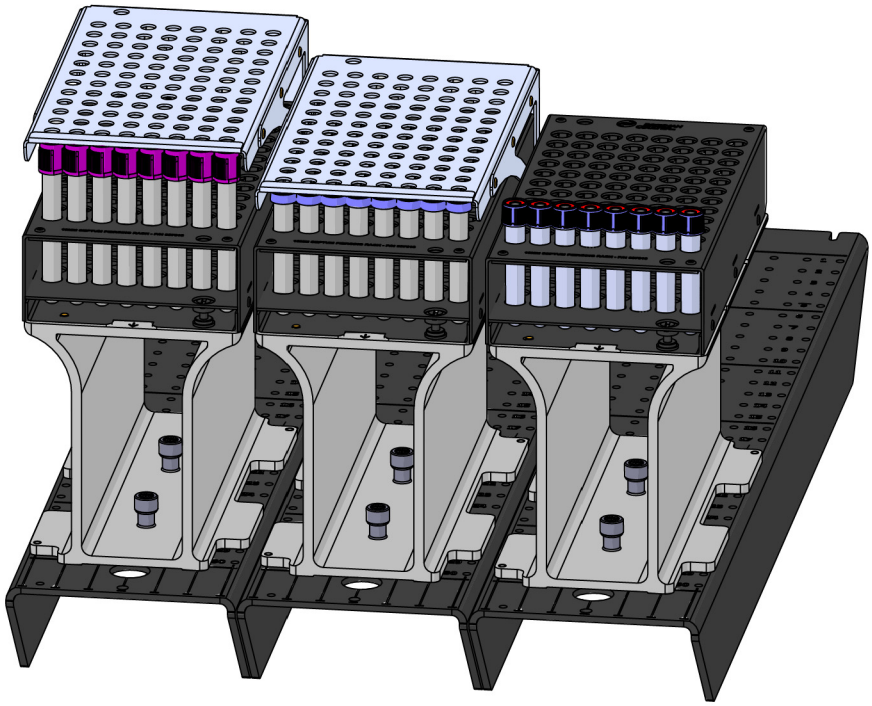
CHAPTER 2

Test Tube Rack ALP

Overview

A Test Tube Rack ALP (Figure 2.1) is an open-structured platform that holds one high-capacity test tube rack in place on the Biomek i-Series deck. When the Test Tube Rack ALP is used by a Span-8 pod, it ensures that test tubes are accessible at a predetermined height.

Figure 2.1 Test Tube Rack ALPs — Example Configurations

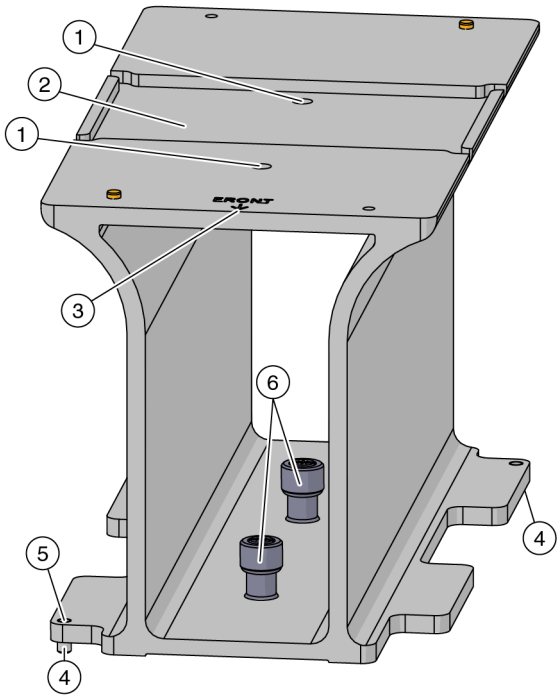


The sections in this chapter include:

- *Installing the Test Tube Rack ALP*
- *Framing Instructions*
- *Adding Test Tube Racks*
- *Removing Test Tube Racks*
- *Removing Test Tube Rack ALPs from the Deck*
- *Storage*
- *Preventive Maintenance*

The Test Tube Rack ALP (Figure 2.2) holds one high-density rack of test tubes. Test tubes and test tube racks are not gripper-accessible or stackable.

Figure 2.2 Test Tube Rack ALP



1. **Screwdriver Entry Holes**
2. **AccuFrame Pocket**: Secures the AccuFrame device when framing the ALP.
3. **FRONT** label: The ALP is properly oriented when the **FRONT** label is located on the front side of the instrument.
4. **Mounting Pins**
5. **Pointing Feature**: The mounting pin closest to the front of the instrument. The coordinates of the pointing feature ensure correct placement of the ALP in the software.
6. **Captive Screws**

Compatible Test Tube Racks

The Test Tube Rack ALP is designed to house only high-capacity test tube racks; these racks are intended to remain stationary for the duration of the method run, as high-capacity test tube racks cannot be moved. The test tube racks requiring placement on a Test Tube Rack ALP are specified in Table 2.1.

⚠ CAUTION

Risk of equipment damage. 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. Different sizes of test tubes must not be mixed in one test tube rack.

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.

Table 2.1 High-Density Test Tubes

	Outer Diameter	Length
Standard Test Tube Racks	10 mm	75 mm
	12 mm	75 mm
	13 mm	100 mm
	15.5 mm	100 mm
Septum-Piercing Test Tube Racks/Adapters	13 mm	75 mm & 100 mm
	15.5 mm	75 mm & 100 mm

Installing the Test Tube Rack ALP

Installing Test Tube Rack ALPs includes:

- *Choosing a Deck Position and Adding the ALP to the Deck Editor*
- *Mounting Test Tube Rack ALPs to the Deck*

After installing the Test Tube Rack ALP, test tube racks must be added properly to the ALP to use them in a method (refer to *Adding Test Tube Racks*).

Choosing a Deck Position and Adding the ALP to the Deck Editor

The Test Tube Rack ALP takes up one standard labware position in width (x) and 2.5 standard positions in depth (y) on the deck.

To select a deck position for a Test Tube Rack ALP:

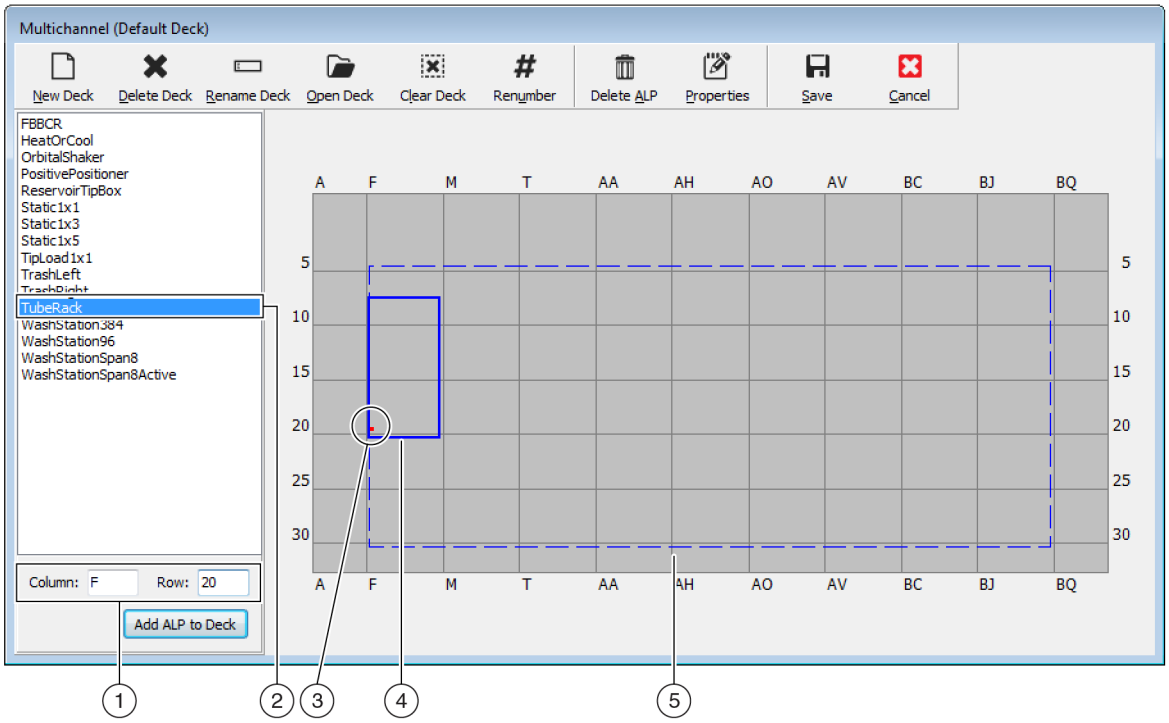
---

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the **TubeRack** in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP.

Figure 2.3 Area Capable of Supporting the Test Tube Rack ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the pointing feature when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 2.2.

IMPORTANT Test Tube Rack ALPs must be mounted with the pointing feature on rows **20**, **25** or **30** only. These locations ensure each captive screws on the base of the ALP are located directly over a tapped hole, which provides ample space to allow for a secure hold for the tightened screw.

NOTE A Tube Rack ALPs equipped with a retention plate for septum-piercing operations cannot be positioned directly in front of the Syringe Pumps, as this configuration does not allow enough room to tighten the thumbscrews that secure the plate to the ALP.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting Test Tube Rack ALPs to the Deck

To mount a Test Tube Rack ALP to the deck:

1 Place the Test Tube Rack ALP on the selected deck location so that the mounting pins on the bottom of the ALP slip into the mounting holes on the deck. Make sure to align the pointing feature to the exact coordinates (**Column**/**Row**) used to configure the ALP in the **Deck Editor**.

2 Firmly press down on the ALP until the mounting pin locks into place.

3 Tighten the captive screws to secure the ALP to the deck by completing the following step(s):

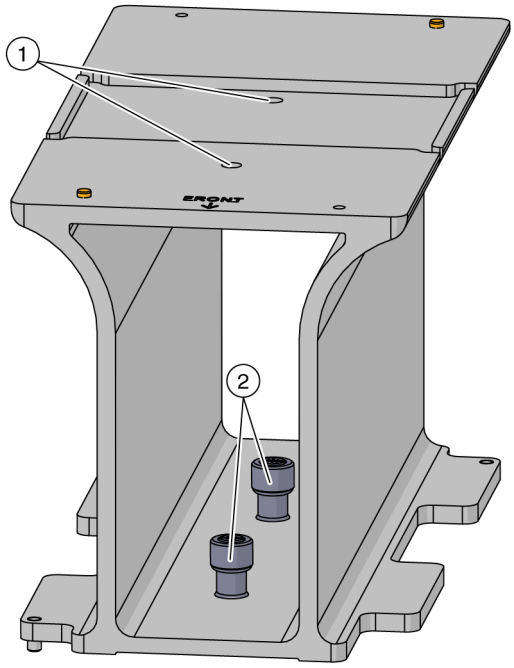
- ***If the captive screw can be accessed with your hand:*** Hand tighten the captive screw at the base of the ALP (Figure 2.4) by turning the head clockwise until it can no longer be turned.

  OR

- ***If you cannot access the captive screw with your hand:***
  - Lower the supplied #2 Phillips head screwdriver through the entry hole down to head of the captive screw, located at the base of the ALP (Figure 2.4).
  - Insert the tip of the screwdriver into the slot on the head of the screw, making sure it is secured into position.
  - Tighten the screws by turning it clockwise until it can no longer be turned.

If necessary, repeat the procedure above for any additional captive screws on the ALP.

Figure 2.4 Securing the ALP to the Deck



1. Entry holes for the screwdriver.
2. **Captive Screws** (two total)

Framing Instructions

Special framing instructions are necessary for Test Tube Rack ALP, which is framed using the AccuFrame.

To frame a Test Tube Rack ALP:

1 Turn off power to main unit before connecting the AccuFrame.

⚠ CAUTION

Risk of equipment damage. Removing the AccuFrame tool from the AccuFrame port while power to the instrument is on can cause equipment damage. Turn off power to the instrument before attaching or removing the AccuFrame tool from the AccuFrame port.

2 Plug AccuFrame into the AccuFrame port on the left rear tower of the instrument (Figure 2.5).

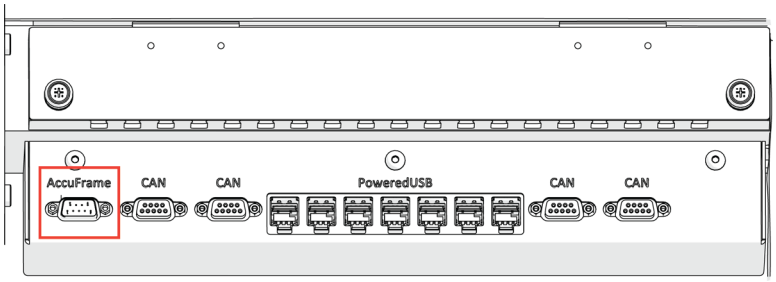
⚠ CAUTION

The AccuFrame cable positioning could violate the light curtain, which would immediately halt the framing process. Make sure that the AccuFrame cable does not violate the light curtain.

⚠ CAUTION

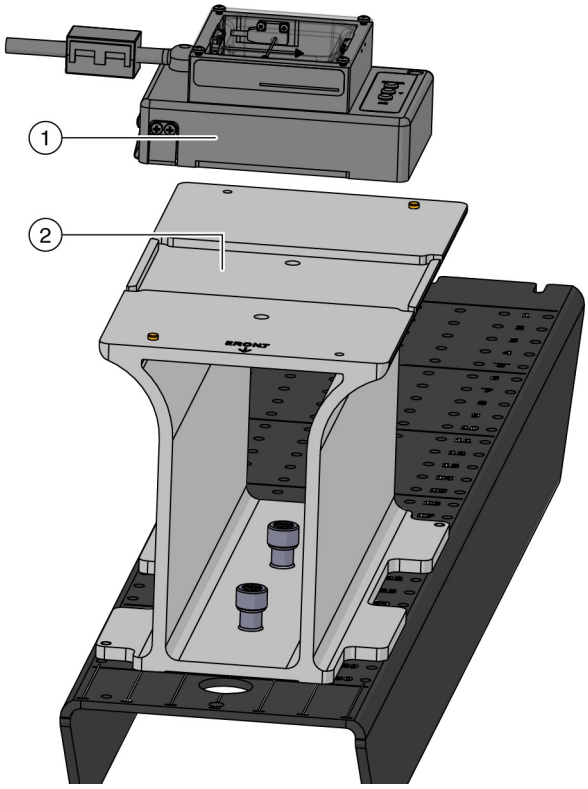
Risk of equipment damage. The AccuFrame cable positioning could interfere with pod movement. Make sure the AccuFrame cable is in a location that does not obstruct pod movement.

Figure 2.5 AccuFrame Cable Port



3 Position the AccuFrame over the ALP base pocket and gently press down to secure it to the ALP (Figure 2.6).

Figure 2.6 Framing for the Test Tube Rack ALP



1. **AccuFrame**
2. **Pocket**

4 Turn on power to the instrument.

5 Frame the Test Tube Rack ALP according to the procedures outlined in the *Biomek i-Series Hardware Reference Manual* (PN B54474).

Adding Test Tube Racks

The procedure for placing test tube racks on a Test Tube Rack ALP is different for the two types of test tube racks. Following the appropriate instructions for the type of tubes with which you are working:

- *Adding Standard Test Tube Racks*
- *Adding Septum-Piercing Test Tube Racks (Span-8 only)*

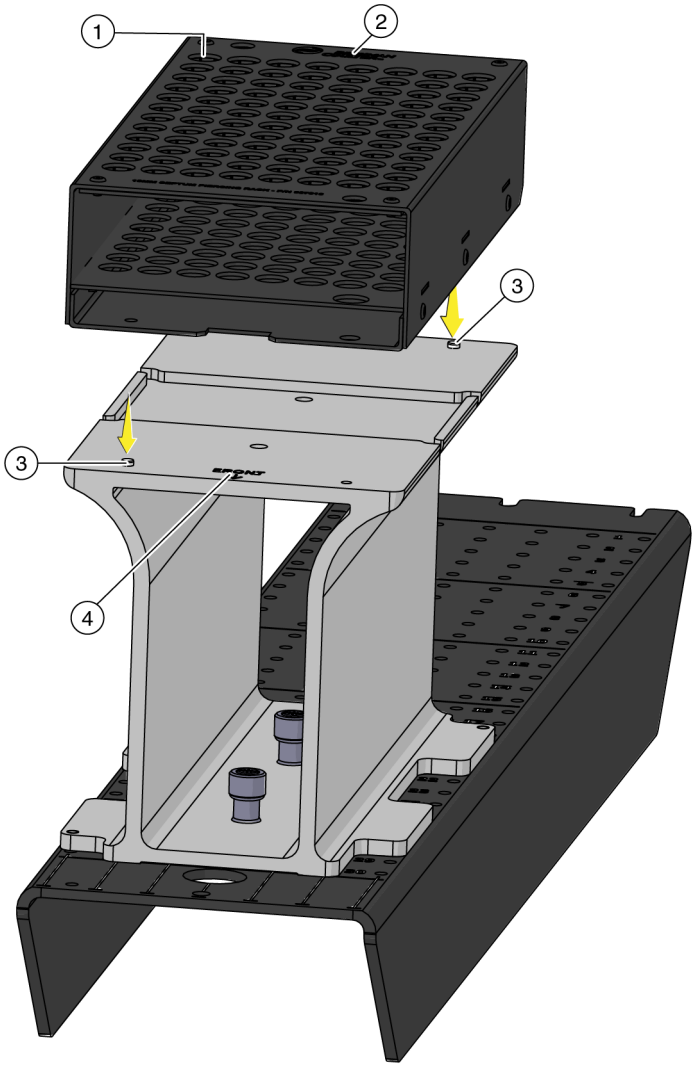
Adding Standard Test Tube Racks

To add standard test tube racks to the Test Tube Rack ALP:

1 Orient the test tube rack so that the **A1** position (or **1** position for 15.5 mm racks) on the test tube rack is on the back-left side of the Test Tube Rack ALP (Figure 2.7).

2 Lower the test tube rack so the holes on the bottom of the rack slip over the rack locating pins on the Test Tube Rack ALP (Figure 2.7) and press down to ensure it is correctly in position.

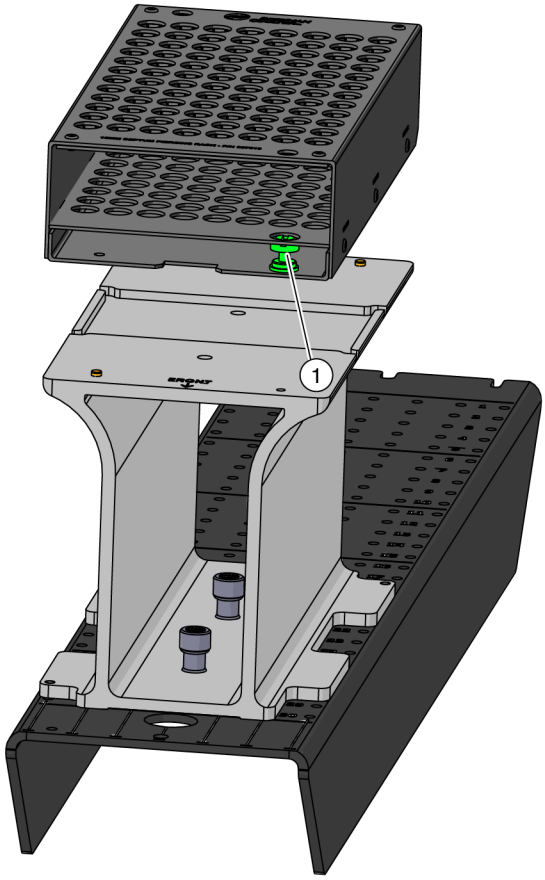
Figure 2.7 Mounting a Test Tube Rack to a Test Tube Rack ALP



1. Position **A1** (or Position **1**) on a Test Tube Rack
2. **Test Tube Rack**
3. **Rack Locating Pins**
4. **FRONT** of ALP

3 Secure the test tube rack to the ALP by inserting and tightening thumbscrews in the labware-positioning thumbscrew holes on the front-right and back-left corners, as shown in Figure 2.8.

Figure 2.8 Securing the Test Tube Rack to the ALP Base



1. **Labware-Positioning Screw** (back-left screw not shown)

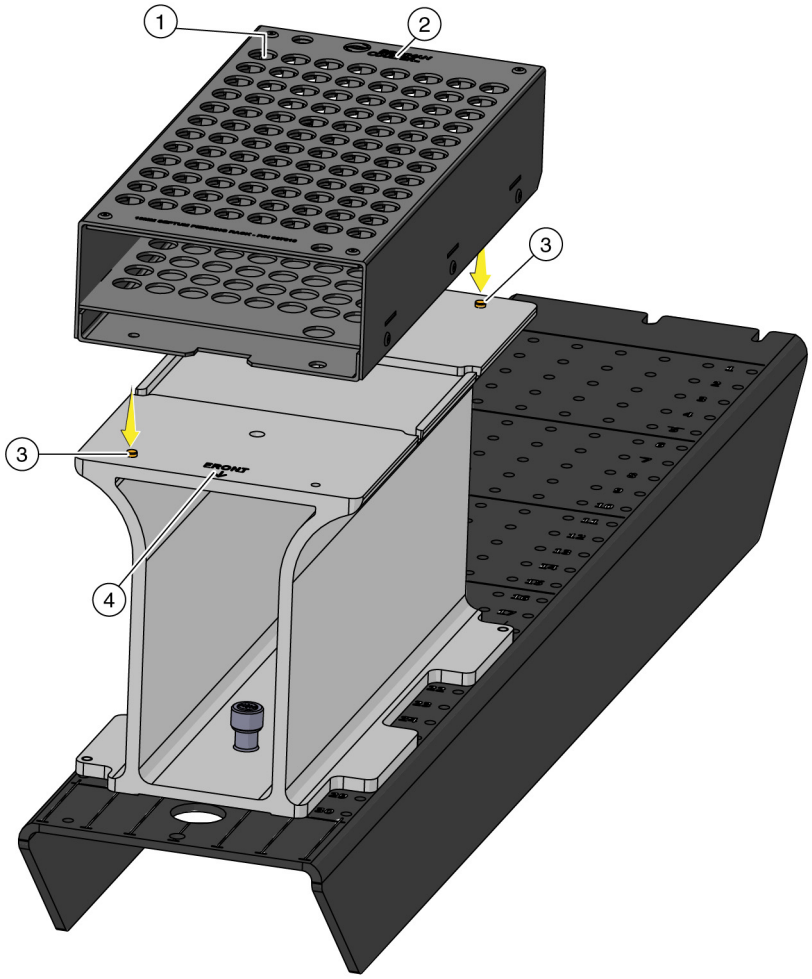
Adding Septum-Piercing Test Tube Racks (Span-8 only)

To add septum-piercing test tube racks to a Test Tube Rack ALP:

1 Orient the test tube rack so that the **H1** position (or **1** position for 15.5 mm racks) is on the back-left side of the ALP (Figure 2.9).

2 Lower the test tube rack onto the ALP so that the mounting holes on the bottom of the rack slip over the rack locating pins (Figure 2.9) and press down to ensure it is fully seated into position.

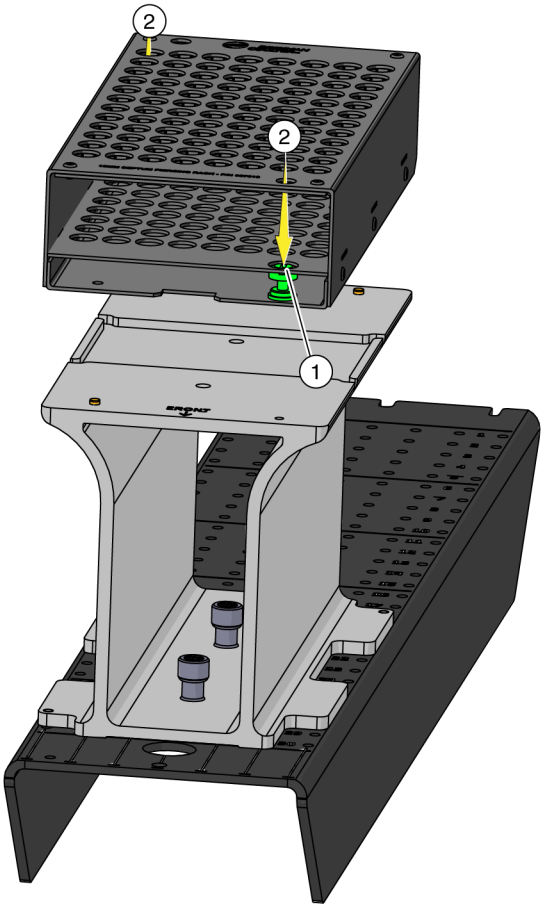
Figure 2.9 Mounting a Septum-Piercing Test Tube Rack to a Test Tube Rack ALP



1. Labware Position **H1** (or Position **1**) on a Test Tube Rack
2. **Test Tube Rack**
3. **Rack Locating Pins**
4. **Front of ALP**

3 Secure the test tube rack to the ALP by inserting and tightening the thumbscrews through the labware-positioning screw holes on the front-right and back-left corners, as shown in Figure 2.10.

Figure 2.10 Securing the Septum-Piercing Test Tube Rack to the ALP Base



1. Place the labware-positioning screws though the hole in the middle plate of the test tube rack, and comparable position on the back-left (not shown).
2. Insert a screwdriver though the top of the test tube rack and tighten the screws until they are securely in place.

4 Add test tubes to the test tube rack, if necessary.

5 Position the retention plate over the test tube rack so that the side with the tube markings is located at the back of the ALP.

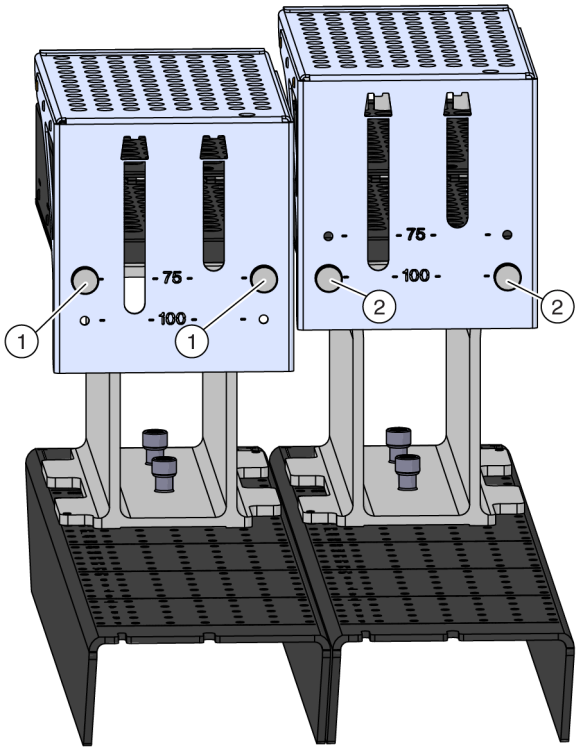
NOTE The retention plate ensures that the test tubes remain in the rack by providing a stopping mechanism to ensure septum-piercing tips detach from the tubes.

6 For Test Tube Racks containing:

- **100 mm tubes**: Align the two holes on the Test Tube Rack ALP to the holes that are at the **100** mark on the retention plate.
- **75 mm tubes**: Align the two holes on the Test Tube Rack ALP to the holes that are at the **75** mark on the retention plate.

7 Secure the retention plate to the ALP by placing and tightening a thumbscrew in each of the two holes, as shown in Figure 2.11.

Figure 2.11 Back View — Retention Plate Installation Locations Based on Test Tube Type



1. Thumbscrew locations for test tube racks containing 75 mm test tubes.
2. Thumbscrew locations for test tube racks containing 100 mm test tubes.

Removing Test Tube Racks

To remove a test tube rack from a Test Tube Rack ALP:

1 Loosen and remove each of the two labware-positioning screws from the front-right and back-left corners of the test tube rack.

2 Carefully lift the test tube rack up off the pins, and then pull it forward.

Removing Test Tube Rack ALPs from the Deck

To remove a Test Tube Rack ALP from the deck:

1 If not already completed, remove the test tube racks from the Test Tube Rack ALP (refer to *Removing Test Tube Racks* for instructions).

2 Remove the captive screw by completing the following step(s):

- ***If the captive screw can be accessed using your hand:*** Using your fingers, turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

  OR

- ***If you cannot access the captive screw using your hand:*** Insert the screwdriver into the hole on the top of the ALP and turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

Repeat the above procedure for the other captive screw on the ALP.

3 Lift the positioner straight up from the deck until the mounting pins are clear of the mounting holes.

Preventive Maintenance

⚠ WARNING

Risk of contamination. ALPs might 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.

Storage

Clean the ALP as instructed in *Preventive Maintenance*, and then store it in a dry, dust-free, environmentally-controlled area.

When not in use, return the following items to their original packing materials and store in a dry, dust-free, environmentally-controlled area:

- Test Tube Rack ALPs
- Test Tube Racks
- Septum-Piercing Racks
- Septum-Piercing Adapter

CHAPTER 3

Fly-By Bar Code Reader

Overview

⚠ WARNING

The Fly-By Bar Code Reader is a Class II laser product. Observe all cautions and warnings as labeled on the bar code reader assembly.

The Fly-By Bar Code Reader (FBBCR) ALP (Figure 3.1) scans bar code labels applied to the left-most side of the labware (when viewed from the fro0nt). It is powered through an external power supply and is mounted directly to the deck.

The grippers can bring up to four pieces of stacked labware to the Fly-By Bar Code Reader, where it makes an initial read before and/or a confirmatory check after pipetting. Using other Biomek steps, such as an **If** step, the bar code scanner sends labware to different branches of a method, depending on whether the bar code read matches the initial scan.

Fly-By Read Step

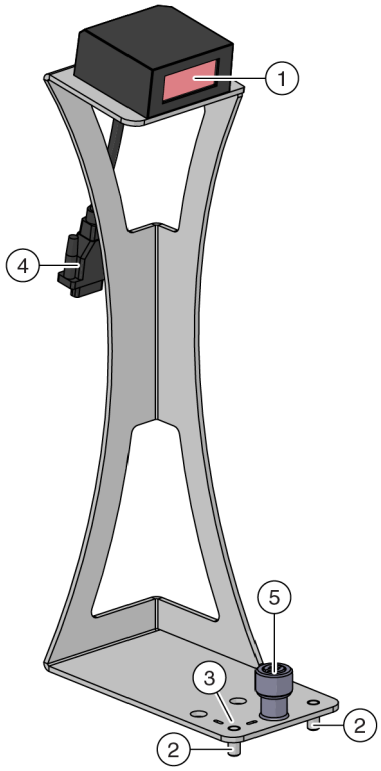
Using the grippers, the **Fly-By Read** step can do the following:

1. Remove the lid from a microplate and place it on a **Swap Space**.
2. Bring the microplate to the Fly-By Bar Code Reader, where the bar code is read.
3. Bring the microplate back to the original position, or to another position.
4. If desired, move the lid from the **Swap Space** and place it 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 could spill onto the deck while they are being transferred to the Fly-By Bar Code Reader.

Figure 3.1 Fly-By Bar Code Reader



1. **Fly-By Bar Code Reader**
2. **Mounting Pin**
3. **Pointing Feature** (indicated by the two markings)
4. **Cable**

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

The sections in this chapter include:

Installing the Fly-By Bar Code Reader

Installing the Fly-By Bar Code Reader on the deck includes choosing the deck location and then mounting it to the deck. Installation instructions are provided in the sections below.

Choosing a Deck Position and Adding the ALP to the Deck Editor

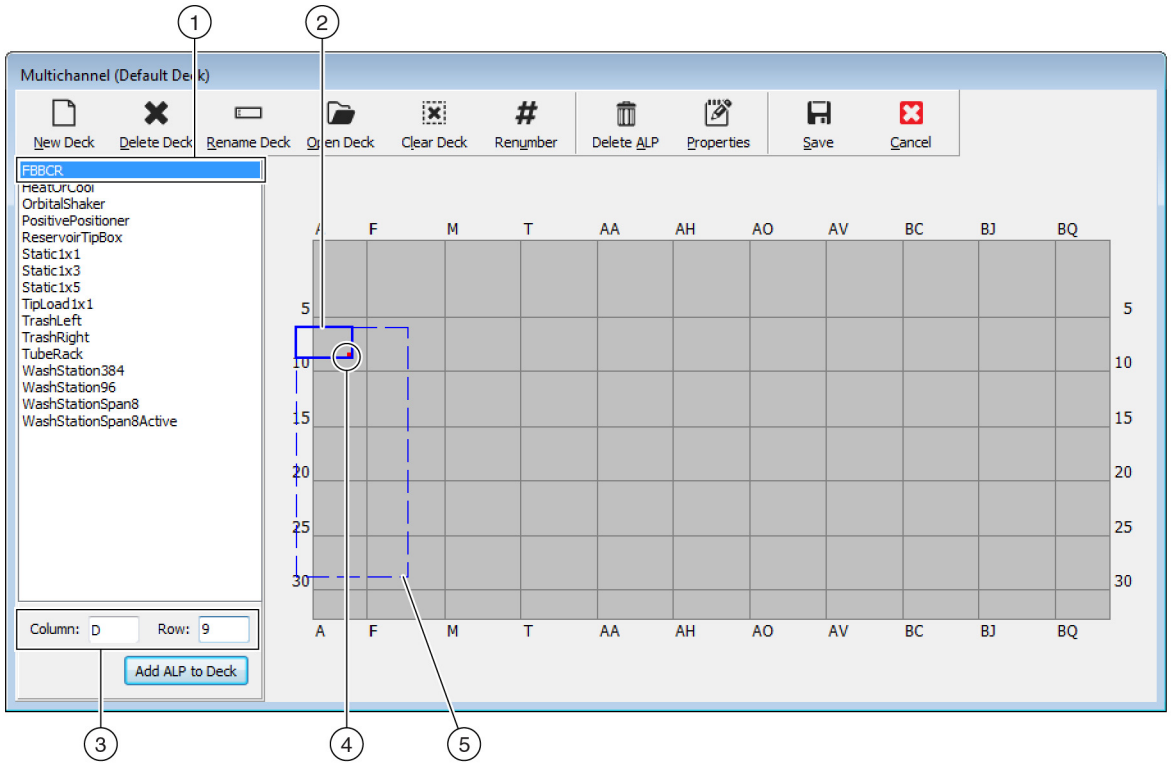
To select a deck position for the Fly-By Bar Code Reader:

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the FBBCR from the ALPs Type list. The area capable of supporting the FBBCR is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP.

Figure 3.2 Area Capable of Supporting the FBBCR on a Biomek i7 Instrument



1. **Selected ALP**
2. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
3. **Column** and **Row** fields: The location of the pointing feature (frontmost mounting pin) when the device is physically installed in the deck.
4. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(3)**, which is indicated by the red dot.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 3.1.

IMPORTANT FBBCRs must be mounted with the pointing feature on rows **9**, **14**, **19**, **24**, or **29** only. These locations ensure each captive screw on the base of the ALP is located directly over a tapped hole, which provides ample space to allow for a secure hold for the tightened screw.

NOTE The FBBCR should always face to the right side of the instrument.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting the Fly-By Bar Code Reader to the Deck

To mount the Fly-By Bar Code Reader to the deck:

1 Place the ALP on the deck, aligning the pointing feature (Figure 3.1) to the exact coordinates (**Column**/**Row**) defined in the **Deck Editor**. Make sure that the mounting pins on the bottom of the ALP have slipped into the appropriate mounting holes on the deck.

2 Firmly press down on the ALP, and then press on each of the mounting pins to secure the ALP into position.

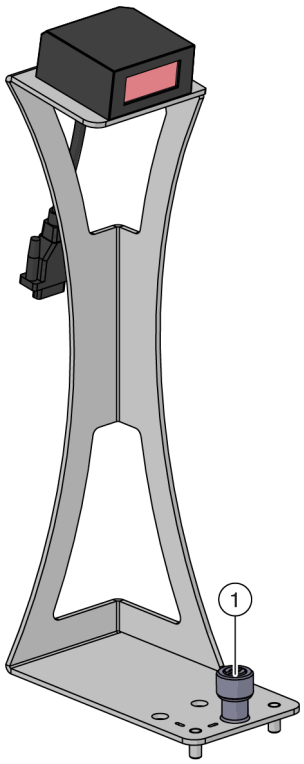
3 Tighten the captive screw to secure the ALP to the deck by completing the following step(s):

- **By Hand**: Hand tighten the captive screw (Figure 3.1) by turning the head clockwise until it can no longer be turned.

  OR

- **With a Screwdriver**:
  - Insert the tip of the supplied #2 Phillips head screwdriver into the slot on the head of the captive screw (Figure 3.1), making sure it is secured into position.
  - Tighten the screw by turning it clockwise until it can no longer be turned.

Figure 3.3 Captive Screw Location



1. Captive Screw Location

Properly Applying Bar Code Labels to Labware

⚠ WARNING

The Fly-By Bar Code Reader is a Class II laser product. Observe all cautions and warnings as labeled on the bar code reader assembly.

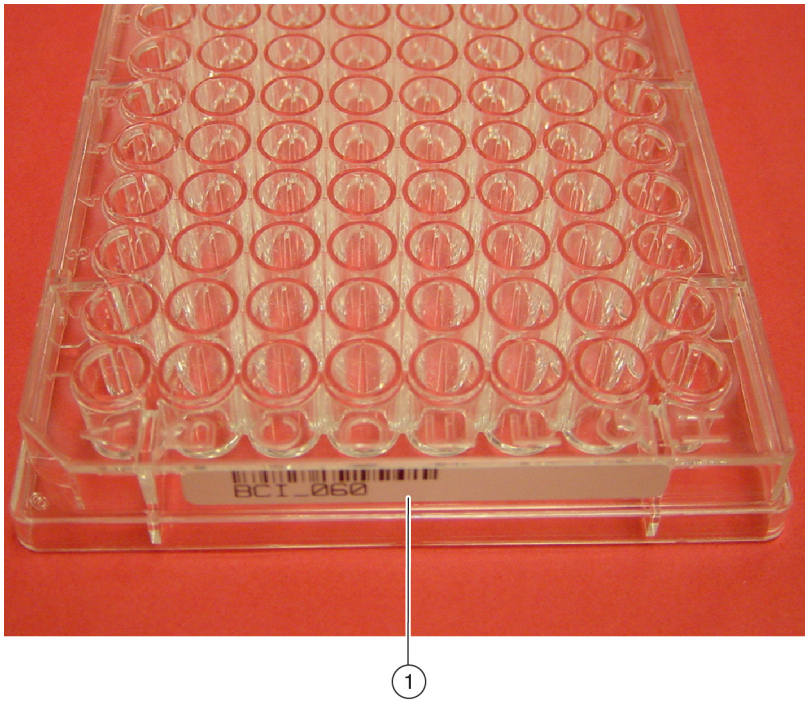
⚠ WARNING

Risk of erroneous results. If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads could occur. Verify definitions are correct prior to executing a method run.

Because a stack of microplates can be moved to the front of the Fly-By Bar Code Reader to be read, it is important to position each label on the upper middle portion of the left-most side of the labware (when viewed from the front), as shown in Figure 3.4. Proper placement of bar code labels ensures the bar code on each microplate in a stack is read correctly.

NOTE If a microplate is not part of a stack and/or will not be used for framing, it is not required to place the bar code label at the top side of the microplate.

Figure 3.4 Correct Positioning of a Bar Code Label When Stacking Microplates



1. When stacking microplates, place the bar code label on the upper middle portion of the short side of a microplate.

Framing the Fly-By Bar Code Reader

IMPORTANT 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 Representative initially frames the Fly-By Bar Code Reader during installation, it could 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.

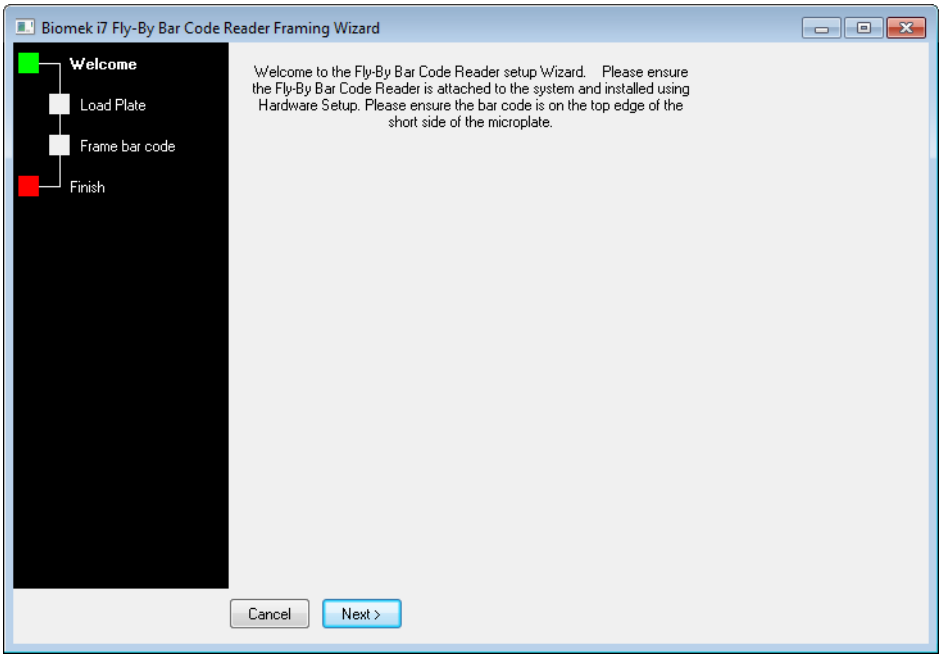
2. From the **Utilities** tab, in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

3. Double click on the Fly-By Bar Code Reader position to open **Position Properties**.

4. From **Position Properties**, choose **Manual Teach**. The **Biomek Fly-By Bar Code Reader Framing Wizard - Welcome** appears (Figure 3.5).

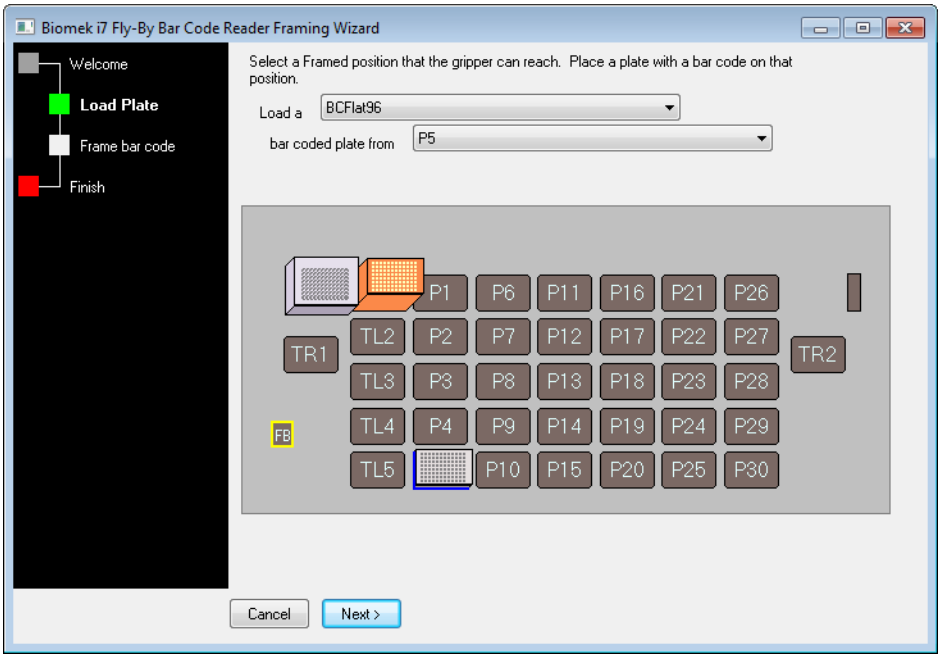
Figure 3.5 Biomek i7 Fly-By Bar Code Reader Framing Wizard - Welcome



NOTE When framing a Biomek i7 instrument, the **Biomek i7 Fly-By Bar Code Reader Framing Wizard** appears.

5 Choose **Load Plate.** The **Biomek Fly-By Bar Code Reader Framing Wizard - Load Plate** appears (Figure 3.6).

Figure 3.6 Biomek i7 Fly-By Bar Code Reader Framing Wizard - Load Plate

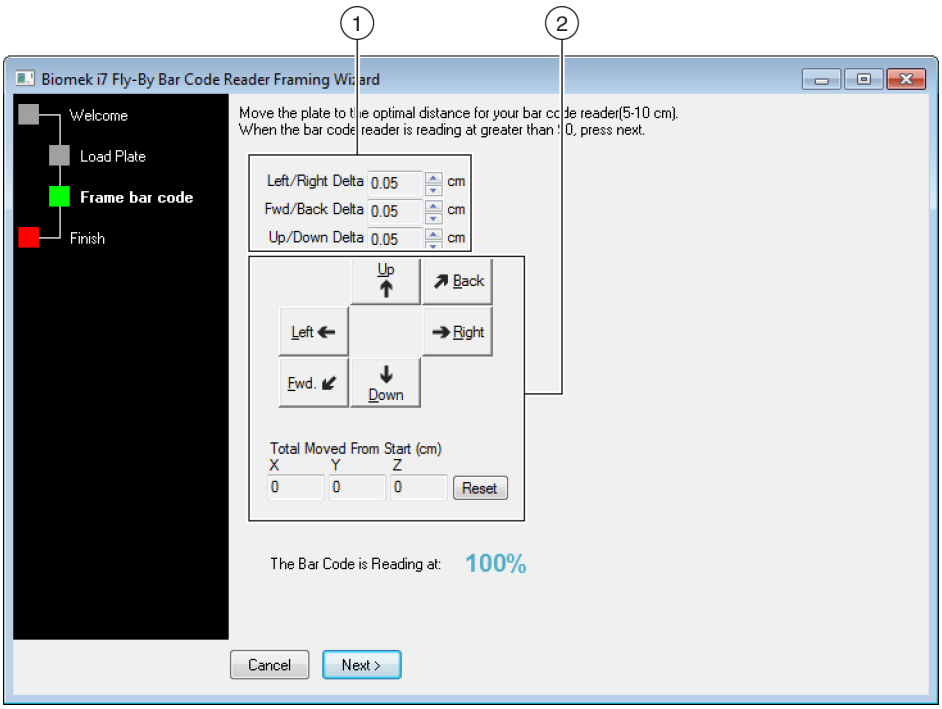


6 In **Load a**, choose the labware type placed on the framed position in Step 1.

7 In **bar coded plate from**, choose the framed position on which the microplate was placed in Step 1.

8 Choose **Next.** The **Biomek Fly-By Bar Code Reader Framing Wizard - Frame bar code** appears (Figure 3.7).

Figure 3.7 Biomek i7 Fly-By Bar Code Reader Framing Wizard - Frame Bar Code

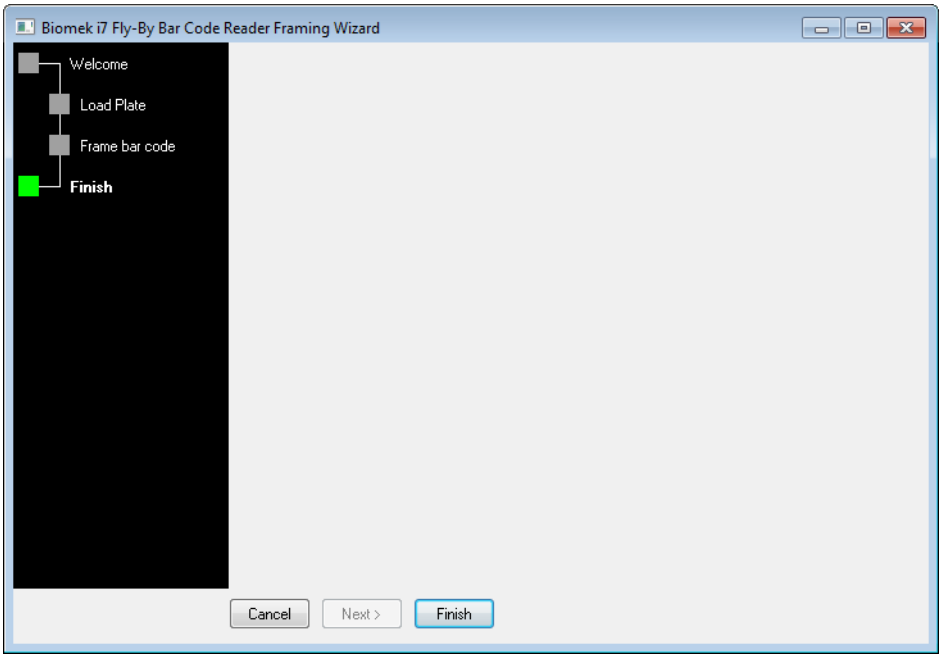


1. **Delta Value**: The magnitude of change applied to the gripper each time a directional button is selected.
2. **Directional Buttons**: The directional buttons move the labware in front of the Fly-By Bar Code Reader by the amount shown in **Delta** with each press of a button.

9 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 Bar Code is Reading at** reaches at least 90%.

10 After ensuring **The Bar Code is Reading at** reaches at least 90%, choose **Next**. The **Biomek Fly-By Bar Code Reader Framing Wizard - Finish** appears (Figure 3.8).

Figure 3.8 Biomek i7 Fly-By Bar Code Reader Framing Wizard - Finish



11 Choose **Finish** to close **Biomek 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 3.7). 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 3.7). 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.

Using the Fly-By Bar Code Reader with Biomek Software

⚠ CAUTION

Risk of equipment damage. Do not plug the FBBCR into the instrument tower connection panel, as this can cause the FBBCR to malfunction. To work properly, the FBBCR must be connected to the automation controller.

⚠ CAUTION

Risk of equipment damage. Using Home All Axes with a Fly-By Bar Code Reader on the deck could cause a collision if the pod is near the front, back, or side of the instrument. Make sure the pod and gripper are oriented as shown in the Home All Axes Warning.

⚠ WARNING

The Bar Code Reader is a Class II laser product. Observe all cautions and warnings as labeled on the bar code reader assembly.

⚠ WARNING

Risk of personal injury. Do not remove the module access cover on the Fly-By Bar Code Reader. 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 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 Code Reader is done in **Hardware Setup**. The Beckman Coulter Representative initially configures the default error handling for the Fly-By Bar Code Reader during installation; however, these settings can 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**. For more information about adding, configuring, and removing devices in **Hardware Setup**, refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

To change the default error handling in **Hardware Setup**:

IMPORTANT The **Serial Port** is set during installation. Do not change this value.

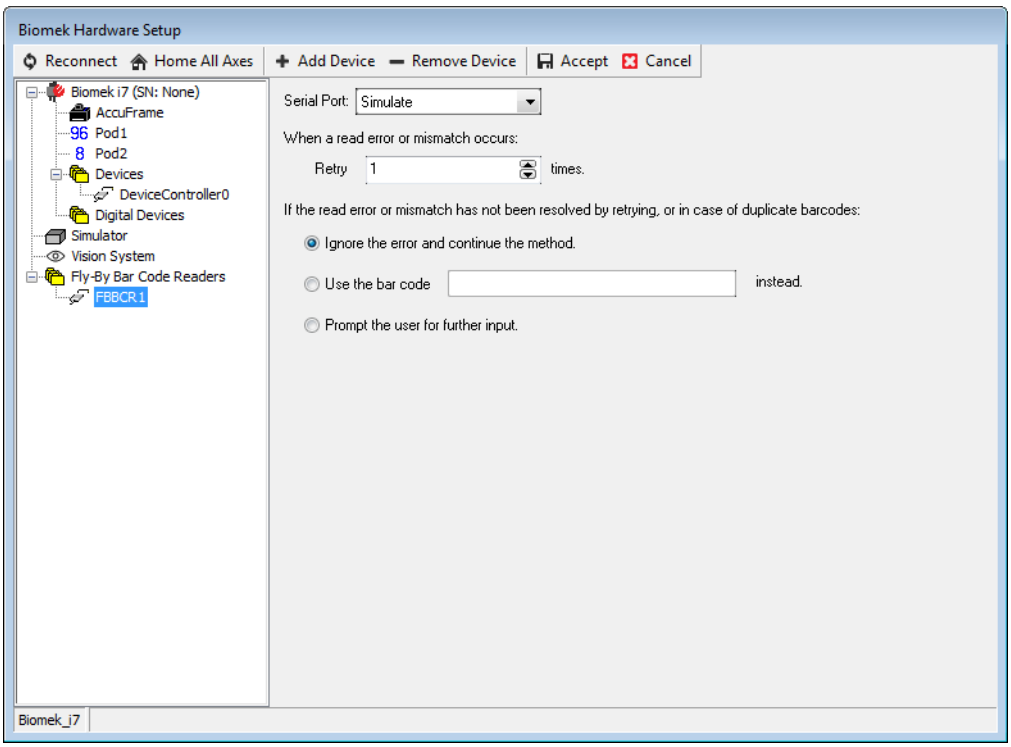
---

1 From the **Utilities** tab, in the **Instrument** group, select 

(**Hardware Setup**). **Hardware Setup** appears (Figure 3.9).

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 3.9).

Figure 3.9 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 barcode . . . 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 3.10 and Figure 3.11) 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 3.10 appears. If the bar code read does not match the expected bar code, Figure 3.11 appears.

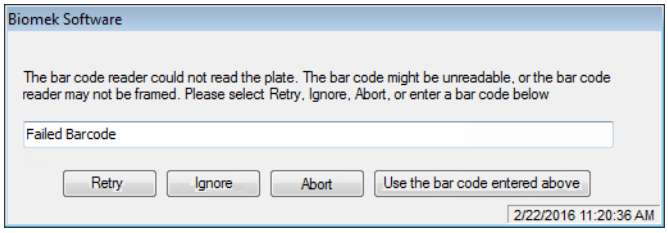
If a **Fly-By Logging** step has been configured, the action selected from the prompt is recorded in the log (refer to *Logging Reads from the Fly-By Bar Code Reader*).

Bar Code Cannot Be Read

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 barcode entered above** — the bar code entered above is used instead of the initial bar code entered in **Labware Properties**.

Figure 3.10 Prompt to Choose Options When Fly-By Bar Code Reader Could Not Read the Bar Code

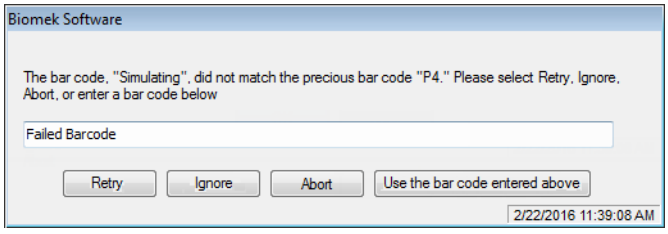


Bar Code Does Not Match

When the prompt is displayed, choose one of the following options:

- **Retry** — the Fly-By Bar Code Reader retries to match the bar code.
- **Ignore** — the method continues without the mismatch resolved and the bar code read is used instead of the initial bar code entered in **Labware Properties**.
- **Abort** — the method stops.
- **Use the barcode entered above** — the bar code entered above is used instead of the initial bar code entered in **Labware Properties**.

Figure 3.11 Prompt to Choose Options When Fly-By Bar Code Reader Could Not Read the Bar Code



Configuring the Fly-By Bar Code Reader to Read Labels in a Method

To configure the Fly-By Bar Code Reader to read bar codes in a 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 i-Series Software Reference Manual* (PN B56358), *Instrument Setup Step*, for more information on configuring the **Instrument Setup** step or **Labware Properties**.

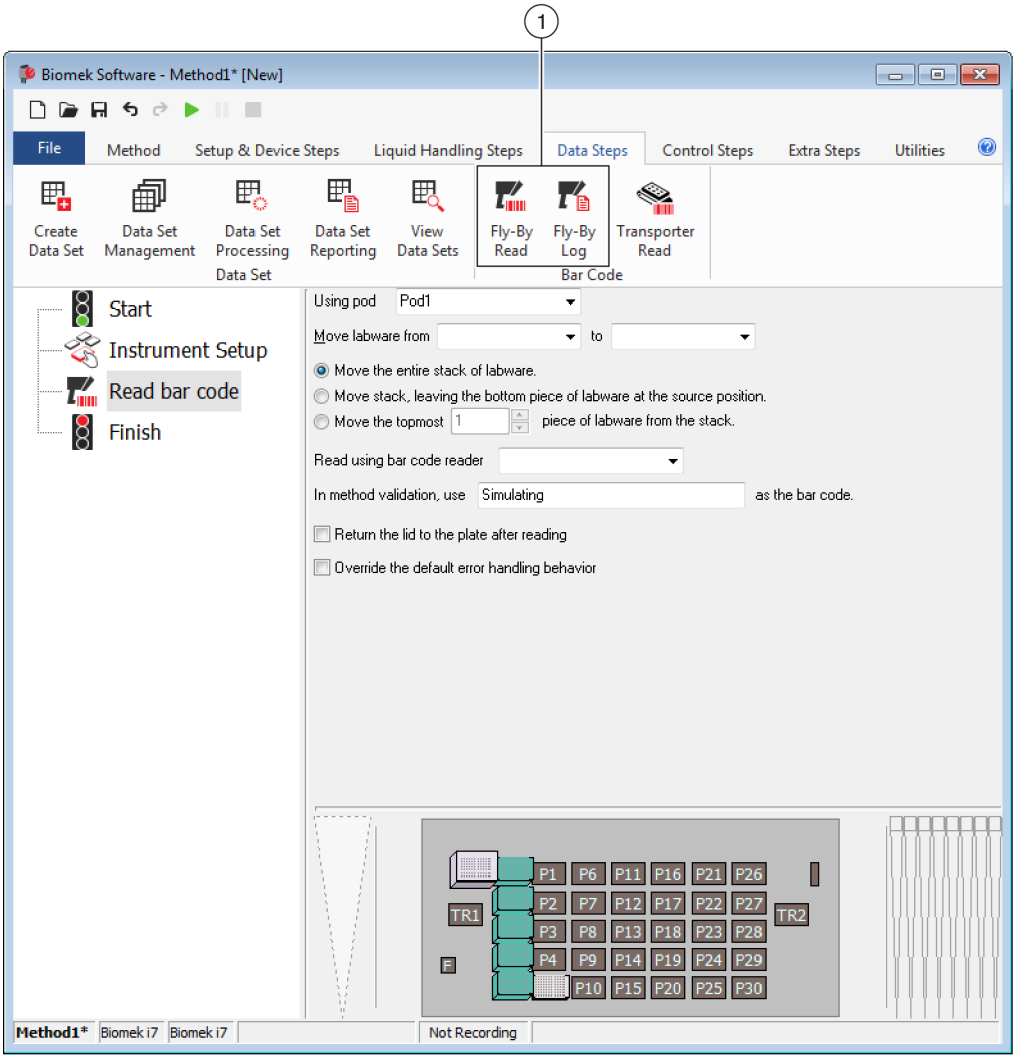
The **Bar Code** steps (Figure 3.12) automatically appear on the **Data Steps** tab when the software is installed.

To configure the Fly-By Bar Code Reader to read bar codes:

1 From the **Data Steps** tab, in the **Bar Code** group, select the 

step to insert a **Fly-By Read** step into the method view. The **Fly-By Read** step configuration appears (Figure 3.12).

Figure 3.12 Fly-By Read Step Configuration



1. **Fly-By Bar Code Reader** steps

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 labware:

NOTE When setting up the labware move, keep in mind the following:

- The gripper can move up to four plates at one time.
- Labware or stacks of labware taller than 4.57 cm (1.80 in.) are not able to be read at the standard barcode reading distance. To read stacks of labware taller than 4.57 cm (1.80 in.), you will need to reframe the ALP (*Framing the Fly-By Bar Code Reader*) with the scan position farther away from the reader.

  NOTE Distance limitations are provided in the Microscan MS-3 Spec Sheet.*

- Labware is gripped from the left when moving to the FBBCR.

- **Move the entire stack of labware** — moves all labware in the stack; select 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 i-Series Software Reference Manual* (PN B56358) 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 barcode**, use the default **Simulating** to allow Biomek Software to validate the method.

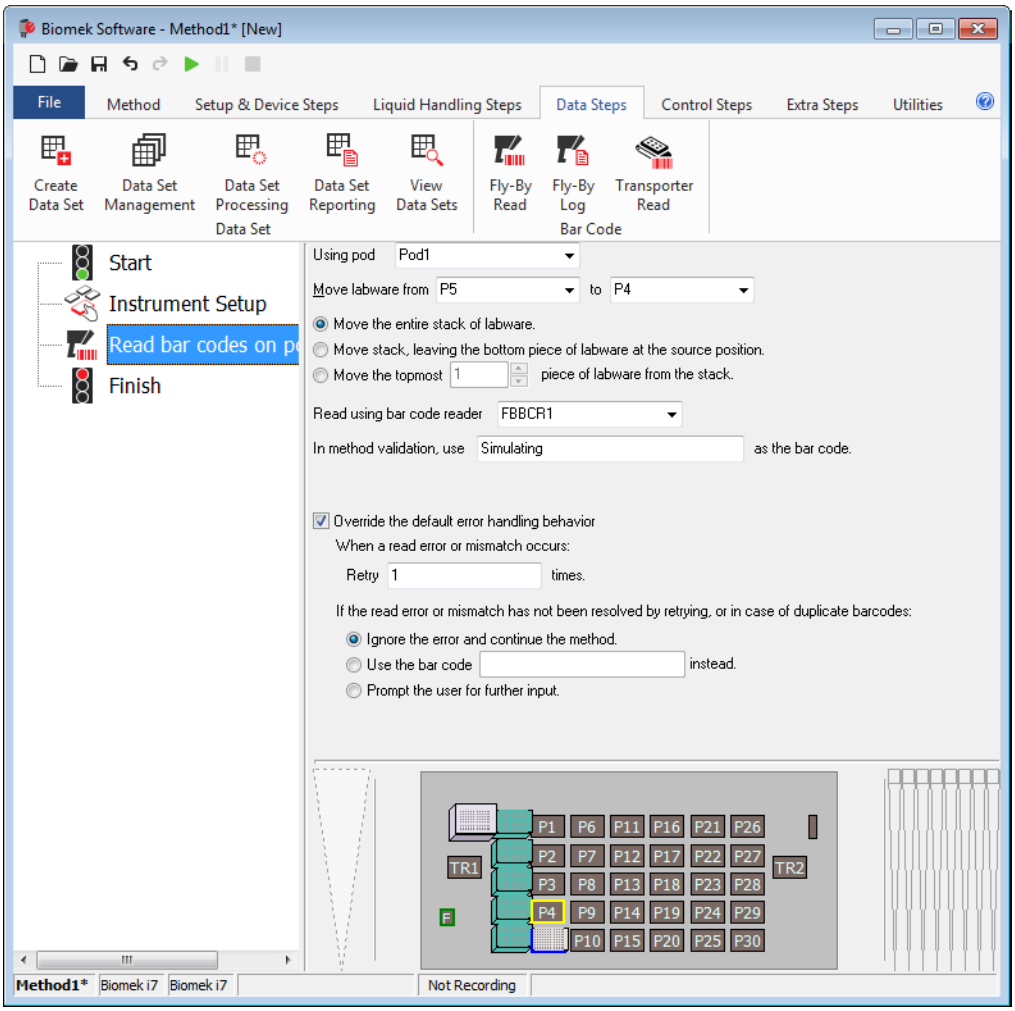
NOTE A value must be entered since a bar code is not actually read during validation. Without a value, the software cannot validate the next operation. The entered value is only used for method validation and not used during method execution.

8 If desired, check **Return the lid to the plate after reading.**

* Visit www.microscan.com to find the MS-3 Spec Sheet.

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 3.13 appears.

Figure 3.13 Fly-By Read Step Configuration With Override the Default Error Handling Behavior Checked



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 In **If the read error or mismatch has not been resolved by retrying**, choose one of the following:

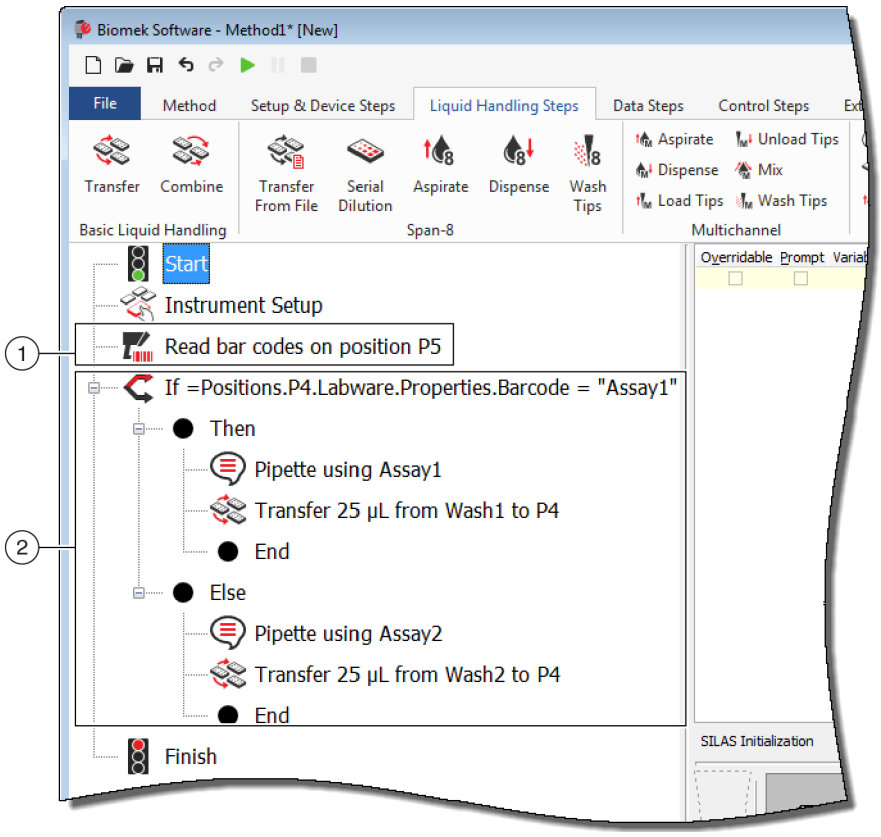
- **Ignore the error and continue the method.** — when this option is chosen, if the bar code has not been read, the method continues after the number of times to retry has been exhausted. If the bar code has been read, the mismatch is ignored, the new bar code read is accepted, and the method continues after the number of times to retry has been exhausted.
- **Use the barcode . . . 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 can be configured using an **If** step and a **Fly-By Read** (Figure 3.14).

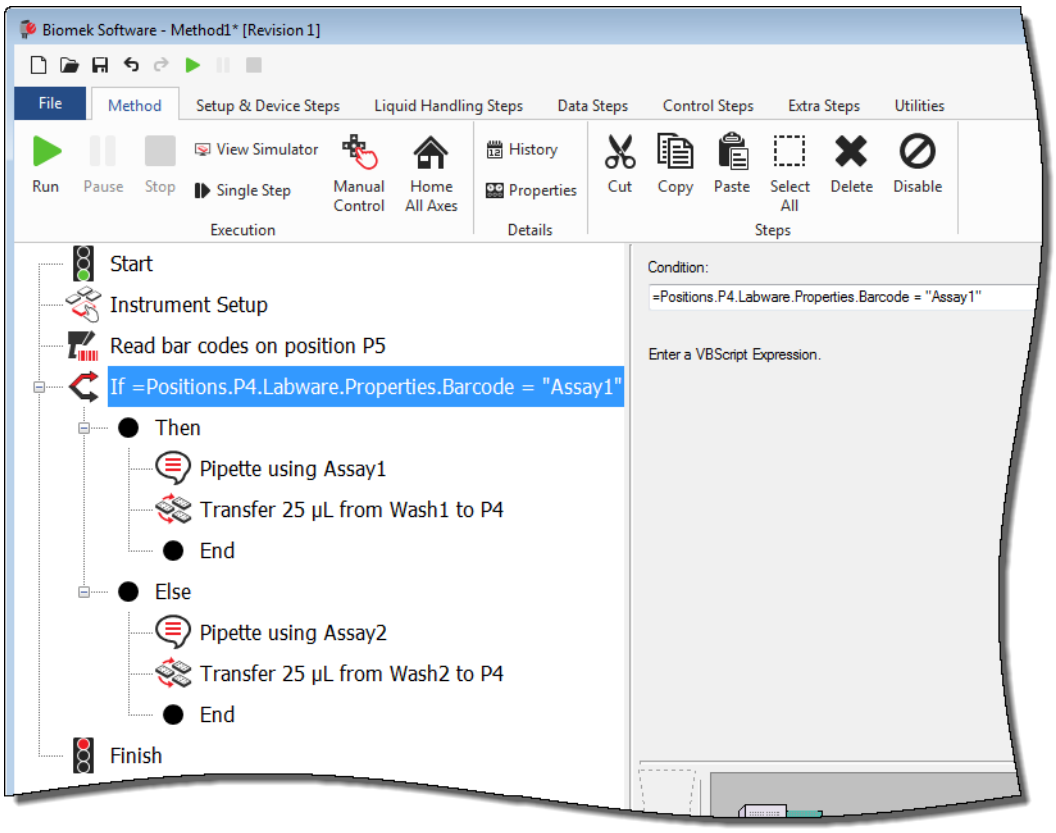
Then, depending on the read results and the **If** step configuration (Figure 3.15), a microplate is sent to one pipetting operation or the other. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), for more information on configuring the **If** step.

Figure 3.14 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 3.15 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 3.16) that records:

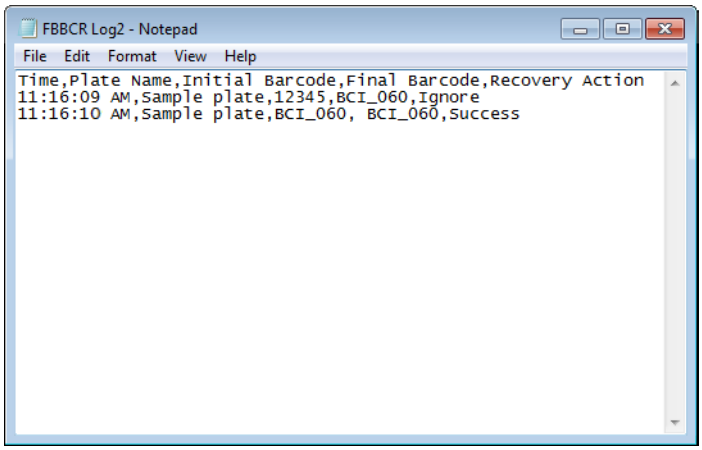
- **Time** — time when the bar code was read.
- **Plate Name** — name of the labware specified in **Labware Properties**.
- **Initial Barcode** — bar code specified in **Labware Properties**.

  NOTE If the bar code is not specified in **Labware Properties**, the first bar code read by the Fly-By Bar Code Reader is the **Initial Barcode**.

- **Final Barcode** — 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*).

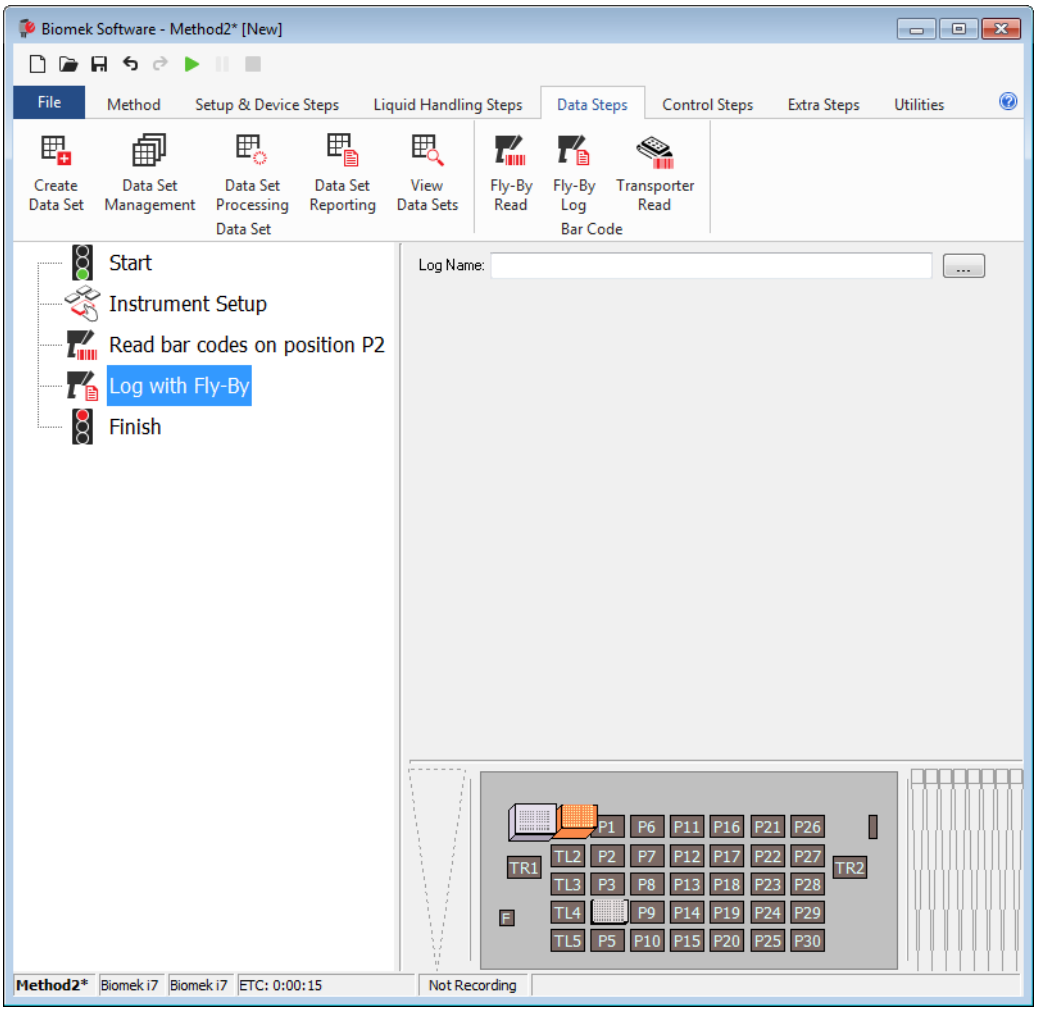
Figure 3.16 Example of a Log File from Fly-By Bar Code Reader



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 3.17).

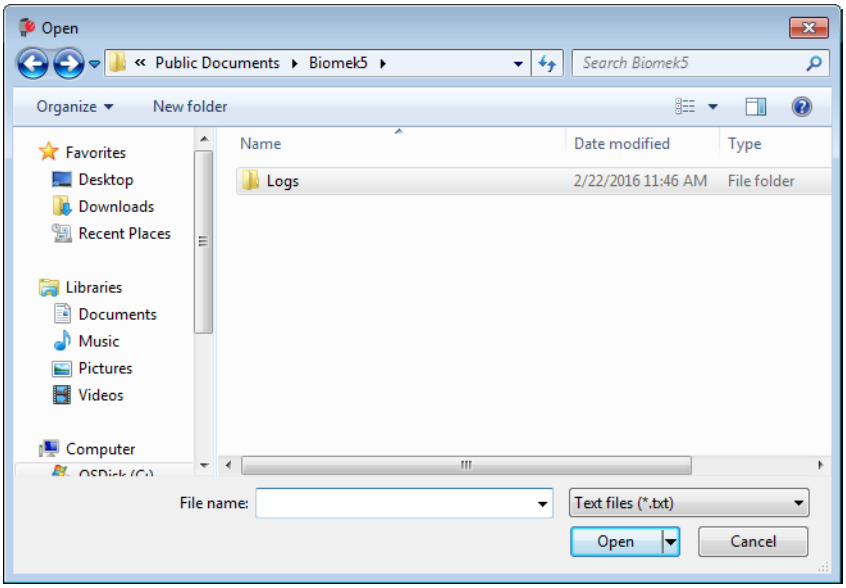
Figure 3.17 Fly-By Logging Step Configuration



2 Enter a descriptive **Log Name** for the log.

3 Use the browse button to save the new log file to **Biomek Logs** (Figure 3.18).

Figure 3.18 Open to Save the Log to the Biomek Logs



Removing Fly-By Bar Code Reader ALPs from the Deck

To remove a Fly-By Bar Code Reader ALP from the deck:

1 Remove the captive screw by completing one of the following:

- ***By hand***: Using your fingers, turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

  OR

- ***With a Screwdriver***: Turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

2 Pull up on the two mounting pins to release the ALP, and then lift the Fly-By Bar Code Reader ALP straight up from the deck until the pins are clear of the mounting holes.

Preventive Maintenance

Clean the scanner window with a clean, dry cotton swab or cotton cloth on a regular basis.

Storage

When not in use, store in a dry, dust-free, environmentally-controlled area.

CHAPTER 4

Trash ALP

Overview

The Trash ALP (Figure 4.1) provides a means to dispose of trash during a method. When the slide is attached, it can be used to dispose tip boxes and labware into an off-deck waste container; when the slide is not attached, it is used with a bin for tip disposal only. Specifically, this accessory is used in one of two ways:

- ***With Disposal Bin*** — Tips are shucked into the disposal bin positioned inside the base. *Refer to Trash ALP With Disposal Bin* for installation and removal instructions specific to the self-contained version of this ALP.

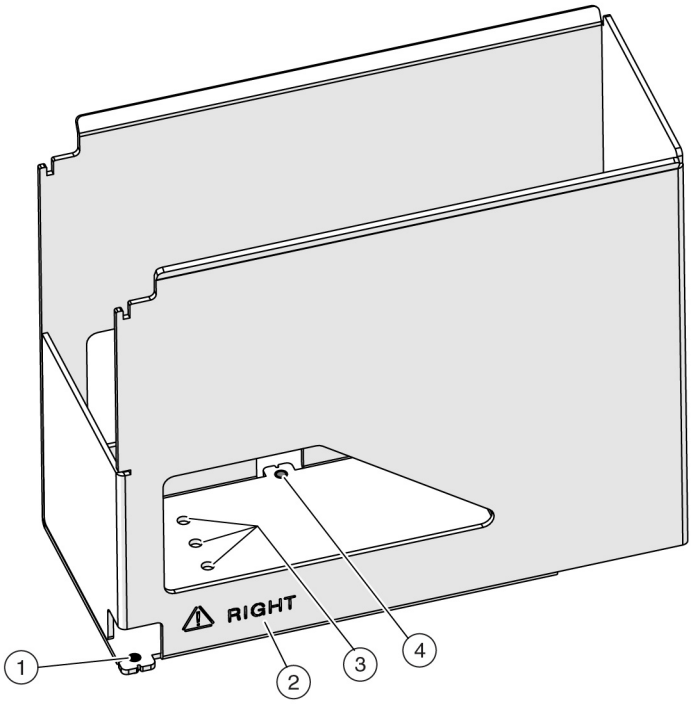
  OR

- ***With Slide*** — A slide that extends to the edge of the deck is inserted into the ALP. Tip boxes, labware, and tips placed inside the ALP slide down into a receptacle that has been placed below. Refer to *Trash ALP With Slide* for installation and removal instructions specific to the self-contained version of this ALP.

NOTE The Trash ALP is shipped so that either of the two options above can be assembled and used.

The sections in this chapter include:

Figure 4.1 Trash ALP



1. **Mounting Pin** & **Right-Mounted Pointing Feature**
2. The ALP is marked to ensure proper orientation on the deck. When mounting the ALP, make sure that the correct **LEFT** or **RIGHT** label is visible when standing in front of the instrument.
3. **Screw Hole** options (3 shown, 5 total)
4. **Mounting Pin** & **Left-Mounted Pointing Feature** for the ALP *when mounted on the left side of the deck*.

NOTE The ALP faces the opposite direction when mounted on the left.

Trash ALP *With Disposal Bin*

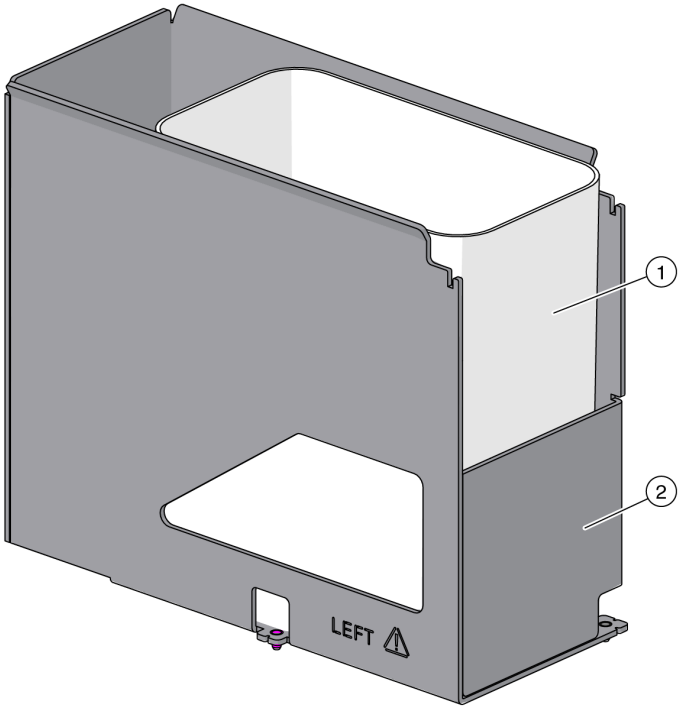
The Trash ALP *With Disposal Bin* (Figure 4.2) is used to discard tips. It is positioned on the deck on either the left or right side of the instrument. When using this ALP as a self-contained unit, a disposal bin must be positioned inside the accessory to ensure the safe and easy removal of discarded tips.

⚠ WARNING

Risk of contamination. When using the ALP, tips could spill over onto the deck, possibly contaminating the deck with hazardous materials. Do not overfill the disposal bin.

NOTE The Trash ALP *With Disposal Bin* is used only for tip disposal.

Figure 4.2 Trash ALP with Disposal Bin



1. **Disposal Bin**
2. **ALP Body**

Installation

Installing the Trash ALP *With Disposal Bin* includes choosing a deck position, adding the ALP to the **Deck Editor**, and installing the ALP onto the deck.

Choosing a Deck Position and Adding the ALP to the Deck Editor

⚠ CAUTION

Risk of equipment damage. The pod could collide into the Trash ALP if it is placed in the incorrect deck position. Mount the accessory within the region defined in the Deck Editor to avoid collisions.

To select a deck position for a Trash ALP:

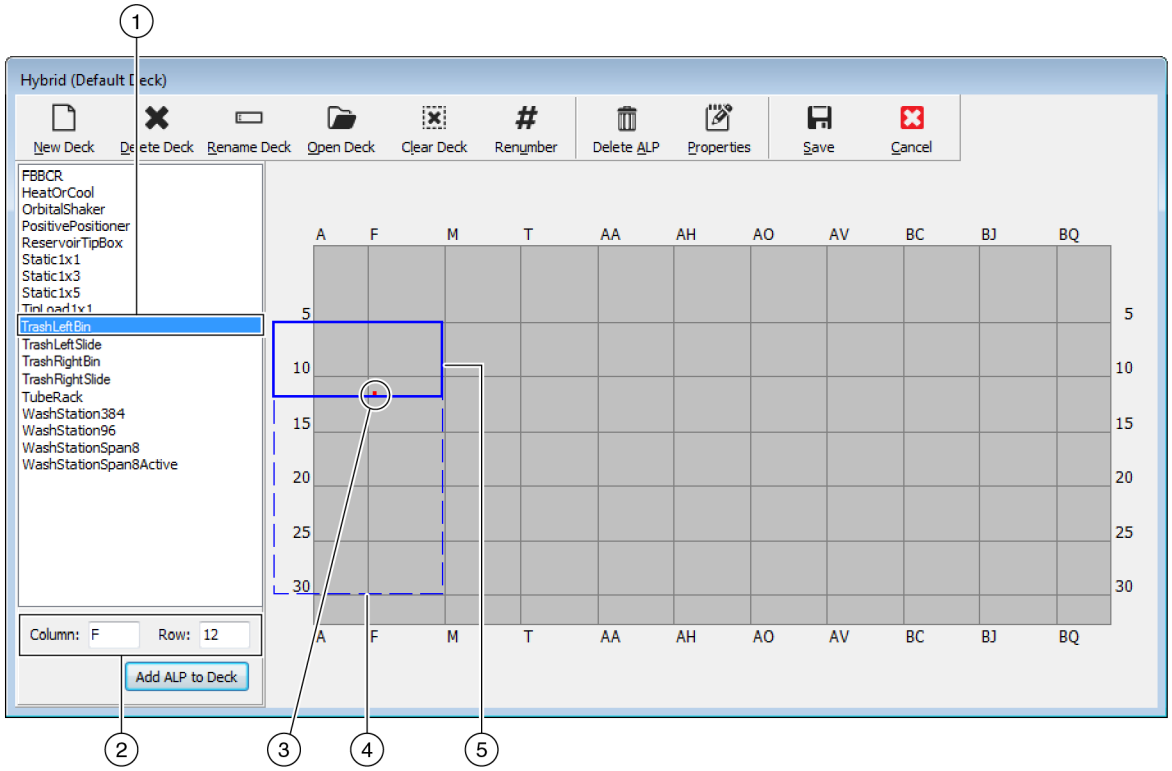
---

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the appropriate Trash ALP in the ALPs Type list. The Trash ALPs *with disposal bin* are labeled as **TrashLeftBin** and **TrashRightBin** and are selected based on which edge of the deck you wish to place the ALP. The area capable of supporting the ALP is indicated by blue dashed lines. Make sure to choose a position within this area that does not currently contain an ALP. In Figure 4.3, the **TrashLeftBin** ALP was selected on a cleared Biomek i7 instrument deck.

Figure 4.3 Area Capable of Supporting the Trash ALP on a Biomek i7 Instrument



1. **Selected ALP**
2. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(2)**, which is indicated by the red dot.
4. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.
5. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 4.1.

4 Enter the selected location in Biomek Software, using the **Deck Editor.** Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for complete instructions.

Mounting the Trash ALP *With Disposal Bin* onto the Deck

To mount the Trash ALP *With Disposal Bin*:

1 If necessary, remove the slide from the ALP by lifting up on the upper tabs of the slide and pulling it out of the ALP.

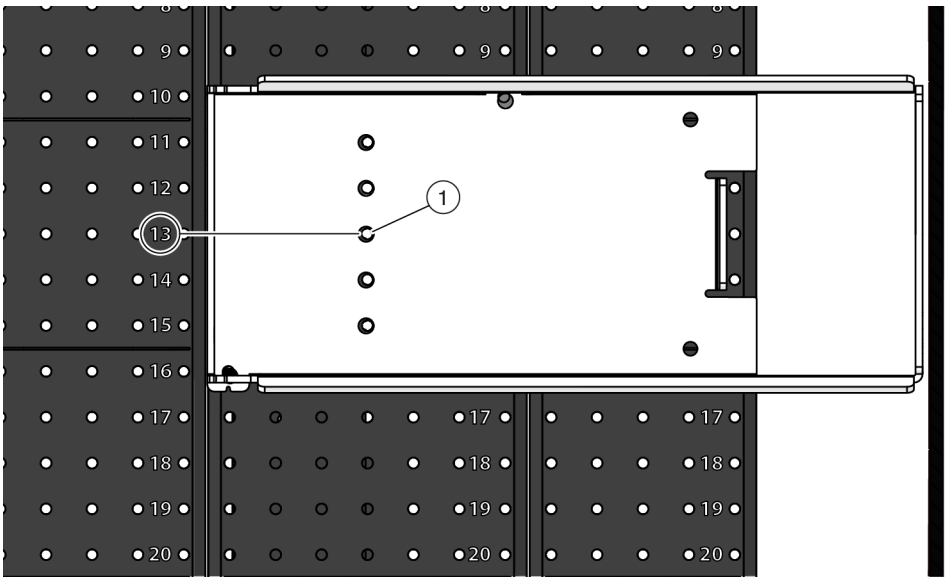
2 Place the ALP on the deck, aligning the pointing feature (Figure 4.1) to the exact coordinates (**Column**/**Row**) defined in the **Deck Editor**. Make sure that the mounting pins on the bottom of the ALP have slipped into the appropriate mounting holes on the deck, and then firmly press down on the ALP until it is fully seated into position.

3 A threaded screw is used to ensure a secure hold to the deck. The Trash ALP is equipped with five hole options for the screw, providing the flexibility to place the ALP in any location on the deck. The appropriate hole for the screw is determined by the row on the deck, as described below. Secure the mounting plate as follows:

a. Place the screw into the hole that corresponds with the deck row containing tapped holes:

- Tapped holes comprise every fifth row, starting at **Row 3**, and therefore, the screw should be placed in the hole located in **Row 8**, **13**, **18**, **23**, or **28**. The row that intersects with the mounting plate is the appropriate hole. Place the supplied M6 screw into that hole (Figure 4.4).

Figure 4.4 Appropriate Hole for Threaded Screw — Top View of Trash ALP



1. In this example, the threaded screw is placed in the hole located on **Row 13**.

b. Insert the tip of a #2 Phillips screwdriver into the slot on the head of the screw, making sure it is secured into position.

c. Tighten the screw by turning it clockwise until it can no longer move.

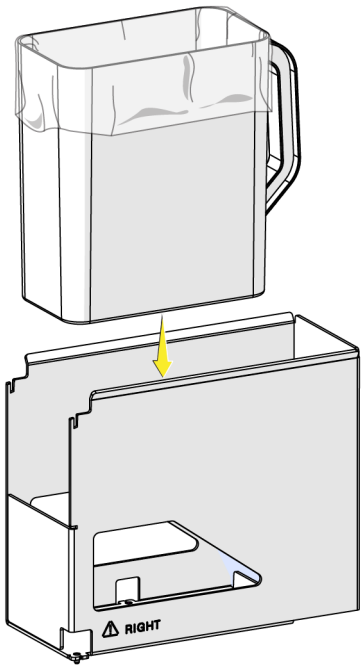
4 If necessary, place a disposal bag inside of the bin, folding the top over the outside of the bin and making sure that the bottom of the bag reaches the bottom of the bin.

⚠ WARNING

Risk of contamination. The disposal bags shipped with the ALP are not biohazard bags. Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

5 Slide the disposal bin straight down into the ALP. If a disposal bag was placed in the bin, make sure that the portion folded over the outside is positioned between the outside of the bin and the inside of the ALP. Make sure to properly orient the bin in the ALP, as demonstrated in Figure 4.5; the Right-Mounted Trash ALP is shown in this figure; make sure to reverse the orientation for the Left-Mounted Trash ALP.

Figure 4.5 Placing the Bin in the Right-Mounted Trash ALP



6 Smooth out the disposal bag to allow items to drop directly to the bottom.

NOTE For hazardous applications, appropriately marked autoclavable biohazard bags are recommended.

Removal

⚠ WARNING

Risk of contamination. ALPs might be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

To remove the Trash ALP *With Disposal Bin* from the deck:

1. Remove the disposal bin from the accessory.
2. Dispose of the bag and contents as specified by the safety officer.
3. Locate the screw designated to secure the ALP to the deck. This screw will be in one of the five holes aligned vertically on the bottom of the ALP.
4. Insert a screwdriver into divot on the top of the screw and turn counterclockwise until it is clear of the mounting plate.

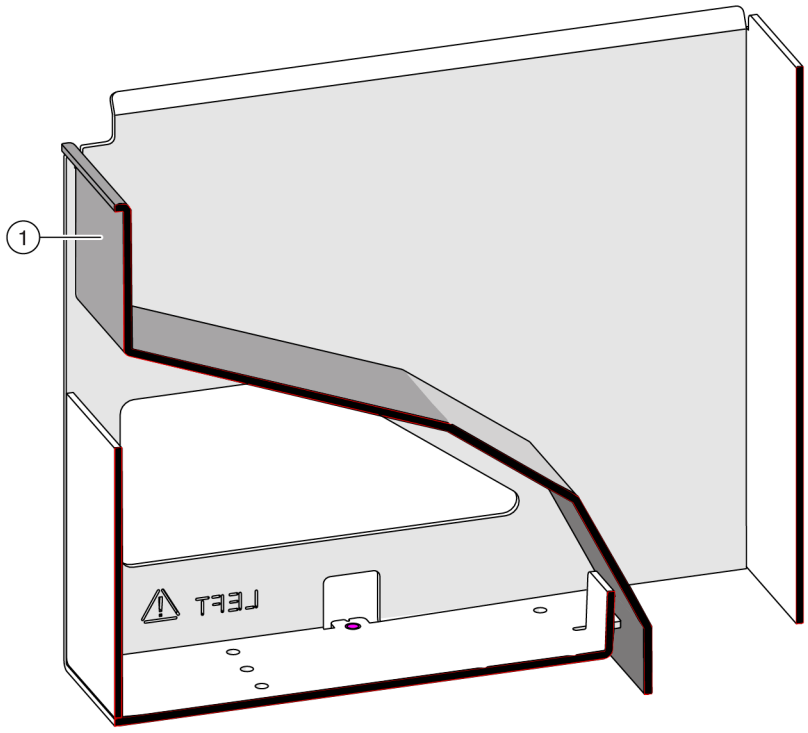
5 Lift the Trash ALP straight up from the deck until the mounting pins are clear of the mounting holes.

Trash ALP *With Slide*

The Trash ALP *With Slide* (Figure 4.6) is positioned on the deck on either the left or right side of the instrument. The slide, which is positioned inside of the ALP, leads to an opening that extends off the edge of the deck. A trash receptacle is placed on the floor under the opening at the end of the slide to catch the waste. Most types of used labware can be discarded into the Trash ALP *With Slide*, and all tips can be disposed of using this ALP. The Trash ALP *With Slide* allows discarding as many used items as the trash receptacle is capable of holding.

NOTE Used tips could 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.

Figure 4.6 Cross-Section of the Right-Mounted Trash ALP



1. **Slide**

Installation

Installing the Trash ALP *With Slide* includes choosing a deck position, adding the ALP to the Deck Editor, and installing the ALP onto the deck.

Choosing a Deck Position and Adding the ALP to the Deck Editor

⚠ CAUTION

Risk of equipment damage. The pod could collide into the Trash ALP if it is placed in the incorrect deck position. Mount the accessory within the region defined in the Deck Editor to avoid collisions.

To select a deck position for a Trash ALP:

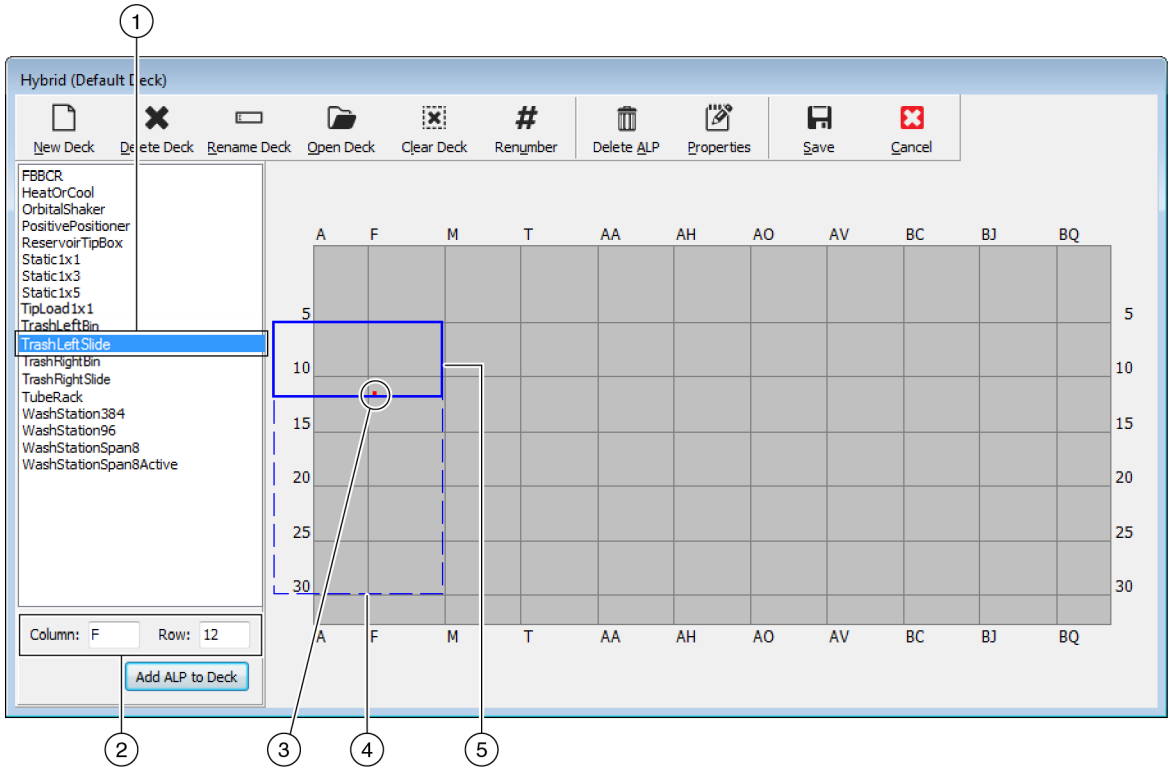
---

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the appropriate Trash ALP in the ALPs Type list. Trash ALPs are labeled as **TrashLeftSlide** and **TrashRightSlide** and are selected based on which edge of the deck you wish to place the ALP. The area capable of supporting the ALP is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP. In Figure 4.3, the **TrashLeftSlide** ALP was selected on a cleared Biomek i7 instrument deck.

Figure 4.7 Area Capable of Supporting the Trash ALP on a Biomek i7 Instrument



1. **Selected ALP**
2. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(2)**, which is indicated by the red dot.
4. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.
5. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin (Figure 4.1).

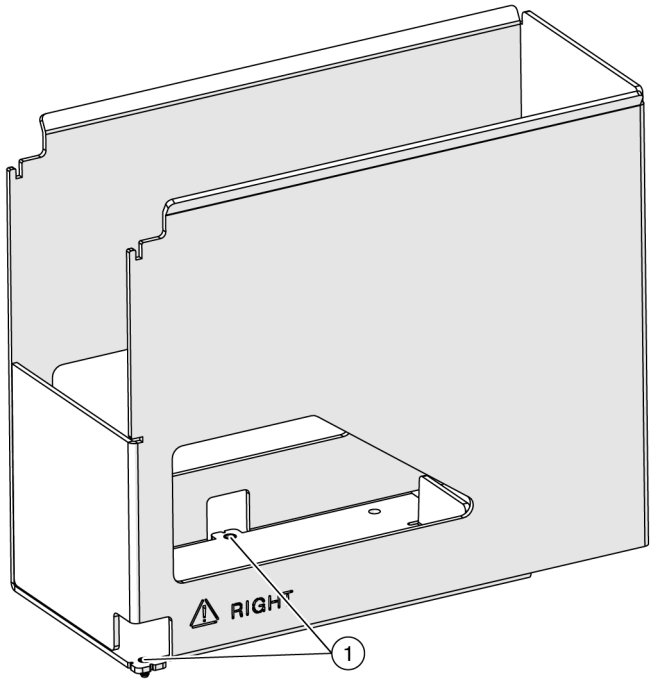
4 Enter the selected location in Biomek Software, using the **Deck Editor.** Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for complete instructions.

Mounting the Trash ALP *With Slide* onto the Deck

To mount a Trash ALP *With Slide*:

1 Place the ALP on the deck, aligning the pointing feature (Figure 4.1) to the exact coordinates (**Column**/**Row**) defined in the **Deck Editor.** Make sure that the mounting pins on the bottom of the ALP (Figure 4.8) have slipped into the appropriate mounting holes on the deck, and then firmly press down on the ALP until it is fully seated into position.

Figure 4.8 Mounting Pins on the Right-Mounted Trash ALP *With Slide*



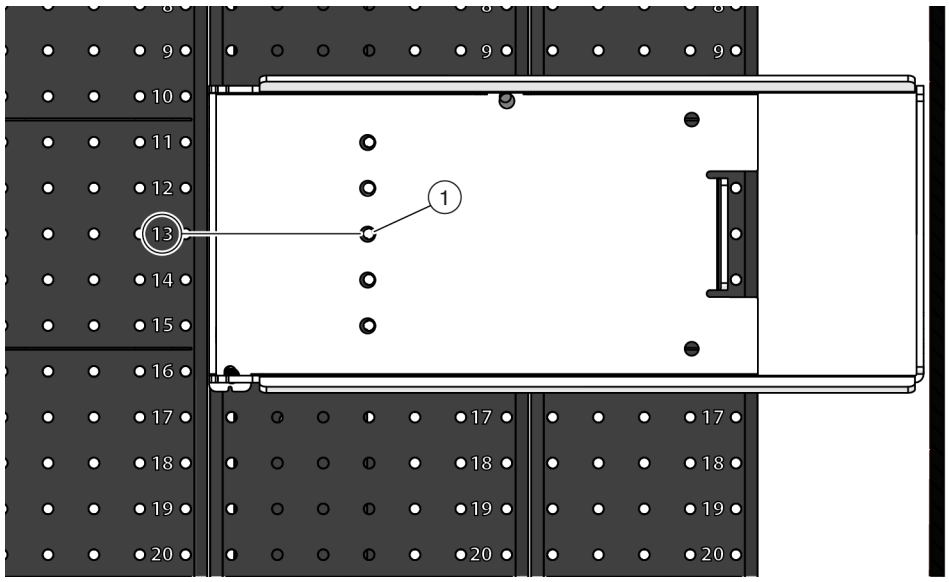
1. **Mounting Pins**

2 A threaded screw is used to ensure a secure hold to the deck. The Trash ALP is equipped with five hole options for the screw, providing the flexibility to place the ALP in any location on the deck. The appropriate hole for the screw is determined by the row on the deck, as described below. Secure the mounting plate follows:

a. Place the screw into the hole that corresponds with the deck row containing tapped holes:

- Tapped holes comprise every fifth row, starting at **Row 3**, and therefore, the screw should be placed in the hole located in **Row 8**, **13**, **18**, **23**, or **28**. The row that intersects with the mounting plate is the appropriate hole; place the supplied M6 screw into that hole (Figure 4.9).

Figure 4.9 Appropriate Hole for Threaded Screw — Top View of Trash ALP



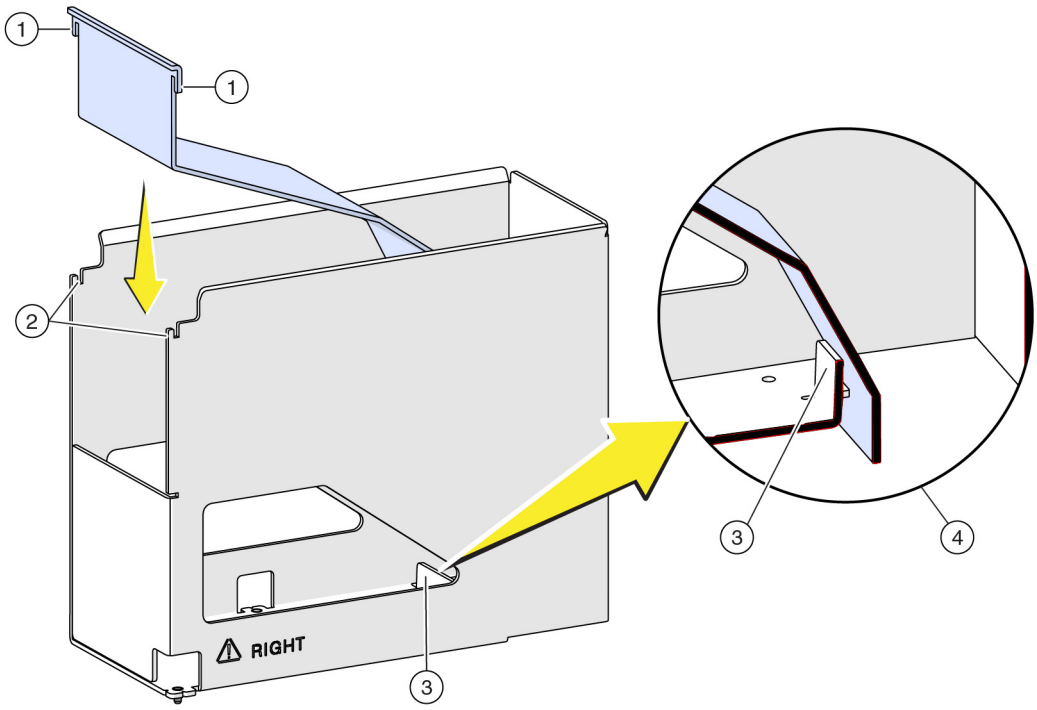
1. In this example, the threaded screw is placed in the hole located on **Row 13**.

b. Insert the tip of a #2 Phillips screwdriver into the slot on the head of the screw, making sure it is secured into position.

c. Tighten the screw by turning it clockwise until it can no longer move.

3 Attach the disposal slide to the Trash ALP by lowering the upper tabs into the grooves in the Trash ALP base (Figure 4.10).

Figure 4.10 Trash ALP Slide Attachment Being Updated



1. **Upper Tabs**
2. **Upper Tabs Rest Here**
3. **Lower Tab Portion of Slide Rests Here**
4. **Cross-section of the ALP when the slide is secured into position.**

4 Ensure that the slide is fully seated against the lower tabs (Figure 4.10) to provide the proper amount of space for tip boxes to pass through the opening.

5 Press down on the slide to secure it into position.

6 Place a trash receptacle at the end of the ALP opening to catch disposed items.

7 Look down through the ALP, 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.

Removal

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

To remove the Trash 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 slide from the ALP by lifting up on the tabs of the slide and pulling it out of the ALP.
4. Locate the screw designated to secure the ALP to the deck. This screw will be in one of the five holes aligned vertically on the bottom of the ALP.
5. Insert a screwdriver into divot on the top of the screw and turn counterclockwise until it is clear of the mounting plate.
6. Lift the Trash ALP straight up from the deck until the mounting pins are clear of the mounting holes.

Framing Instructions

No special framing is necessary for the Trash ALP. Framing the accessory occurred when the deck was framed with the **Shift Deck** command. However, as it is necessary to physically remove the Trash ALP prior to framing neighboring positions with the multichannel pod, it may be preferable to delay placement of the Trash ALP until surrounding positions have been framed. For more information, refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

Preventive Maintenance

⚠ WARNING

Risk of contamination. ALPs might be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Trash ALP with a soft cloth.

Storage

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

NOTE It is desirable to allow the Trash ALP to air-dry before returning it to the original packing materials.

CHAPTER 5

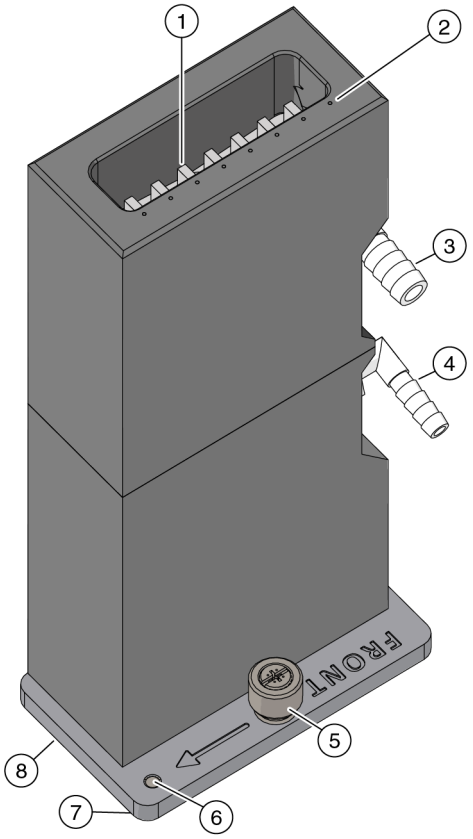
Span-8 Active Wash ALP

Overview

The Span-8 Active Wash ALP (Figure 5.1) 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 Span-8 Active Wash ALP from a source reservoir to a waste reservoir.

Information in this chapter includes the following:

Figure 5.1 Span-8 Active Wash ALP



1. **Reservoir**
2. **Framing Points** (8 total)
3. **Waste Port**
4. **Source Port**
5. **Captive Screw**
6. **Pointing Feature**
7. **Mounting Pin** (back, left not shown)
8. **ALP Front**: When mounted correctly, the side of the ALP that is closest to the front of the instrument is indicated by the directional arrow labeled **FRONT** located on the right side of the ALP.

Mounting the Span-8 Active Wash ALP

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

- *Choosing a Deck Position and Adding the ALP to the Deck Editor*
- *Installing the Span-8 Active Wash ALP on the Deck*
- *Routing Tubing for the Span-8 Active Wash ALP*
- *Adding a Wash Pump in Hardware Setup*
- *Configuring the Span-8 Active Wash ALP in the Deck Editor*

Choosing a Deck Position and Adding the ALP to the Deck Editor

To select a deck position for Span-8 Active Wash ALP:

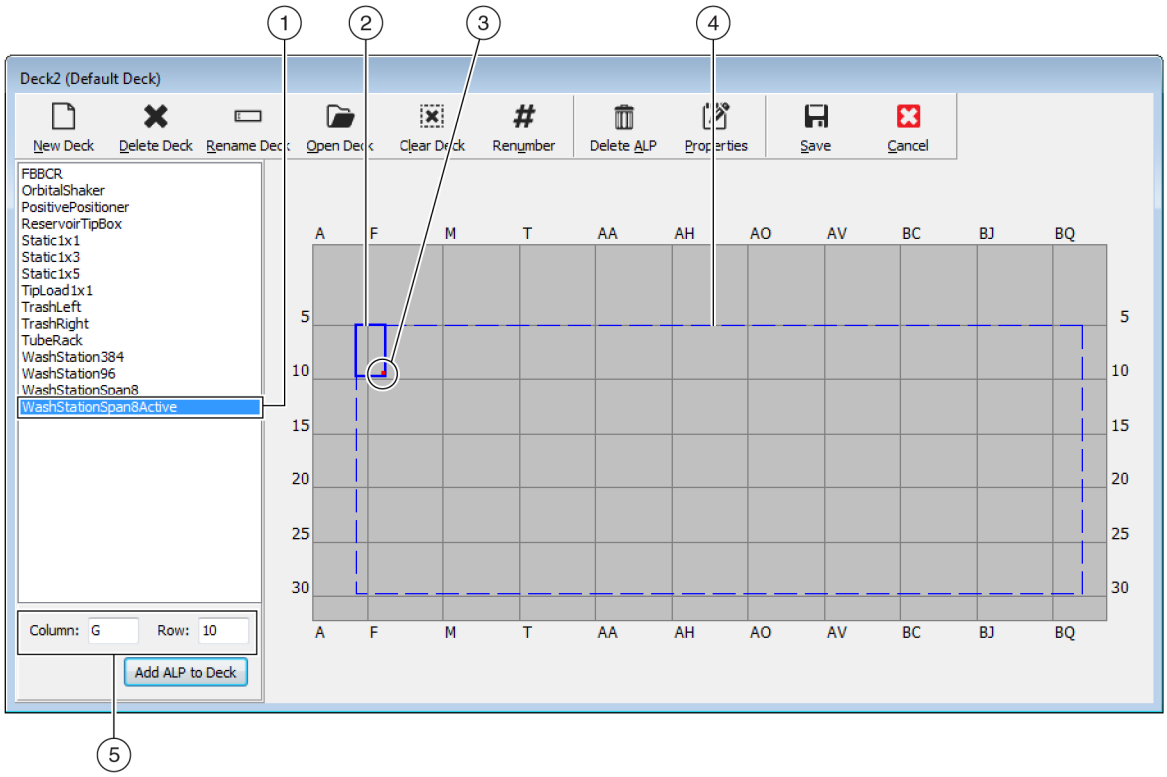
1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the **WashStationSpan8Active** in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines. In Figure 5.2, the Span-8 Active Wash ALP was selected on a cleared Biomek i7 instrument deck. When choosing a position, keep the following in mind:

- When the dual-pod Biomek i7 instrument has one Multichannel pod and one Span-8 pod, the Span-8 Active Wash ALP must be installed so the ALP is accessible to the Span-8 pod without interfering with the other pod.
- If different types of waste materials must be disposed of separately, additional Span-8 Active Wash ALPs can be installed on the deck.
- Placing the Span-8 Active Wash ALP in front of the Trash ALP makes routing the tubing very difficult. If possible, place the Span-8 Active Wash ALP behind the Trash ALP.
- Make sure to choose a position within the blue outlined area that does not currently contain an ALP.

Figure 5.2 Area Capable of Supporting the Span-8 Active Wash ALP on a Biomek i7 Instrument



1. **Selected ALP**
2. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(5)**, which is indicated by the red dot.
4. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.
5. **Column** and **Row** fields: The location of the pointing feature when the ALP is physically installed on the deck.

---

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 5.1.

IMPORTANT The Span-8 Active Wash ALP must be mounted with the pointing feature on rows **10**, **15**, **20**, **25** or **30** only. These locations ensure each captive screw on the base of the ALP is located directly over a tapped hole, which provides ample space to allow for a secure hold for the tightened screw.

---

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Installing the Span-8 Active Wash ALP on the Deck

To mount a Span-8 Active Wash ALP to the deck:

1 Place the ALP on the deck, aligning the pointing feature (Figure 5.1) to the exact coordinates (**Column**/**Row**) defined in the **Deck Editor**. The ALP must be oriented so that the directional arrow labeled **FRONT** is pointing to the side closest to the front of the instrument (Figure 5.1), and the Source and Waste ports are on the side facing the back of the instrument (refer to *Routing Tubing for the Span-8 Active Wash ALP*).Make sure that the mounting pins on the bottom of the ALP have slipped into the appropriate mounting holes on the deck.

NOTE The space allocated to the ALP in the **Deck Editor** includes clearance behind the ALP to route tubing.

2 Firmly press down on the ALP to secure the ALP into position.

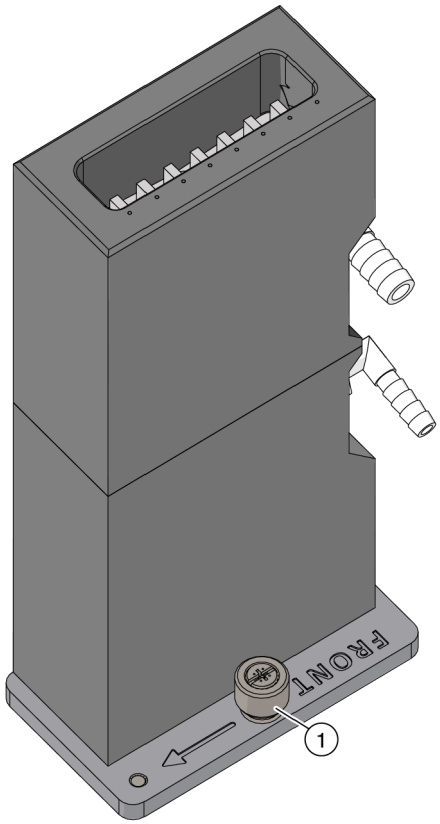
3 Tighten the captive screw to secure the ALP to the deck by completing the following step(s):

- **By Hand**: Hand tighten the captive screw (Figure 5.3) by turning the head clockwise until it can no longer be turned.

  OR

- **With a Screwdriver**:
  - Insert the tip of the supplied #2 Phillips head screwdriver into the slot on the head of the captive screw (Figure 5.3), making sure it is secured into position.
  - Tighten the screw by turning it clockwise until it can no longer be turned.

Figure 5.3 Captive Screw Location



1. **Captive Screw**

Routing Tubing for the Span-8 Active Wash ALP

⚠ WARNING

Risk of contamination. Kinked or obstructed tubing can cause leaks, overflow, and contamination from hazardous substances. Always use the appropriate Personal Protective Equipment (PPE) and thoroughly inspect all hoses before proceeding with using biological or chemical agents. Clean up any leaks immediately according to the procedures defined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

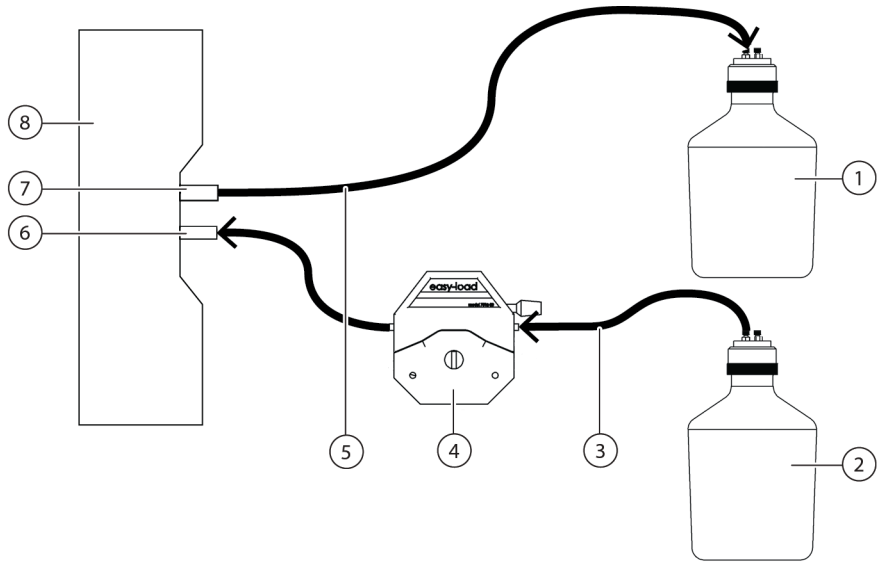
Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury or contamination. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials. If the end of the tubing going into the waste container is located near the bottom, excessive pressure can cause liquid to overflow onto the deck. Make sure the end of the tubing is no more than 15 cm (6 in.) from the top of the container.

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 Span-8 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 5.4 Tube Routing for Span-8 Active Wash ALP



1. **Waste Container**
2. **Source Container**
3. **Source Tubing**
4. **Pump Head**
5. **Waste Tubing**
6. **Source Port**
7. **Waste Port**
8. **Span-8 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 Span-8 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 the *Automated Labware Positioners (ALPs) Instructions for Use*, PN 987836).

---

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 the side shields and deck.

NOTE Care should be taken to route the tubing around the on-deck ALPs and devices.

NOTE Make sure the tube routing does not interfere with the operation of the 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 5.1).

12 Run the opposite end of the drainage tube to the waste container by passing the tube through the side shields and deck.

NOTE Make sure the tube routing does not interfere with the operation of the 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 Wash Pump in Hardware Setup

The Span-8 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 the **Utilities** tab, in the **Instrument** group, select 

(**Hardware Setup**). **Hardware Setup** appears.

---

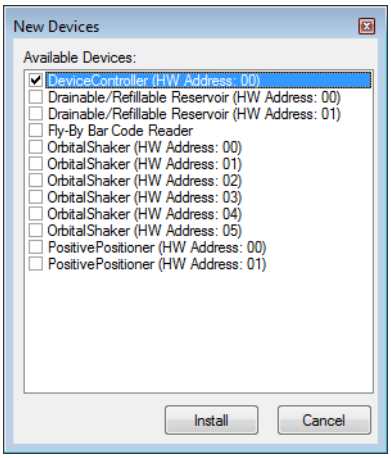
2 In **Hardware Setup**, right click **Digital Devices** or any device under **Digital Devices** and choose **Add Device**, then select **DeviceController**.

OR

Form the **Hardware Setup** toolbar, select **Add Device**. **New Devices** appears (Figure 5.6). Select **DeviceController** and choose **Install**.

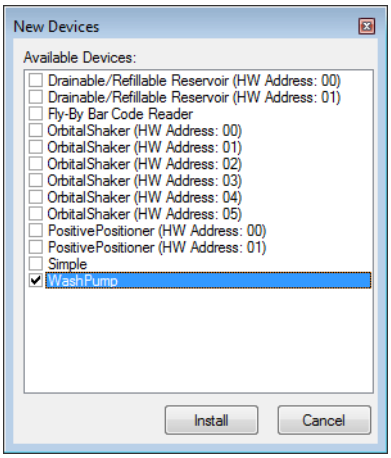
The **Device Controller** is added to the installed digital devices under **Digital Devices** in the left pane.

Figure 5.5 New Devices Displaying All Detected Devices



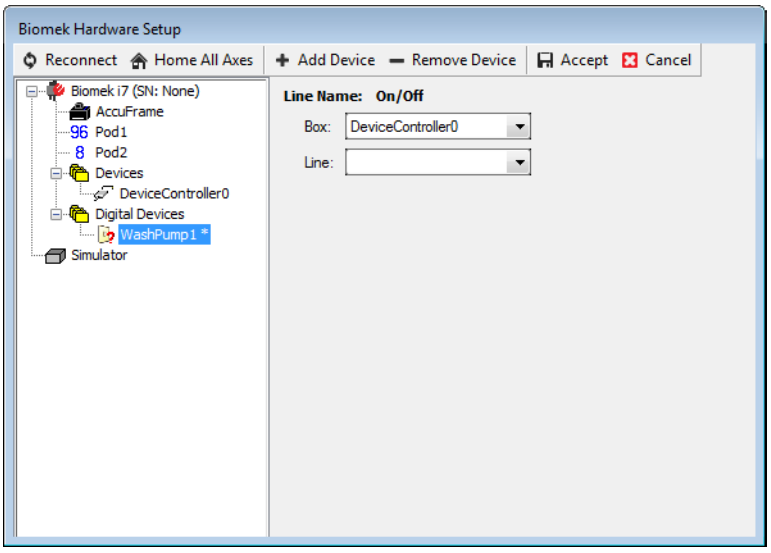
3 From the **Hardware Setup** toolbar, select **Add Device**. **New Devices** appears (Figure 5.6). Select **WashPump** and choose **Install**. The **WashPump** is added to the installed digital devices under **Digital Devices** in the left pane.

Figure 5.6 New Devices Displaying All Detected Devices



4 Select the **WashPump** under **Digital Devices** to configure it. The configuration screen for the **WashPump** appears to the right in **Hardware Setup** (Figure 5.7).

Figure 5.7 WashPump Configuration in Hardware Setup



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

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

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

Configuring the Span-8 Active Wash ALP in the Deck Editor

After adding and configuring the **WashPump** in **Hardware Setup**, the **WashPump** must be associated as a device with the position.

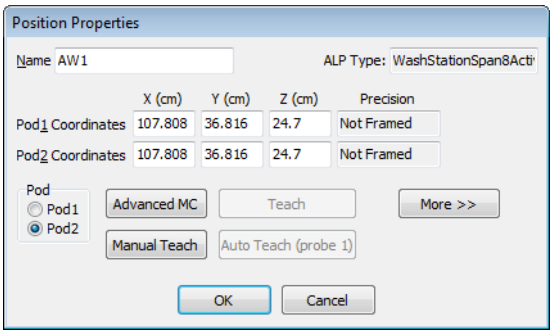
To add and configure the Span-8 Active Wash ALP in the **Deck Editor**:

1 From the **Utilities** tab, in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** appears.

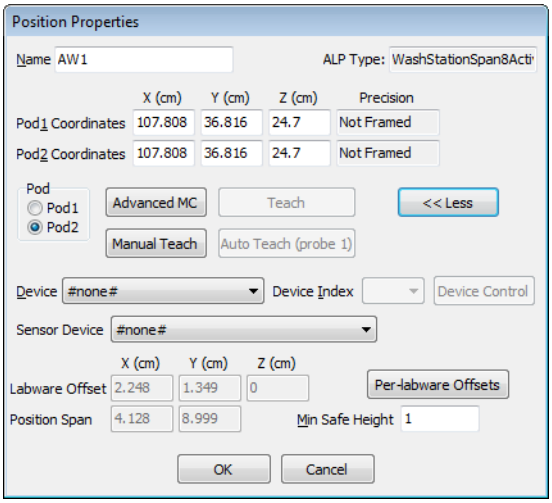
2 Double click on the **WashStationSpan8Active** ALP to open **Position Properties** (Figure 5.8).

Figure 5.8 Position Properties for Span-8 Active Wash ALP



3 Choose **More** to display additional configuration options for the ALP (Figure 5.9).

Figure 5.9 Expanded Position Properties for the Span-8 Active Wash ALP



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

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

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

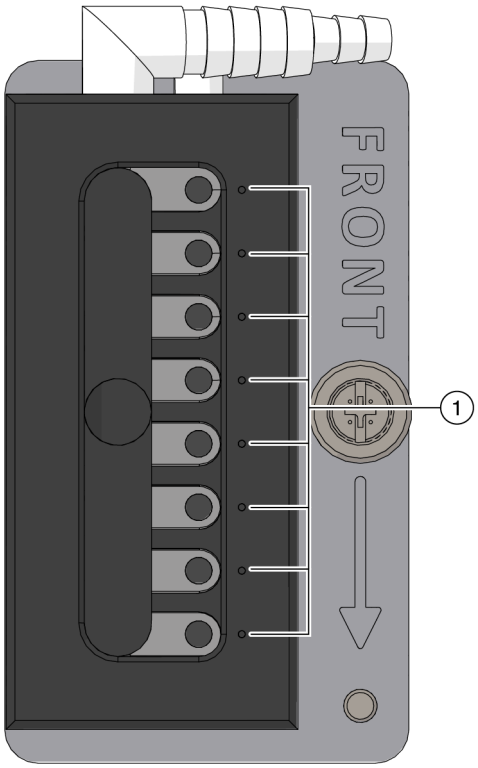
Framing Instructions

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

- loading disposable tips to the probes, if necessary.
- aligning disposable or fixed tips with the framing targets on the Span-8 Active Wash ALP (Figure 5.10).

Figure 5.10 Framing Targets on Span-8 Active Wash ALP (Top View)



1. **Framing Targets**: Align the tips to these small white dots on the ALP.

To frame the Span-8 Active Wash ALP using the **Biomek Manual Framing Wizard:**

NOTE If the Span-8 Active Wash ALP has not already been added to the Biomek Software deck, complete the instructions in Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) prior to completing this procedure.

---

1 From the **Utilities** tab, in the **Instrument** group, select 

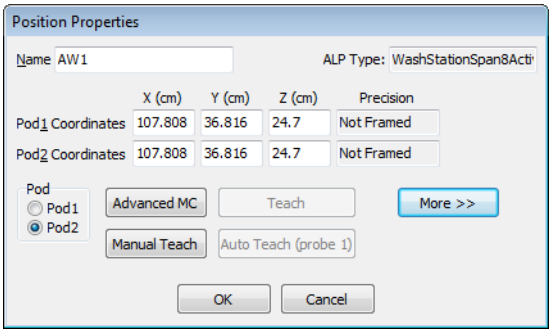
(**Deck Editor**). The **Deck Editor** appears.

---

2 Open **Position Properties** for the Span-8 Active Wash ALP by double clicking in the area outlined in the center of the Span-8 Active Wash ALP. **Position Properties** appears (Figure 5.11).

NOTE **Position Properties** is used to manually frame the Span-8 Active Wash ALP. To open **Position Properties**, double click in the area outlined in the center of the Span-8 Active Wash ALP. A pink outline appears around the **AW** in the center of the ALP when **Position Properties** are being configured. (When configuring **ALP Properties**, a yellow outline appears around the **AW**, a pink outline appears around the entire ALP position, and **ALP Properties** appears.)

Figure 5.11 Position Properties for the Span-8 Active Wash ALP



---

3 In **Name**, verify that the Span-8 Active Wash ALP is assigned a unique name.

NOTE The software automatically assigns a name beginning with an **AW** and followed by a number; for example, **AW1** and **AW2**.

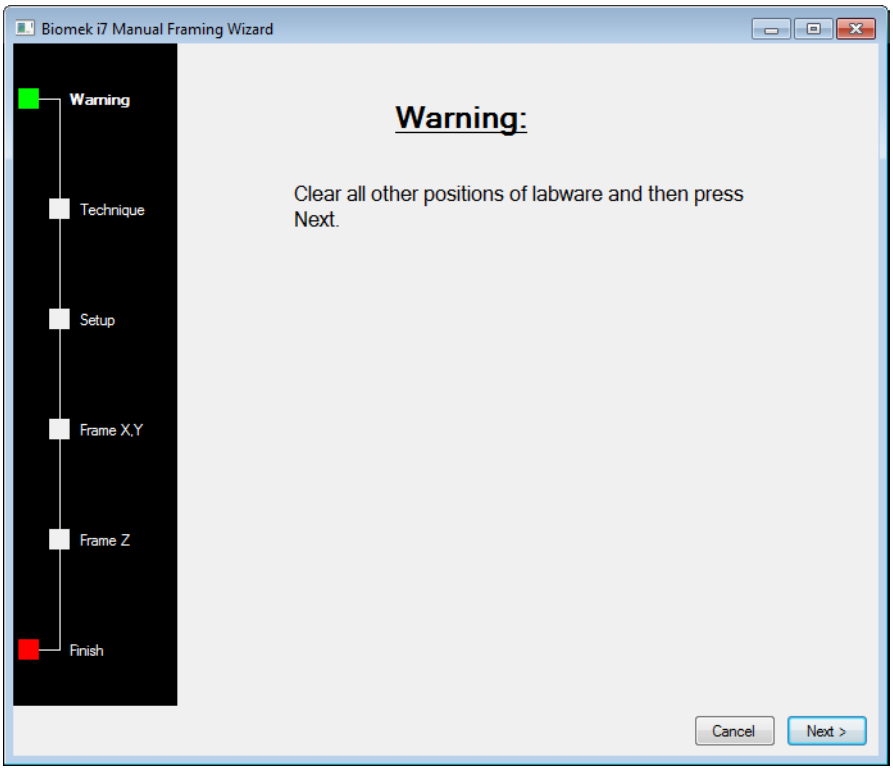
---

4 In **Pod**, select the Span-8 pod used to frame the Span-8 Active Wash ALP.

5 Choose **Manual Teach**. The **Biomek Manual Framing Wizard** opens with a Warning (Figure 5.12).

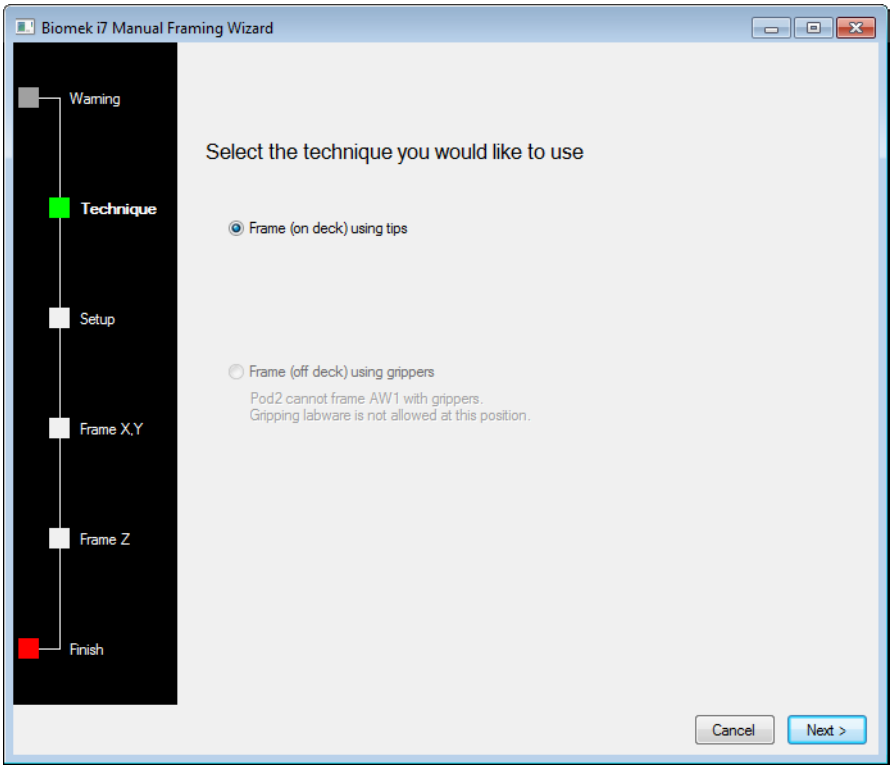
NOTE On the left side of **Biomek Manual Framing Wizard**, a list of steps required to complete the framing process are displayed. As the steps of **Manual Framing** are accessed, they are highlighted on the left.

Figure 5.12 Manual Framing (Warning) For Biomek i7 Instrument



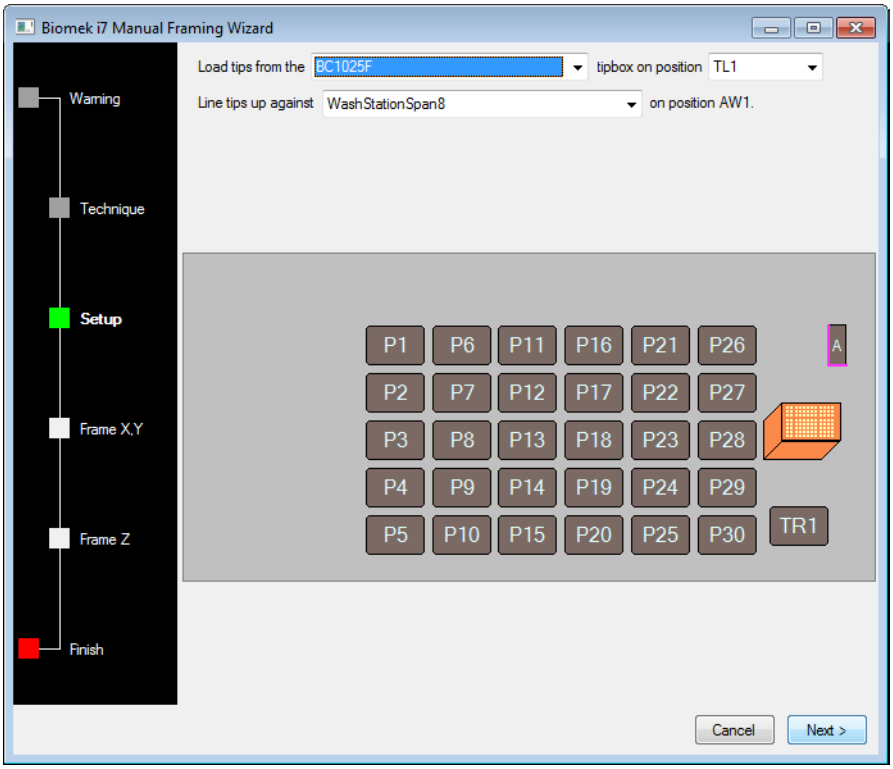
6 Choose **Next.** The **Biomek Manual Framing Wizard - Technique** appears (Figure 5.13).

Figure 5.13 Manual Framing (Technique) For Biomek i7 Instrument



7 Choose **Next.** The **Biomek Manual Framing Wizard - Setup** appears (Figure 5.14)

Figure 5.14 Manual Framing (Setup) of Biomek i7 Instrument

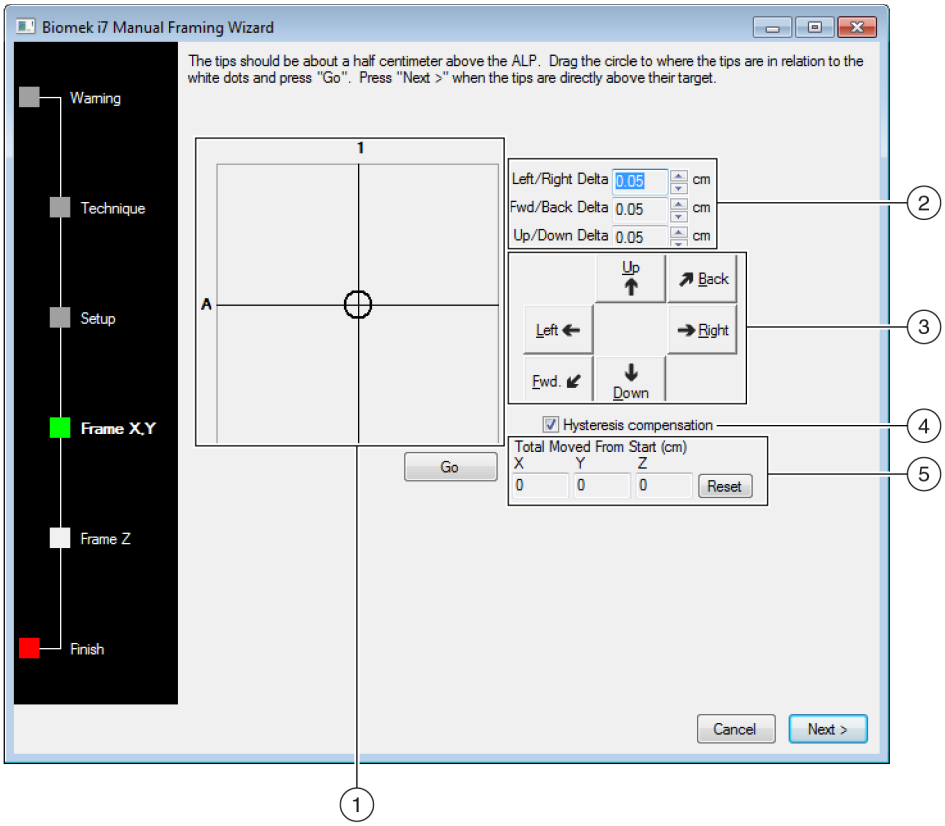


8 If disposable tip mandrels are installed, in **Load tips from the**, verify that the appropriate tips are selected.

9 In **tipbox on position**, select the deck position containing the tipbox by selecting that position in the **Current Deck Display**.

10 Choose **Next.** The **Biomek Manual Framing Wizard - Frame X,Y** appears (Figure 5.15).

Figure 5.15 Manual Framing (Frame X,Y) of Biomek i7 Instrument



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. **Directional Buttons**: The directional buttons move the pod by the amount shown in **Delta** with each press of a button
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 instrument determines a pods position in the X-axis based on the position of the bridge at the back of the instrument.
5. **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)**.

11 To align the tips in the X- and Y-axes with the white framing points on top of the Span-8 Active Wash ALP (Figure 5.1), lower the tips in the Z-axis until they are approximately 1 cm above the top of the Span-8 Active Wash ALP.

NOTE Tip height of the pod is set in the next step in the Manual Framing process; therefore, move the pod to any height while manipulating tip alignment with the white framing points.

12 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 Active Wash ALP

13 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 5.15).

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**).

14 Select the **directional button** representing the motion required to physically move the tip into position over the white framing points on the Span-8 Active Wash ALP (Figure 5.15).

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 Active 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.

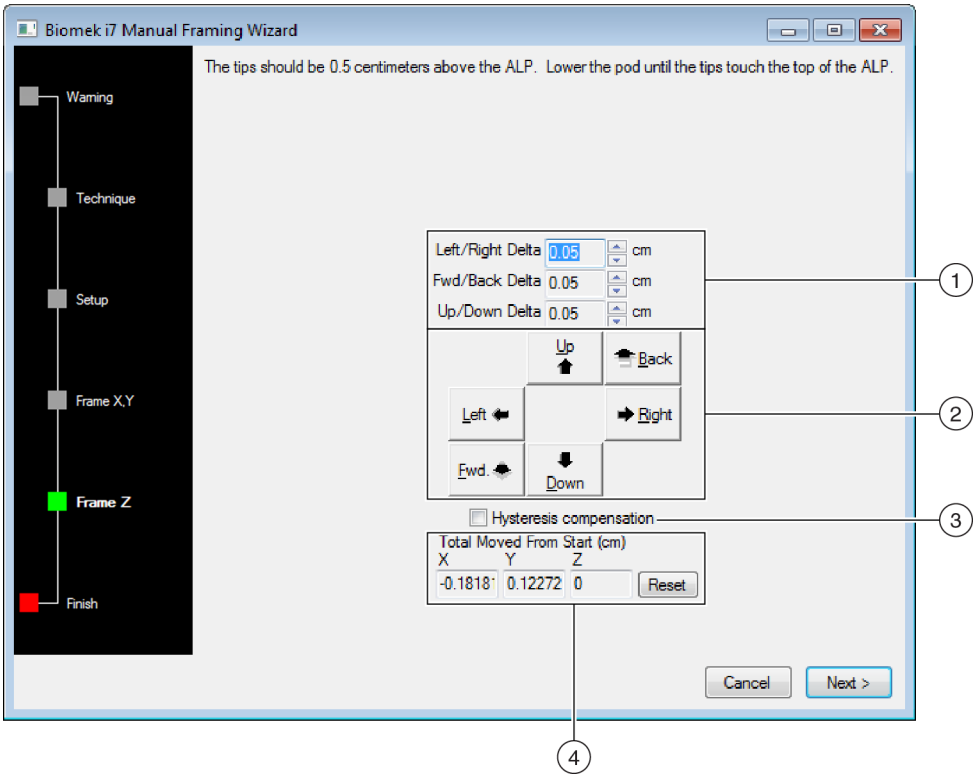
15 Select **Go.** The Span-8 pod moves in accordance to the **Delta** value and the position of the small circle in relation to the large circle.

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**.

16 Visually verify the position of the tips on the instrument in relation to the white framing points on the top of the Span-8 Active Wash ALP. If the tips are still not physically positioned above the white framing points, repeat steps 12 through 15 until they are positioned above the white framing points.

17 Choose **Next.** The **Biomek Manual Framing Wizard - Frame Z** appears (Figure 5.16).

Figure 5.16 Manual Framing (Frame Z) of Biomek i7 Instrument



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.

18 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 5.16).

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**).

19 Select the directional button representing the motion required to physically move the tip into position over the white framing points on the Span-8 Active Wash ALP.

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

20 Select **Finish**. The Span-8 pod moves in accordance to the **Delta** value, **Manual Framing** closes, and **Position Properties** (Figure 5.11) appears.

21 Choose **OK** to close **Position Properties**.

22 Choose **Save** to close the **Deck Editor**. The Span-8 Active Wash ALP is framed.

Using a Span-8 Active Wash ALP in a Method

The Span-8 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 Span-8 Active Wash ALPs on an Instrument

The Span-8 Active Wash ALPs are referred to as wash stations 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:

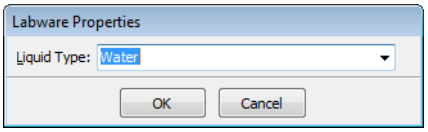
1 In the **Liquid Type Editor**, create a new liquid type or copy an existing liquid type for the wash ALP; for example, create a new liquid type called **AW1_Liquid**.

NOTE Each liquid type must have a unique name; for example, **AW1_Liquid** or **AW2_Liquid**.

NOTE For more information on creating new liquid types and copying liquid types, refer to the *Biomek Software Reference Manual* (PN B56358).

2 In the **Instrument Setup** step, double click the desired wash ALP. **Labware Properties** for the wash ALP appears (Figure 5.17).

Figure 5.17 Labware Properties for a Wash Station ALP



3 In **Liquid Type:**, select the unique liquid type created for that wash ALP; for example, **AW1_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.

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 Span-8 Active Wash ALP

⚠ WARNING

Risk of personal injury or contamination. When draining fluid, always wear the appropriate Personal Protective Equipment (PPE) to avoid contact with any biological or chemical agents that have been used with the Biomek i-Series Automated Workstation.

⚠ WARNING

Risk of personal injury or contamination. The waste fluid might be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety office. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

To remove the Span-8 Active Wash ALP:

1. Turn the waste and source ports on the Span-8 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 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 Remove the captive screw by completing one of the following:

- ***By hand***: Using your fingers, turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

  OR

- ***With a Screwdriver***: Turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

11 Lift the ALP straight up from the deck until the mounting pins are clear of the mounting holes.

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 Span-8 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.

Preventive Maintenance

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

- Periodically clean the Span-8 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.

Storage

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

NOTE Allow the Span-8 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.

Troubleshooting

Contact us before attempting to repair the Span-8 Active Wash ALP.

Table 5.1 Troubleshooting the Span-8 Active Wash ALP

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

CHAPTER 6

Span-8 Wash Station ALP

Overview

The Span-8 Wash Station ALP is a passive ALP. The eight cleaning wells of the Span-8 Wash Station ALP (Figure 6.1) 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 Wash Station ALP is used to dispose of system fluid used when priming the system and purging the tubing and syringes of air.

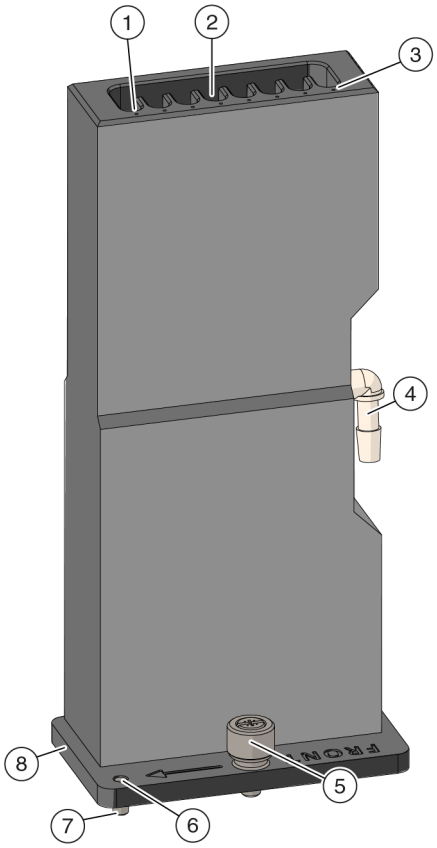
The Span-8 Wash Station ALP uses a flow of system fluid from the off-deck supply container as the wash fluid. Used wash fluid drains from the ALP via a tube connected to the waste port and terminating in an off-deck waste container via a gravity-fed drainage tube.

The sections in this chapter include:

- *Installing the Span-8 Wash Station ALP*
- *Framing Instructions*
- *Removing the Span-8 Wash Station ALP*
- *Storage*
- *Preventive Maintenance*
- *Troubleshooting*

NOTE Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474) for more information on the Speed Pump and the off-deck waste container.

Figure 6.1 Span-8 Wash Station ALP



1. **Cleaning Wells** (8 total)
2. **Reservoir**
3. **Framing Points** (8 total)
4. **Waste Port**
5. **Captive Screw**
6. **Pointing Feature**
7. **Mounting Pin** (back, left not shown)
8. **ALP Front**: When mounted correctly, the side of the ALP that is closest to the front of the instrument is indicated by the directional arrow labeled **FRONT** located on the right side of the ALP.

Installing the Span-8 Wash Station ALP

Installing a Span-8 Wash Station ALP includes choosing the deck position and mounting the ALP to the deck.

Choosing a Deck Position and Adding the ALP to the Deck Editor

The Span-8 Wash Station ALP must be oriented so that the side labeled **FRONT** is on the side closest to the front of the instrument, and the tubing connectors are on the side facing the back of the instrument.

When the dual-pod Biomek i7 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.

NOTE The Span-8 Wash Station 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 Wash Station ALPs may be installed on the deck.

To select a deck position for Span-8 Wash Station ALP and add it to the **Deck Editor**:

---

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

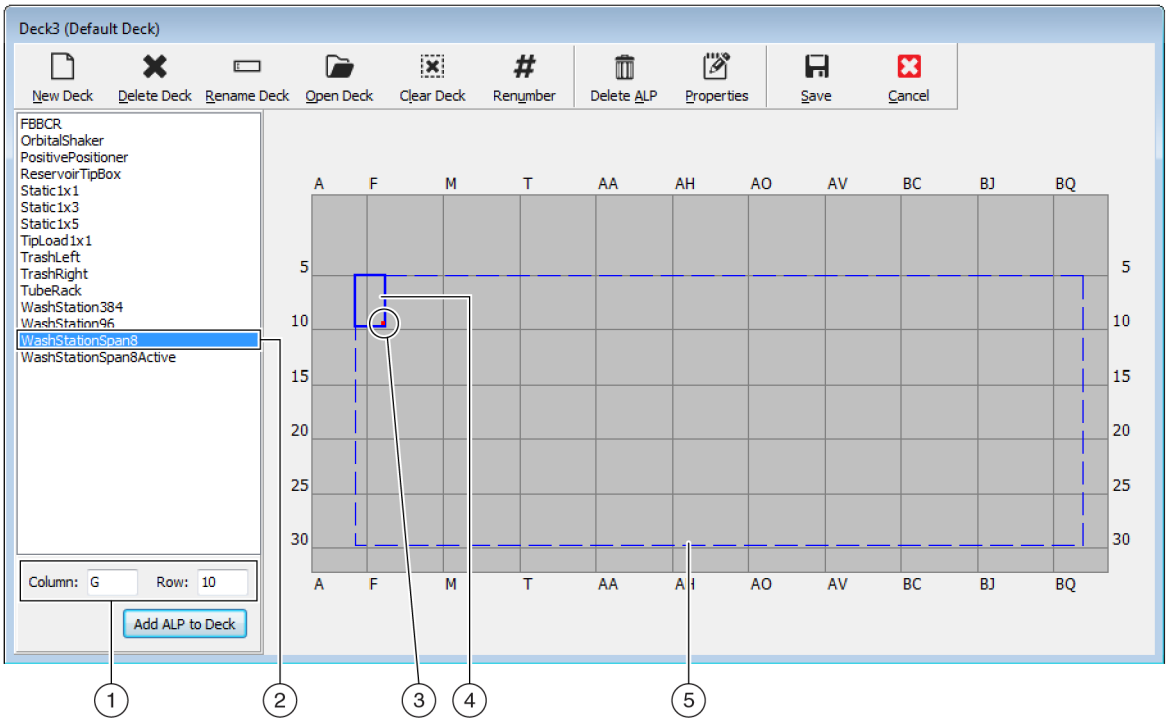
(**Deck Editor**). The **Deck Editor** opens.

---

2 Select the **WashStationSpan8** in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines. In Figure 6.2, the Span-8 Wash Station ALP was selected on a cleared Biomek i7 instrument deck. When choosing a position, keep the following in mind:

- When the dual-pod Biomek i7 instrument has one Multichannel pod and one Span-8 pod, the Span-8 Wash Station ALP must be installed so the ALP is accessible to the Span-8 pod without interfering with the other pod.
- Placing the Span-8 Wash Station ALP in front of the Trash ALP makes routing the tubing very difficult. If possible, place the Span-8 Wash Station ALP behind the Trash ALP.
- If different types of waste materials must be disposed of separately, two Span-8 Wash Station ALPs can be installed on the deck.
- Make sure to choose a position within the blue outlined area that does not currently contain an ALP.

Figure 6.2 Area Capable of Supporting the 8-Channel Wash ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost mounting pin) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

---

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost mounting pin, as shown in Figure 6.1.

IMPORTANT The Span-8 Passive Wash ALP must be mounted with the pointing feature on rows **10**, **15**, **20**, **25** or **30** only. These locations ensure each captive screw on the base of the ALP is located directly over a tapped hole, which provides ample space to allow for a secure hold for the tightened screw.

---

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting the Span-8 Wash Station ALP to the Deck

⚠ WARNING

Risk of contamination. Kinked or obstructed tubing can cause leaks, overflow, and contamination from hazardous substances. Always use the appropriate Personal Protective Equipment (PPE) and thoroughly inspect all hoses before proceeding with using biological or chemical agents. Clean up any leaks immediately according to the procedures defined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

To install the Span-8 Wash Station ALP:

1 Place the ALP on the deck, aligning the pointing feature (Figure 6.1) to the exact coordinates (**Column**/**Row**) defined in the **Deck Editor**. The ALP must be oriented so that the directional arrow labeled **FRONT** is pointing to the side closest to the front of the instrument (Figure 6.1), and the Waste port is on the side facing the back of the instrument. Make sure that the mounting pins on the bottom of the ALP have slipped into the appropriate mounting holes on the deck.

NOTE The space allocated to the ALP in the **Deck Editor** includes clearance behind the ALP to route tubing.

2 Firmly press down on the ALP to secure the ALP into position..

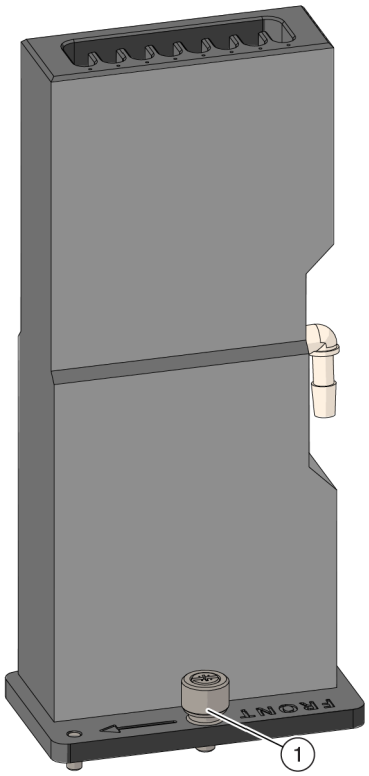
3 Tighten the captive screw to secure the ALP to the deck by completing the following step(s):

- **By Hand**: Hand tighten the captive screw (Figure 6.3) by turning the head clockwise until it can no longer be turned.

  OR

- **With a Screwdriver**:
  - Insert the tip of the supplied #2 Phillips head screwdriver into the slot on the head of the captive screw (Figure 6.3), making sure it is secured into position.
  - Tighten the screw by turning it clockwise until it can no longer be turned.

Figure 6.3 Captive Screw Location



1. Captive Screw

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

5 Attach the drainage tube to the waste port on the Span-8 Wash Station ALP (Figure 6.1).

6 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 Care should be taken to route the tubing around the on-deck ALPs and devices.

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

7 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 Wash Station ALP to the waste container.

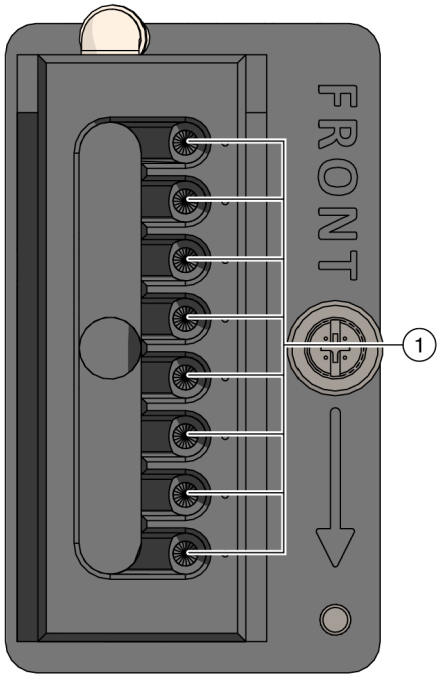
NOTE Since the Span-8 Wash Station ALP is gravity-fed, it is crucial that the drainage tube run down-hill without any rises between the ALP and the waste container.

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

Framing Instructions

Special framing instructions using the **Biomek Manual Framing Wizard** are necessary for the Span-8 Wash Station 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. The **Biomek Manual Framing Wizard** is accessed through **Position Properties** in the **Deck Editor.** This process involves aligning fixed tips with the framing targets on the Span-8 Wash Station ALP (Figure 6.4).

Figure 6.4 Framing Targets on Span-8 Wash Station ALP (Top View)



1. **Framing Targets**: Align the tips to these small white dots on the ALP.

To frame the Span-8 Wash Station ALP:

---

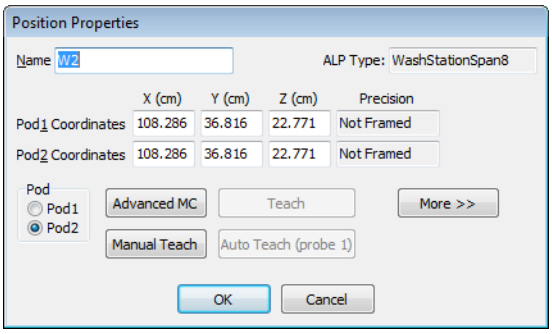
1 From the **Utilities** tab, in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** appears.

2 Open **Position Properties** for the Span-8 Wash Station ALP by double clicking in the area outlined in the center of the Span-8 Wash Station ALP. **Position Properties** appear (Figure 6.5).

NOTE Two different sets of properties can appear when double-clicking on the Span-8 Wash Station ALP: **Position Properties** and **ALP Properties**. **Position Properties** is used to manually frame the Span-8 Wash Station ALP. To open **Position Properties**, double-click in the area outlined in the center of the Span-8 Wash Station 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 6.5 Position Properties for the Span-8 Wash Station ALP



3 In **Name**, verify that the Span-8 Wash Station ALP is assigned a unique name.

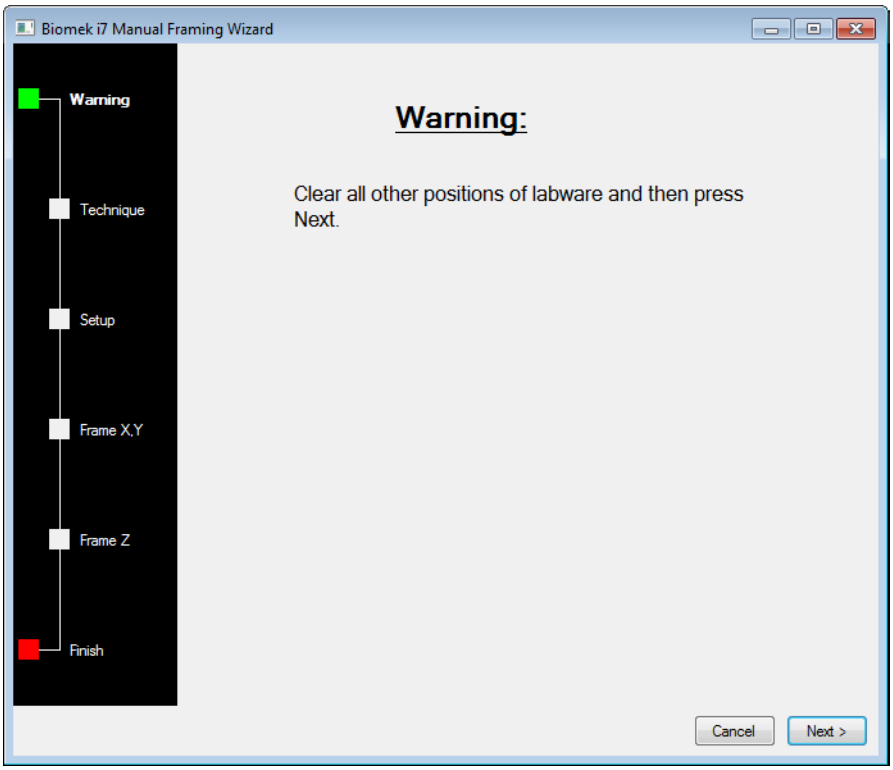
NOTE The software automatically assigns a name beginning with a 'W' and followed by a number; for example, 'W1' and 'W2'.

4 In **Pod**, select the Span-8 pod used to frame the Span-8 Wash Station ALP.

5 Choose **Manual Teach**. The **Biomek Manual Framing Wizard** opens with a Warning (Figure 6.6).

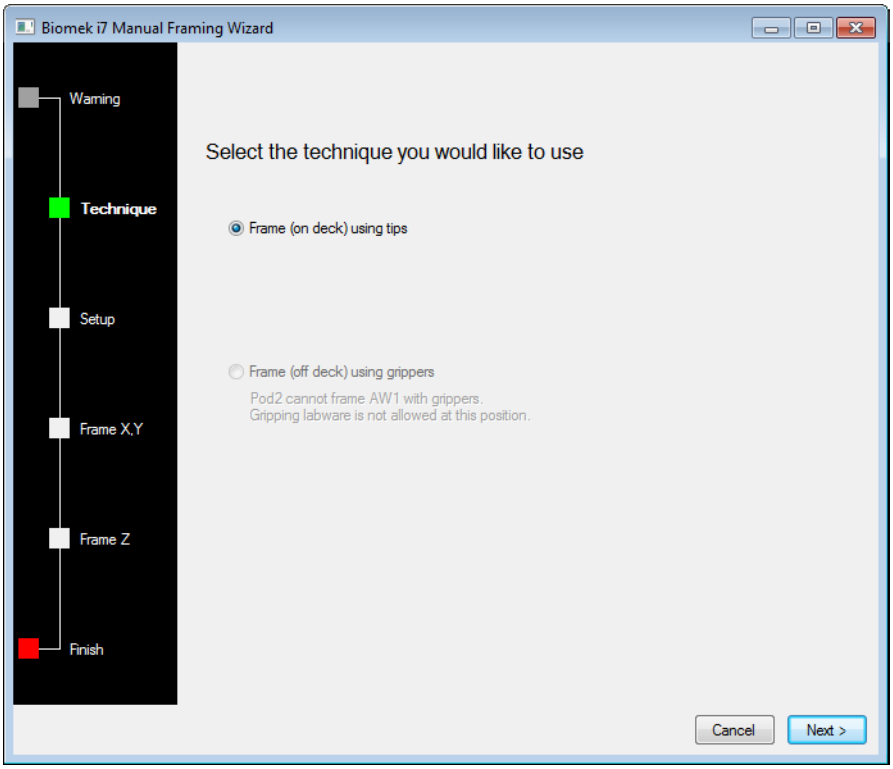
NOTE On the left side of **Biomek Manual Framing Wizard**, a list of steps required to complete the framing process are displayed. As the steps of **Manual Framing** are accessed, they are highlighted on the left.

Figure 6.6 Manual Framing (Warning) For Biomek i7 Instrument



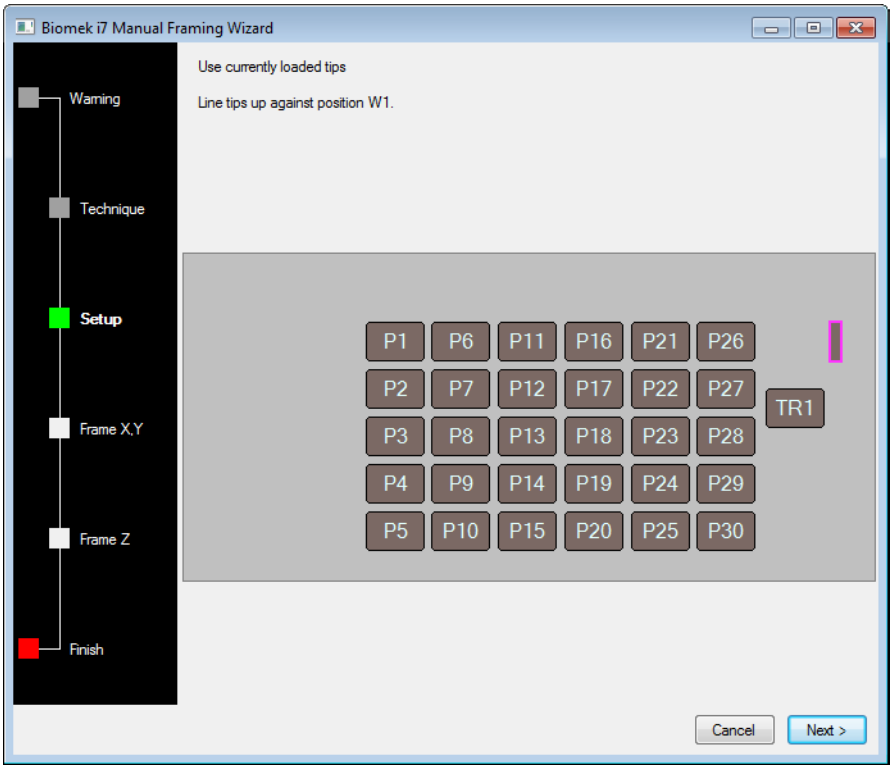
6 Choose **Next.** The **Biomek Manual Framing Wizard - Technique** appears (Figure 6.7).

Figure 6.7 Manual Framing (Technique) For Biomek i7 Instrument



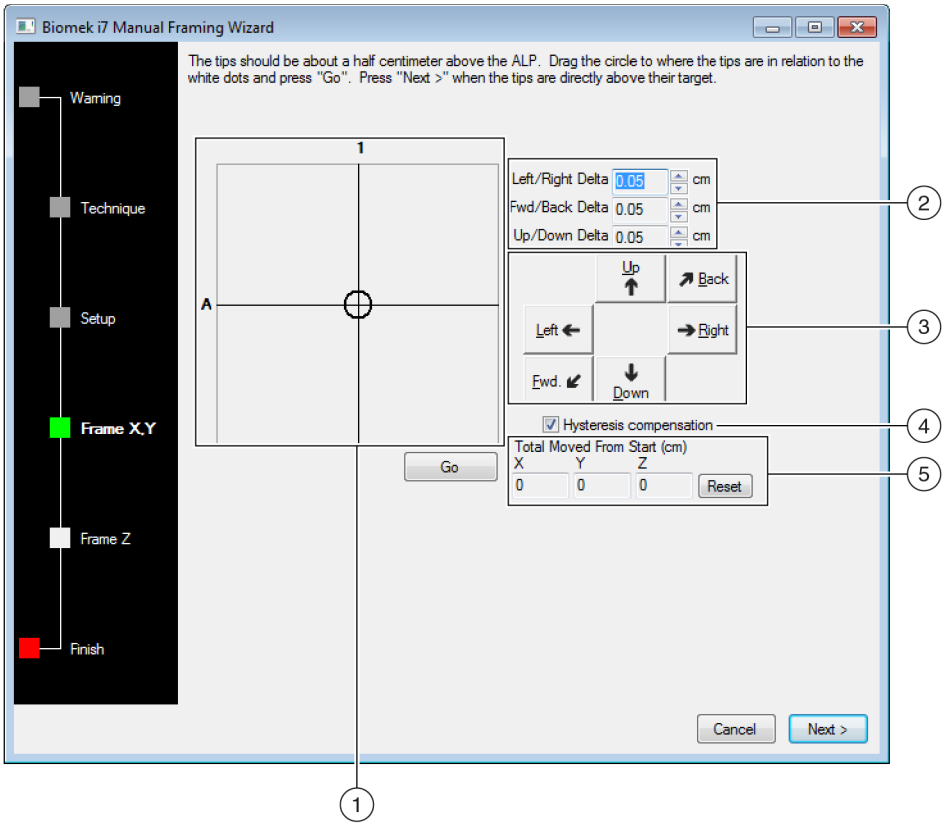
7 Choose **Next. Biomek Manual Framing Wizard - Setup** appears (Figure 6.8)

Figure 6.8 Manual Framing (Setup) of Biomek i7 Instrument



8 Choose **Next.** The **Biomek Manual Framing Wizard - Frame X,Y** appears (Figure 6.9).

Figure 6.9 Manual Framing (Frame 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. **Directional Buttons**: The directional buttons move the pod by the amount shown in **Delta** with each press of a button
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 instrument determines a pods position in the X-axis based on the position of the bridge at the back of the instrument.
5. **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)**.

9 To align the tips in the X- and Y-axes with the white framing points on top of the Span-8 Wash Station ALP (Figure 6.1), lower the tips in the Z-axis until they are approximately 1 cm above the top of the Span-8 Wash Station ALP.

NOTE Tip height of the pod is set in the next step in the Manual Framing process; therefore, move the pod to any height while manipulating tip alignment with the white framing points.

10 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 Wash Station ALP.

11 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 6.9).

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**).

12 Select the **directional button** representing the motion required to physically move the tip into position over the white framing points on the Span-8 Wash Station ALP (Figure 6.9).

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 Wash Station 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.

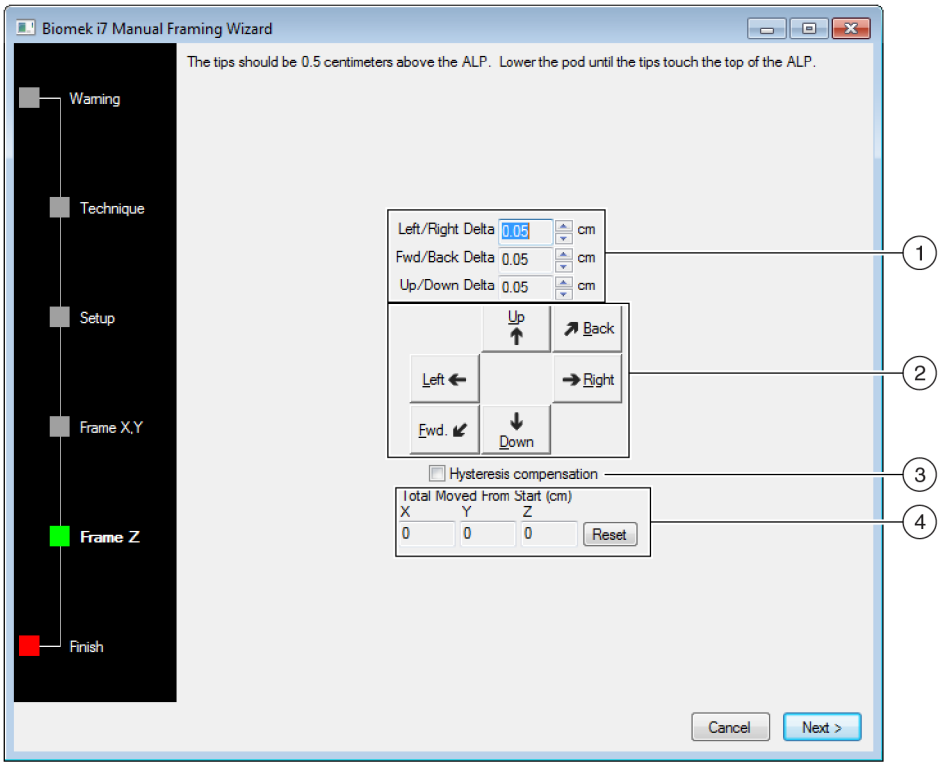
13 Select **Go.** The Span-8 pod moves in accordance to the **Delta** value and the position of the small circle in relation to the large circle.

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**.

14 Visually verify the position of the tips on the instrument in relation to the white framing points on the top of the Span-8 Wash Station ALP. If the tips are still not physically positioned above the white framing points, repeat steps 10 through 13 until they are positioned above the white framing points.

15 Choose **Next.** The **Biomek Manual Framing Wizard - Frame Z** appears (Figure 6.10).

Figure 6.10 Manual Framing (Frame 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.

16 In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 6.10).

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**).

17 Select the directional button representing the motion required to physically move the tip into position over the white framing points on the Span-8 Wash Station ALP.

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

18 Select **Finish**. The Span-8 pod moves in accordance to the **Delta** value, the **Biomek Fly-By Bar Code Reader Framing Wizard** closes, and **Position Properties** (Figure 6.5) appears.

19 Choose **OK** to close **Position Properties**.

20 Choose **Save** to close the **Deck Editor**. The Span-8 Wash Station ALP is framed.

Removing the Span-8 Wash Station ALP

⚠ WARNING

Risk of personal injury or contamination. When draining fluid, always wear the appropriate Personal Protective Equipment (PPE) to avoid contact with any biological or chemical agents that have been used with the Biomek i-Series Automated Workstation.

⚠ WARNING

Risk of personal injury or contamination. The waste fluid might be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety office. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

To remove the Span-8 Wash Station ALP:

1 Turn the waste port on the Span-8 Wash Station 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 instrument deck and the waste container.

5 Remove the captive screw by completing one of the following:

- ***By hand***: Using your fingers, turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

  OR

- ***With a Screwdriver***: Turn the captive screw counterclockwise until it springs slightly upward, indicating it is fully disengaged from the deck.

6 Lift the ALP straight up from the deck until the mounting pins are clear of the mounting holes.

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

⚠ WARNING

Risk of contamination. ALPs might be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer. Also, periodically clean the Span-8 Wash Station ALP by filling the supply container with a bleach solution and running it through the ALP.

Storage

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

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

Troubleshooting

Contact us before attempting to repair the Span-8 Wash Station ALP.

Table 6.1 Troubleshooting the Wash Station ALP

If...	Then...
The Span-8 Wash Station ALP is not functioning correctly,	Make sure that the hoses and cables are properly attached and routed to the Wash Station ALP.
The Span-8 Wash Station ALP is not draining waste fluid,	Look into the wells and reservoir and verify they are not clogged.

CHAPTER 7

Multichannel Wash Station ALPs

Overview

Using a step in a method, the 96-Channel Wash Station ALP (Figure 7.1) and 384-Channel Wash Station ALP (Figure 7.2) are active ALPs that wash tips on the deck. The 96-Channel Wash Station ALP is used with a 96-Channel Head or the Span-8 pod and has 96 cleaning wells, while the 384-Channel Wash Station ALP is used with the 384-Channel Head and has 384 cleaning wells.

NOTE Washing tips in a method using a Multichannel Wash Station ALP is configured in the **Transfer** or **Combine** steps and **Wash** steps. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

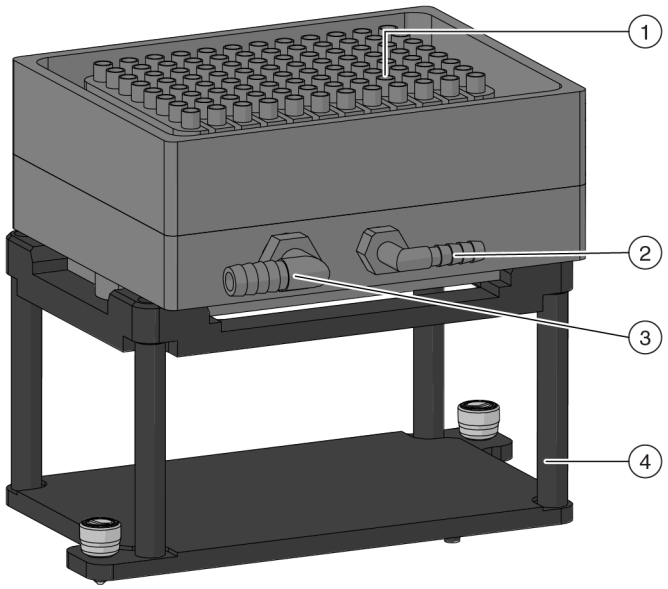
NOTE Use the **Device Action** step for a Multichannel Wash Station ALP to allow the ALP to continue washing until the **Finish** step is executed. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

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 Wash Station ALP is used on an instrument with two or more Multichannel Wash Station ALPs, each ALP must be configured to use a unique liquid type (refer to *Configuring Multiple Wash Stations on an Instrument*).

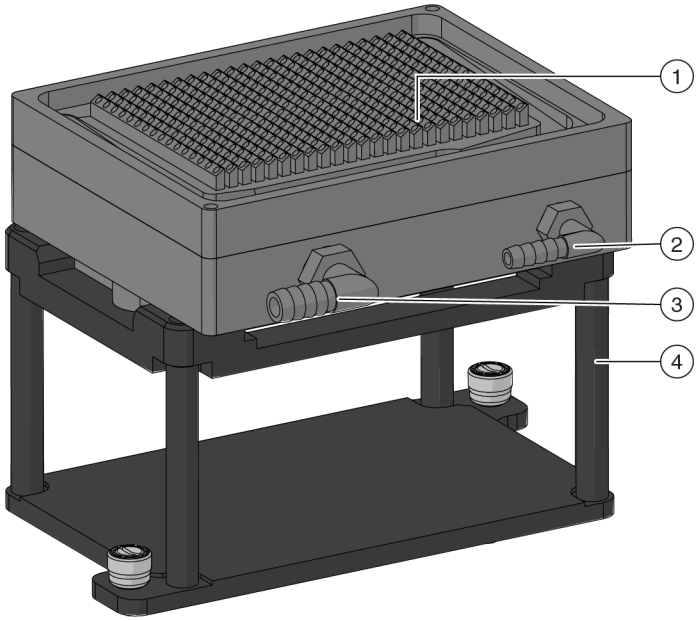
The sections in this chapter include:

Figure 7.1 96-Channel Wash Station ALP (Back View)



1. **Cleaning Wells**
2. **Out**
3. **In**
4. **ALP Base**

Figure 7.2 384-Channel Wash Station ALP (Back View)



1. **Cleaning Wells**
2. **Out**
3. **In**
4. **ALP Base**

Installing Multichannel Wash Station ALPs

NOTE Both Multichannel Wash Station ALPs are installed and removed in the same manner.

Installing Multichannel Wash Station ALPs to the deck includes choosing the appropriate deck position and mounting the ALP to the deck.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

⚠ WARNING

Risk of contamination. Kinked or obstructed tubing can cause leaks, overflow, and contamination from hazardous substances. Always use the appropriate Personal Protective Equipment (PPE) and thoroughly inspect all hoses before proceeding with using biological or chemical agents. Clean up any leaks immediately according to the procedures defined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ CAUTION

Risk of equipment damage. A Multichannel Wash Station ALP oriented the wrong way may cause obstructions on the instrument deck. Orient the Multichannel Wash Station ALP so the in and out connections face the back of the Biomek instrument.

⚠ WARNING

Risk of equipment damage or contamination. A 384-Channel head will not fit into a 96-Channel Wash Station ALP and may cause a crash or overflow. Use the 384-Channel Wash Station ALP only with the 384-Channel Head.

⚠ WARNING

Risk of equipment damage or contamination. A 96-Channel head will not fit into a 384-Channel Wash Station ALP and may cause a crash or overflow. Use the 384-Channel Wash Station ALP only with the 384-Channel head.

NOTE The Multichannel Wash Station ALPs require both an in and an out hose to attach the ALP to the pump.

Choosing a Deck Position and Adding the ALP to the Deck Editor

To choose a deck position and add the ALP to the **Deck Editor:**

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

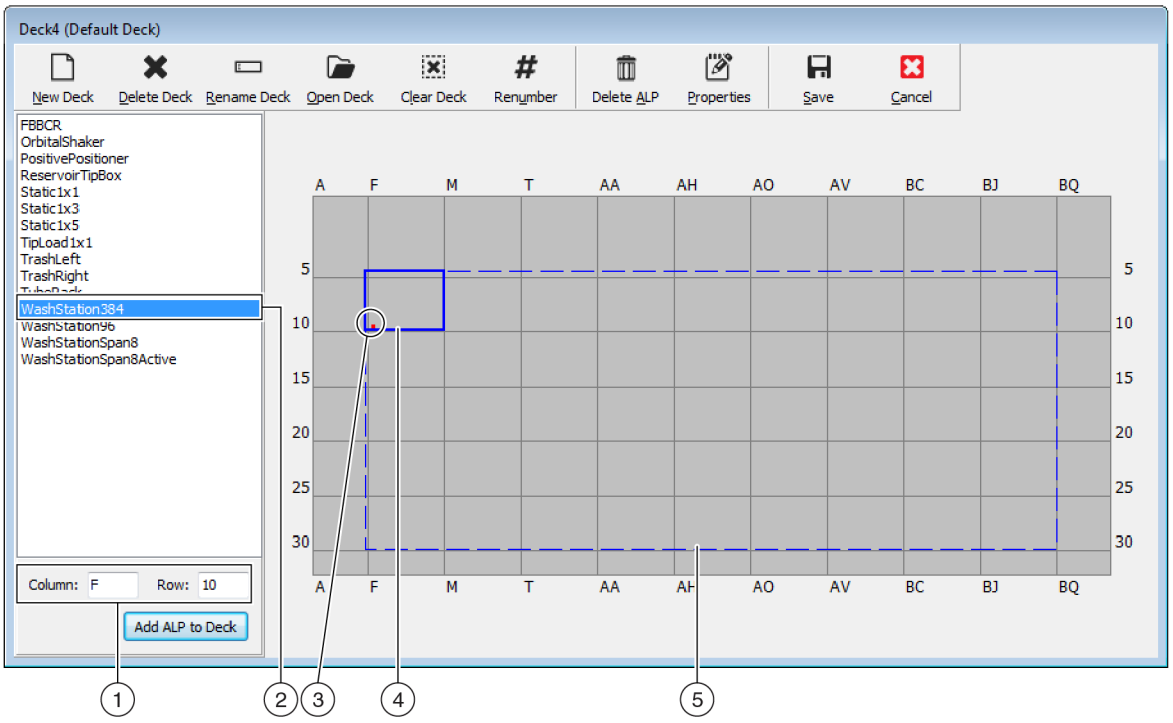
(**Deck Editor**). The **Deck Editor** opens.

2 Select the appropriate Multichannel Wash Station ALP in the ALPs type list. In the **Deck Editor**, the 96-Channel Wash Station ALP is referred to as **WashStation96** and the 384-Channel Wash Station ALP is referred to as **WashStation384**. The area capable of supporting the ALP is indicated by blue dashed lines. When adding the ALP to the **Deck Editor**, make sure that the position in the software does not currently contain an ALP, and that the selected location includes empty space behind it as an allowance for the tubing.

NOTE Placing the Multichannel Wash ALP in front of the Trash ALP makes routing the tubing very difficult. If possible, place the Multichannel Wash ALP behind the Trash ALP.

In Figure 7.3, the **WashStation384** was selected on a cleared Biomek i7 instrument deck.

Figure 7.3 Area Capable of Supporting the 384-Channel Wash Station ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost notch) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

---

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost notch, as shown in Figure 7.1 or Figure 7.2.

NOTE When choosing a position for a Multichannel Wash Station ALP, keep in mind the following:

- If mounting the ALP next to a Static 1 x 1 or Static 1 x 3 ALP, make sure to allow at least one empty grid space of clearance between the two ALPs.
- If installing to the left or right of another ALP requiring a mounting plate, make sure to position them so that the tabs do not overlap.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting the Multichannel Wash Station ALP to the Deck

Before mounting the Multichannel Wash Station ALPs to the deck, ensure the requirements for tubing are met (refer to *Tubing*).

Tubing

The supply tubing for the Multichannel Wash Station ALPs is 6.35 mm (0.25 in.) inside diameter, while the drain tubing is 9.53 mm (0.38 in.) 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 instrument.

Installing on the Deck

To mount Multichannel Wash Station ALPs to the deck:

1 Ensure the requirements for tubing are met.

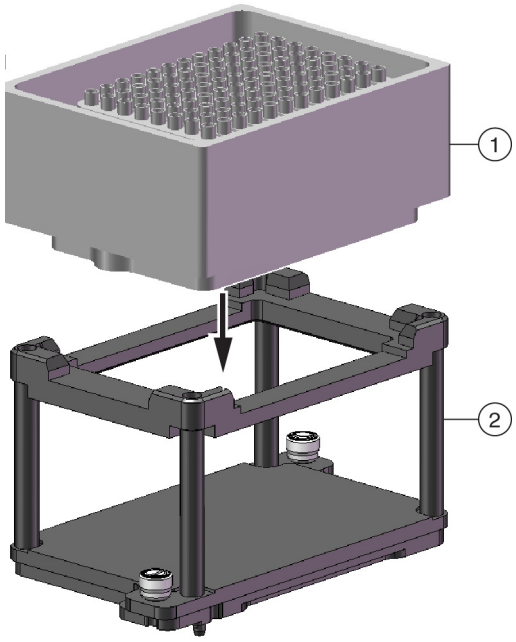
2 If not already completed, choose an appropriate deck location to mount the ALP to the deck (refer to *Choosing a Deck Position and Adding the ALP to the Deck Editor*).

3 Install the mounting plate and ALP on the deck by completing the instructions in CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*.

4 Position the Multichannel Wash Station ALP on the ALP Base so that the hoses are on the back side of the ALP and gently press down to ensure it is seated properly in the ALP Base (Figure 7.4).

NOTE The in/out hose connections on the Multichannel Wash Station ALPs MUST face the back of the instrument.

Figure 7.4 Tip Wash Reservoir and Tip Wash Stand to Create the 96-Channel Tip Wash ALP



1. **Multichannel Wash Station ALP**
2. **ALP Base**

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 (PN 6485-35) to the small hole on the ALP (Figure 7.1 or Figure 7.2).

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 the side shields and deck on either side of the instrument.

NOTE Care should be taken to route the tubing around the on-deck ALPs and devices.

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

10 Attach the out hose to the large hole on the Multichannel Wash Station ALP (Figure 7.1 or Figure 7.2).

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.

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.

Adding a Wash Pump in Hardware Setup

Multichannel Wash Station ALPs use 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 the **Utilities** tab, in the **Instrument** group, select 

(**Hardware Setup**). **Hardware Setup** appears.

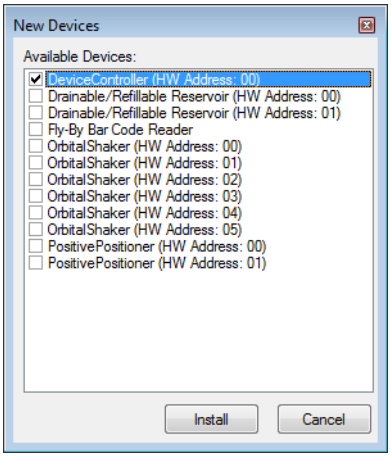
2 In **Hardware Setup**, right click **Digital Devices** or any device under **Digital Devices** and choose **Add Device**, then select **DeviceController**.

OR

Choose **Add Device** from the top of **Hardware Setup**. **New Devices** appears (Figure 7.6). Select **DeviceController** and choose **Install**.

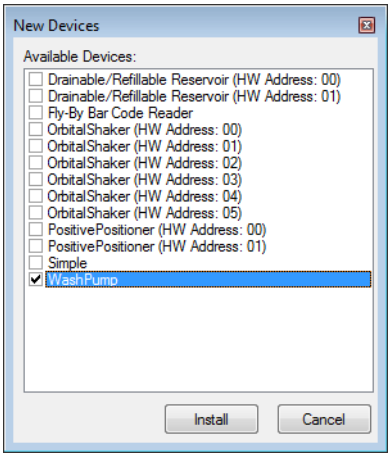
The **Device Controller** is added to the installed digital devices under **Digital Devices** in the left pane.

Figure 7.5 New Devices Displaying All Detected Devices



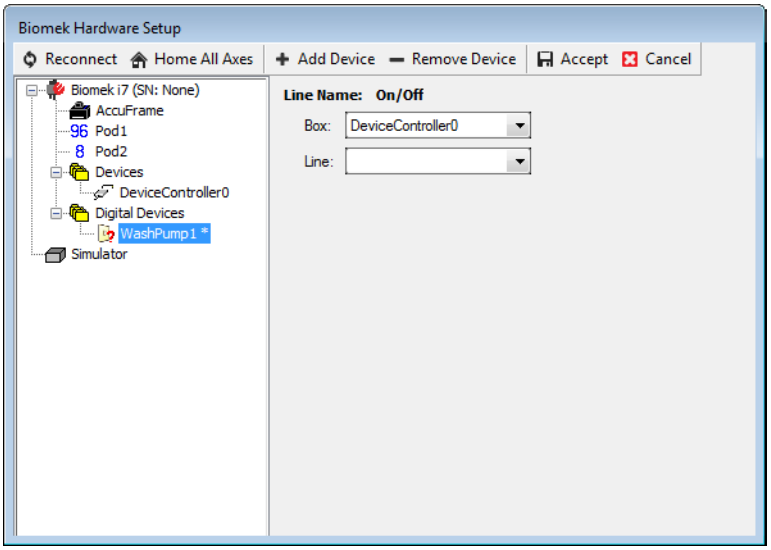
3 Choose **Add Device** from the top of **Hardware Setup. New Devices** appears (Figure 7.6). Select **WashPump** and choose **Install**. The **WashPump** is added to the installed digital devices under **Digital Devices** in the left pane.

Figure 7.6 New Devices Displaying All Detected Devices



4 Select the **WashPump** under **Digital Devices** to configure it. The configuration screen for the **WashPump** appears to the right in **Hardware Setup** (Figure 7.7).

Figure 7.7 WashPump Configuration in Hardware Setup



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

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

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

Configuring the Multichannel Wash Station ALP in the Deck Editor

After adding and configuring the **WashPump** in **Hardware Setup**, the **WashPump** must be associated as a device with the position.

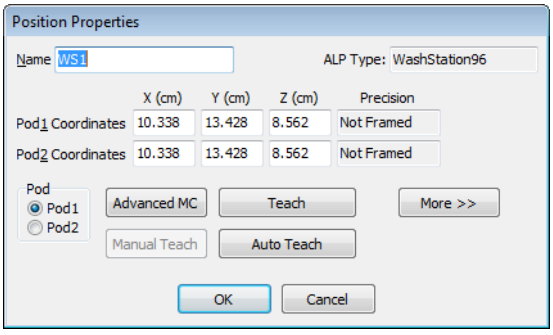
To add and configure the Multichannel Wash Station ALP in the **Deck Editor**:

1 From the **Utilities** tab, in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** appears.

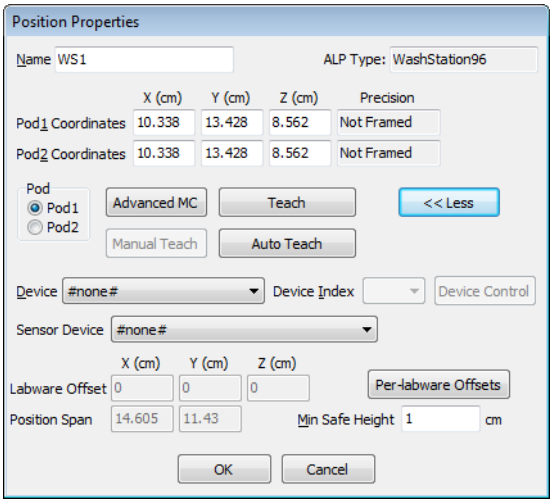
2 Double click on the **WashStation96** or **WashStation384** ALP to open **Position Properties** (Figure 7.8).

Figure 7.8 Position Properties for Multichannel Wash Station ALP



3 Choose **More** to display additional configuration options for the ALP (Figure 7.9).

Figure 7.9 Expanded Position Properties for the Multichannel Wash Station ALP



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

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

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

Configuring Multiple Wash Stations on an Instrument

Multichannel Wash Station 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:

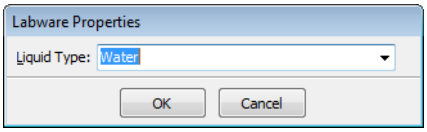
1 In the **Liquid Type Editor**, create a new liquid type or copy an existing liquid type for the wash station; for example, create a new liquid type called **WS1_Liquid**.

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

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information on creating new liquid types and copying liquid types.

2 In the **Instrument Setup** step, double click the desired wash station. **Labware Properties** for the wash station appears (Figure 7.10).

Figure 7.10 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 the **Transfer** or **Combine** steps, select a specific wash station by selecting the appropriate liquid type in **Wash tips in**.

Framing Instructions

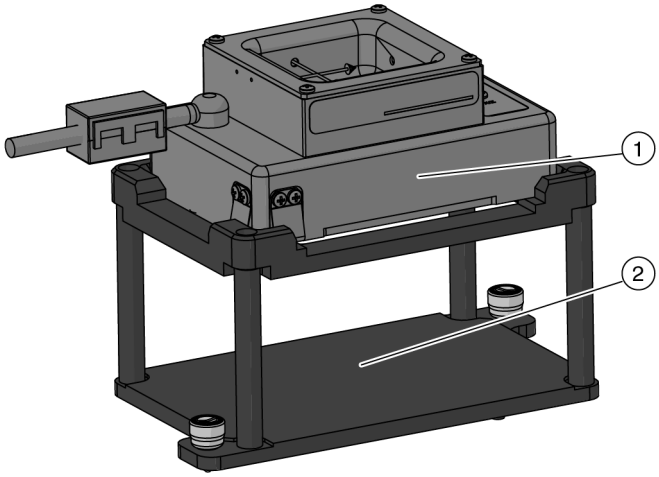
Special framing instructions are necessary for Multichannel Wash Station ALPs, which are framed using AccuFrame.

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 Wash Station ALPs*).

To frame the Multichannel Wash Station ALPs:

1 Place the AccuFrame on the ALP Base (Figure 7.11).

Figure 7.11 AccuFrame and the 96-Channel Wash Station ALP



1. **AccuFrame**: Use for both the 96-Channel and 384-Channel Wash Station ALPs.
2. **ALP Base**

2 Turn off power to instrument before connecting the AccuFrame.

⚠ WARNING

Risk of personal injury or equipment damage. Removing the AccuFrame tool from the AccuFrame port while power to the instrument is on can cause electrical shock or equipment damage. Turn off power to the instrument before attaching or removing the AccuFrame tool from the AccuFrame port.

3 Plug AccuFrame into the AccuFrame port on the left rear tower of the instrument (Figure 7.12).

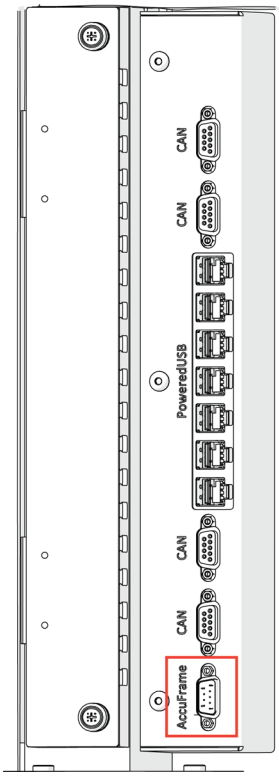
⚠ CAUTION

The AccuFrame cable positioning could violate the light curtain, which would immediately halt the framing process. Make sure that the AccuFrame cable does not violate the light curtain.

⚠ CAUTION

Risk of equipment damage. The AccuFrame cable positioning could interfere with pod movement. Make sure the AccuFrame cable is in a location that does not obstruct pod movement.

Figure 7.12 AccuFrame Cable Port



4 Turn on power to instrument.

5 Frame the ALP according to procedures outlined in the *Biomek i-Series Hardware Reference Manual* (PN B54474).

Entering Offsets for the Multichannel Wash Station ALPs

If a more precise location of the tips in the cleaning wells of the Multichannel Wash Station ALPs during a wash is desired, offsets for framing the Multichannel Wash Station ALPs may be entered.

Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) 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 Wash Station ALP.

NOTE Washing tips in a method using a Multichannel Wash Station ALP is configured in the **Transfer** or **Combine** steps and **Wash** steps. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

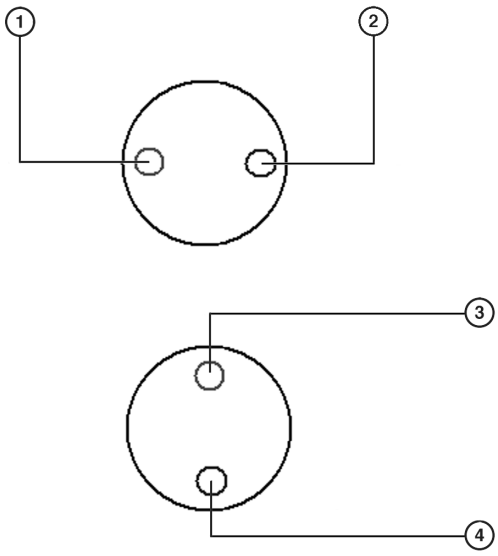
---

2 Based on a visual observation during the method run, use the following explanation to determine the offsets. If the tips are positioned (see Figure 7.13 for details):

- Too much to the left of the center of the wells, increase the number in the **X cm**.
- Too much to the right of the center of the wells, decrease the number in the **X cm**.
- Too much to the back of the center of the wells, increase the number in the **Y cm**.
- Too much to the front of the center of the wells, decrease the number in the **Y cm**.
- Too far down into the wells, increase the number in the **Z cm**.
- Too far above the wells, decrease the number in the **Z cm**.

NOTE Estimate the amount or measure with a ruler or calipers.

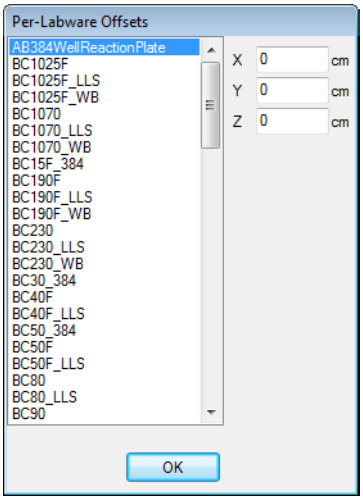
Figure 7.13 Tip and Offset Explanation



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** and enter them in **X cm**, **Y cm**, and **Z cm** (Figure 7.14).

Figure 7.14 Per-Labware Offsets



4 Choose **OK**.

5 Reframe the Multichannel Wash Station ALP according to the instructions in Section *Framing Instructions*.

Removing the Multichannel Wash Station ALPs

To remove Multichannel Wash Station ALPs from the deck:

1 Power down the external pump.

2 Detach the in and out hoses from the tip wash reservoir (Figure 7.1 or Figure 7.2).

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

3 Remove the tip wash reservoir carefully; a small amount of fluid normally remains after draining and could spill.

4 Lift and tilt the tip wash reservoir slightly to the back right corner to allow the fluid to drain.

⚠ WARNING

Risk of personal injury or contamination. When draining fluid, always wear the appropriate Personal Protective Equipment (PPE) to avoid contact with any biological or chemical agents that have been used with the Biomek i-Series Automated Workstation.

5 Remove the ALP from the ALP Base.

6 Loosen the thumbscrews from the mounting plate.

7 Lift the stand vertically to clear the mounting pins from the holes on the deck.

8 If necessary, remove the mounting plate by following instructions in CHAPTER 11, *Removing Mounting Plates from the Deck*.

Preventive Maintenance

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

Storage

Return Multichannel Wash Station ALPs to the original packing materials and store in a dry, dust-free, environmentally controlled area.

NOTE It is desirable to allow Multichannel Wash Station ALPs to air-dry before returning them to the original packing materials.

Troubleshooting

Contact us before attempting to repair a Multichannel Wash Station ALP.

Table 7.1 Troubleshooting the Multichannel Wash Station ALP

If...	Then...
A Multichannel Wash Station ALP is not functioning correctly.	Make sure that the hoses and cables are attached and routed to the Multichannel Wash Station 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 8

Solid Phase Extraction (SPE) Vacuum Filtration System

Overview

The Solid Phase Extraction (SPE) Vacuum Filtration System includes:

- 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;
- Components for directing and controlling a vacuum to pull the 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 Vacuum Filtration System contains two ALPs: the SPE ALP and SPE Collar Stand (refer to *Components of the SPE Vacuum Filtration System*). The two ALPs occupy six deck positions and are used simultaneously during a method run.

NOTE The SPE ALP Stand and SPE Collar Stand are wider and deeper than a standard 1x1 ALP. There must be clearance in front of, behind, and to the left and right of the SPE ALPs. Therefore, two SPE ALPs will take the same footprint as six 1x1 ALPs.

The sections in this chapter include:

Components of the SPE Vacuum Filtration System

The components of the SPE Vacuum Filtration System are stacked on two ALP stands which are used simultaneously during a method run.

The components of an SPE Stack 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 filter microplate and encloses the receiver microplate during filtration operations.

  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 user.

- **Filter Plate** — the labware through which liquid mixtures are separated in the SPE ALP; referred to as the **Filter Source** in the Biomek Software.
- **Filter Holder** — a plastic device that holds a filtered microplate to protect it from damage.

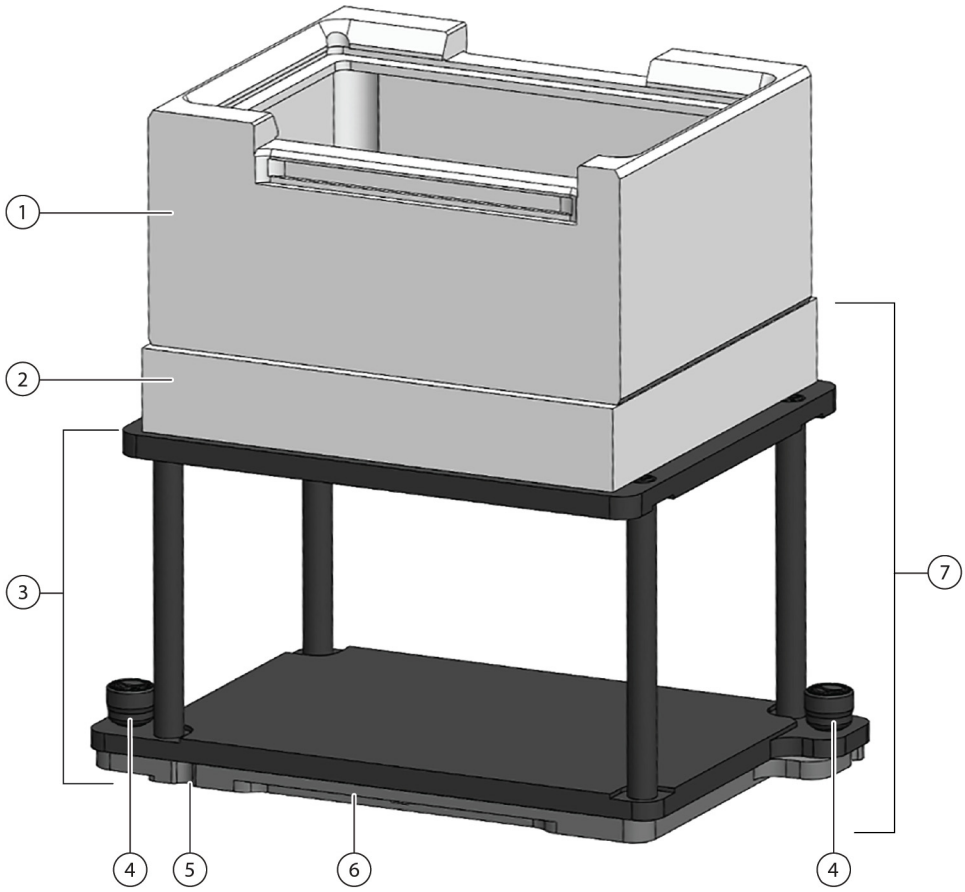
NOTE The process of stacking the components of the SPE Vacuum Filtration Systemduring a method creates the SPE Stack. The SPE Stack can be assembled and/or disassembled during a method.

The two ALPs are:

- **SPE ALP** — Consists of an SPE ALP Stand and SPE ALP Base. The SPE ALP Base is where filtration occurs; the SPE ALP Stack is constructed on the SPE ALP (Figure 8.1).

  NOTE The SPE ALP is the combination of the SPE ALP Base and the SPE ALP Stand. In the Biomek Software, the SPE ALP Base and the SPE ALP Stand are treated as a single unit (the SPE ALP).

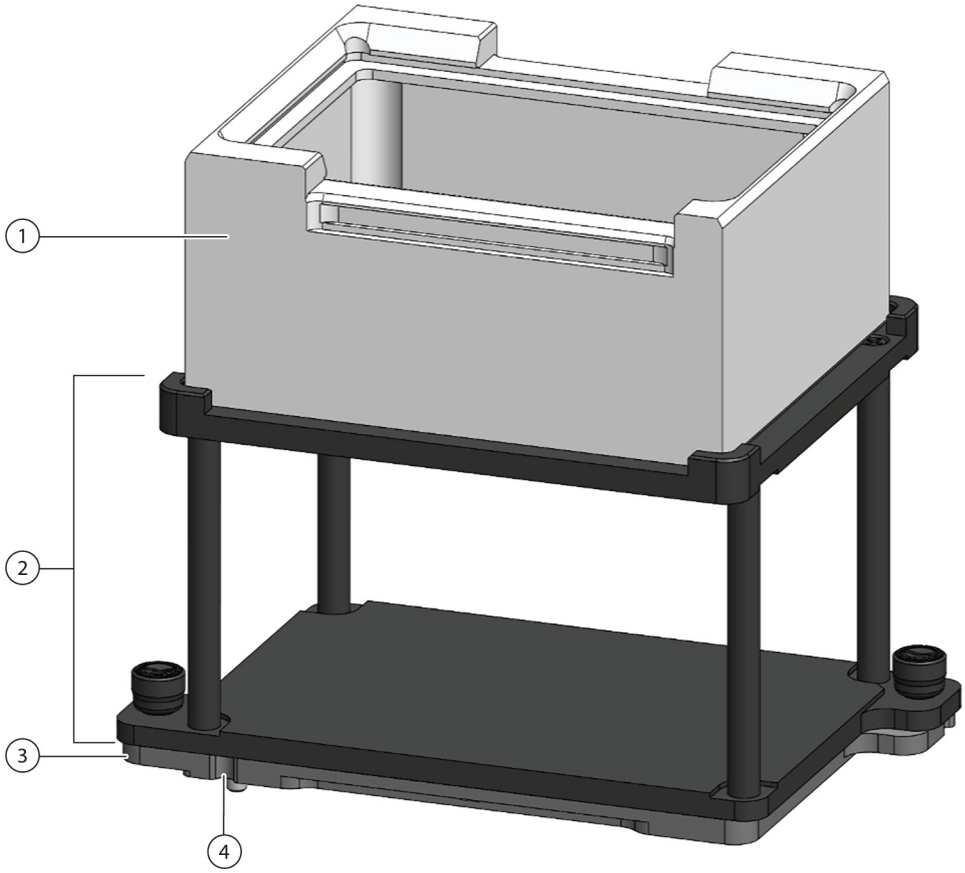
Figure 8.1 SPE Collar, SPE ALP Base, and SPE ALP Stand



1. **SPE Collar**
2. **SPE ALP Base** — the SPE ALP Base connects to the vacuum and all filtered fluids are drained through the SPE ALP Base.
3. **SPE ALP Stand** — supports the SPE ALP Base.
4. **Thumbscrews**
5. **Pointing Feature** (frontmost notch)
6. **Mounting Plate** (sold separately)
7. **SPE ALP** — combination of the SPE ALP Base and the SPE ALP Stand.

- **SPE Collar Stand** — supports the SPE Collar (Figure 8.2) and occupies a deck position adjacent to the SPE ALP.

Figure 8.2 SPE Collar Placed on the SPE Collar Stand



1. **SPE Collar**
2. **SPE Collar Stand**
3. **Mounting Plate** (sold separately)
4. **Pointing Feature** (frontmost notch)

Installing the Vacuum System

⚠ WARNING

Risk of contamination. Kinked or obstructed tubing can cause leaks, overflow, and contamination from hazardous substances. Always use the appropriate Personal Protective Equipment (PPE) and thoroughly inspect all hoses before proceeding with using biological or chemical agents. Clean up any leaks immediately according to the procedures defined by your laboratory safety officer.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ CAUTION

Risk of equipment damage. A Multichannel Wash Station ALP oriented the wrong way may cause obstructions on the instrument deck. Orient the Multichannel Wash Station ALP so the in and out connections face the back of the Biomek instrument.

Items Needed for Installation

- Small Flat-Head Screwdriver
- Box Cutter or Scissors
- 2 Mounting Plates
- Teflon Tape

Installation Instructions

⚠ 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.

---

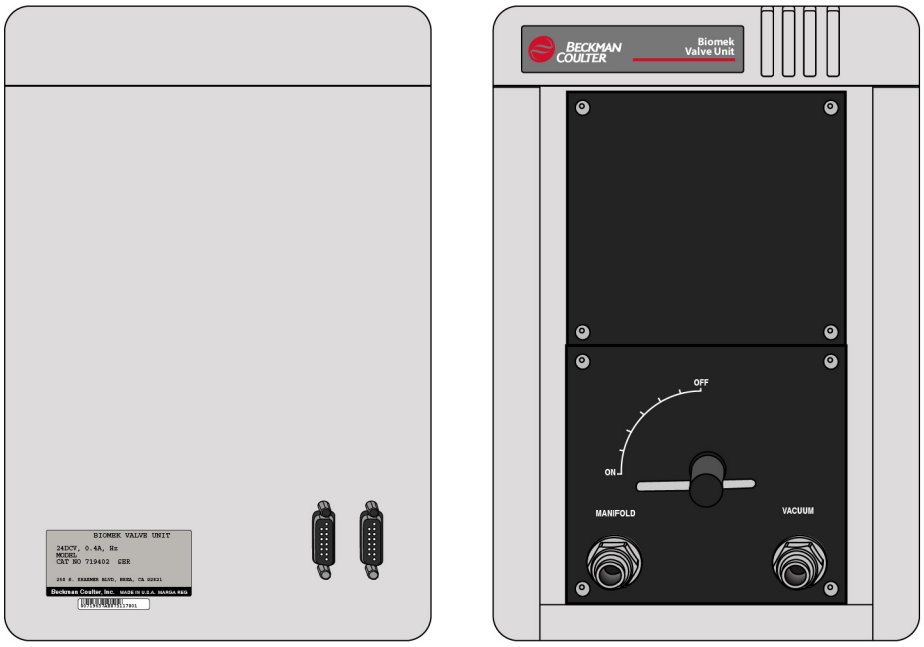
1 Open the Vacuum Valve Kit (719402) box. The kit consists of the following items:

- Serial cable (719282)
- Biomek Valve Unit (719657)
- Box containing the power cable (B01378)
- Two straight fittings (946638)

The other component in the kit, Vacuum Valve (719402) is used for the Biomek 3000, and will not be required for this installation.

2 Attach the serial cable (719282) to the automation controller. Attach the other end of the serial cable to the connector on the back of vacuum valve unit (719657). Use a small flat-head screwdriver to securely attach the cables.

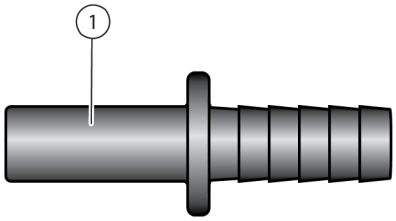
Figure 8.3 Vacuum Valve Unit Back and Front Views



3 Open the box (B01378) containing the power cable, and plug in the power cable to a wall outlet. Attach the other end of the power cable to the Serial cable (719282).

4 Attach the smooth end of a straight fitting (946638) (Figure 8.4) to the hole marked **Manifold** on the front of the Vacuum Valve Unit.

Figure 8.4 Straight fitting



1. Smooth end of fitting

5 Attach the smooth end of the second straight fitting to the hole marked **Vacuum** on the Vacuum Valve Unit.

6 Place the Vacuum Valve unit in its intended location.

7 Open the Vacuum Filtration System (C24316) box. Confirm it contains the following items:

- Bag containing SPE ALP Base and elbow fitting (609670)
- SPE ALP Stand (717632)
- Venting Cap (C24313)
- Bottle (975796)
- Tubing Kit (2) (609676)
- Bag (609674) containing Vacuum Regulator (970041) and 2 straight connectors (974323)
- SPE Collar Stand (719229)
- SPE Collar (719401)
- Collar Gasket Kit (609846)

NOTE The Biomek FX installation instructions (719727) will not be needed for this installation.

8 Open the bag (609670) containing the SPE ALP Base and elbow fitting. Screw the elbow fitting into the SPE ALP Base until the threads of the elbow fitting can no longer be seen, and the output end of the elbow fitting is parallel to the bottom of the SPE ALP Base.

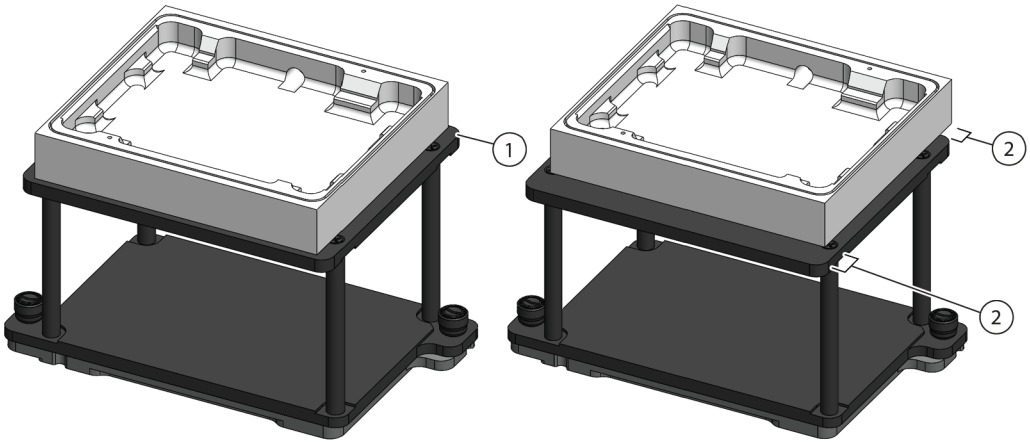
9 Identify the location on the deck where the SPE ALP will be placed (see CHAPTER 11, *Choosing a Deck Position*) – making sure the pipettor can reach the SPE ALP, and there is space in the back for the tubing to be run.

10 Attach a Mounting Plate (B87485, user-supplied) to the selected deck location so the pins of the mounting plate slip into the holes on the deck (see CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*). Ensure the pointing feature aligns to the exact coordinate (Column/Row) used to configure the ALP in the **Deck Editor**.

11 Attach the SPE ALP Stand (717632) to the Mounting Plate (see CHAPTER 11, *Attaching an ALP to the Standard Mounting Plate*.

12 Place the SPE ALP Base on the SPE ALP Stand with the elbow fitting towards the rear of the deck. The SPE ALP Stand is facing the correct direction if the manifold is centered on the top of the SPE ALP Stand (see Figure 8.5). Otherwise, rotate the SPE ALP Stand 180 degrees. Ensure the SPE ALP Base sits flat on the SPE ALP Stand.

Figure 8.5 SPE ALP Stand and SPE ALP Base correct and incorrect orientation



1. **Correct orientation** - SPE ALP Base is centered on the SPE ALP Stand
2. **Incorrect orientation** - SPE ALP Base is not centered and overhangs the SPE ALP Stand

13 Identify the location on the deck where the SPE Collar Stand (719229) will be placed (see CHAPTER 11, *Choosing a Deck Position*).

14 Attach a Mounting Plate (B87485, user-supplied) to the selected deck location so the pins of the mounting plate slip into the holes on the deck (see CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*). Ensure the pointing feature aligns to the exact coordinate (Column/Row) used to configure the ALP in the **Deck Editor**.

15 Attach the SPE Collar Stand (717632) to the Mounting Plate (see CHAPTER 11, *Attaching an ALP to the Standard Mounting Plate*.

NOTE The vacuum hose must run toward the back of the Biomek deck; make sure the barbed fitting on the SPE ALP base is horizontal.

NOTE Make sure the hose routing does not interfere with the operation of the Biomek instrument.

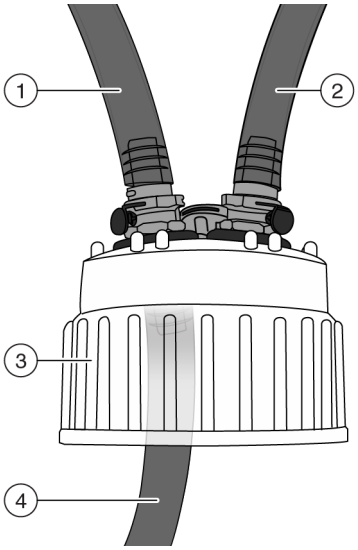
16 Open one of the Tubing kits (609676) and remove the tubing. Attach one end of the tubing to the elbow fitting on the SPE ALP Base. Thread the tubing out the back of the i-Series instrument. Place the other end of the tubing by the Biomek Vacuum Valve.

NOTE Do not connect the tubing to the Biomek Vacuum Valve until step 22.

17 Open the second Tubing Kit (609676) and remove the tubing. Using scissors or a box cutter, cut off a 20 cm (8 in.) section of the tubing.

18 Attach the 20 cm (8 in.) section of tubing to one of the ports on the inside of the Venting Cap (2158-0032). Find the associated port on the top of the Venting Cap, and label that port **Valve**. Label another port on the cap **Regulator**. On the third port, press the silver tab to pop out the 3/8 inch connector. Keep this connector. It can be used to relieve the vacuum from the waste bottle.

Figure 8.6 Venting Cap Connections



1. Valve Port- Connect to Vacuum port on the Vacuum Valve Unit
2. Regulator Port- Connect to vacuum regulator
3. Venting Cap
4. 20 cm (8 in.) tubing connected to Valve Port

19 Remove the cap from the bottle (975796) and discard it, it is no longer needed. Attach the Venting Cap to the bottle, ensuring the 20 cm (8 in.) section of tubing is inside the bottle.

20 Remove the vacuum regulator (609674) from the bag. Apply Teflon to the threads of the connectors. Screw in both connectors to the vacuum regulator until finger tight. The threads of the connectors will still show.

21 Connect the vacuum regulator to the user supplied vacuum, using user supplied appropriately sized tubing.

22 Place the vacuum, regulator, Biomek Valve Unit, and Waste Bottle, in their intended locations (see Figure 8.7 for an example of a suitable placement underneath the instrument).

⚠ CAUTION

Risk of equipment failure. When attaching the tubing to the elbow fitting, failing to support the elbow fitting and using excessive force can break the elbow fitting. Do not use excessive force when attaching the tubing to the elbow fitting.

a. Connect tubing from the SPE ALP Base to the **Manifold** port of the Vacuum Valve Unit.

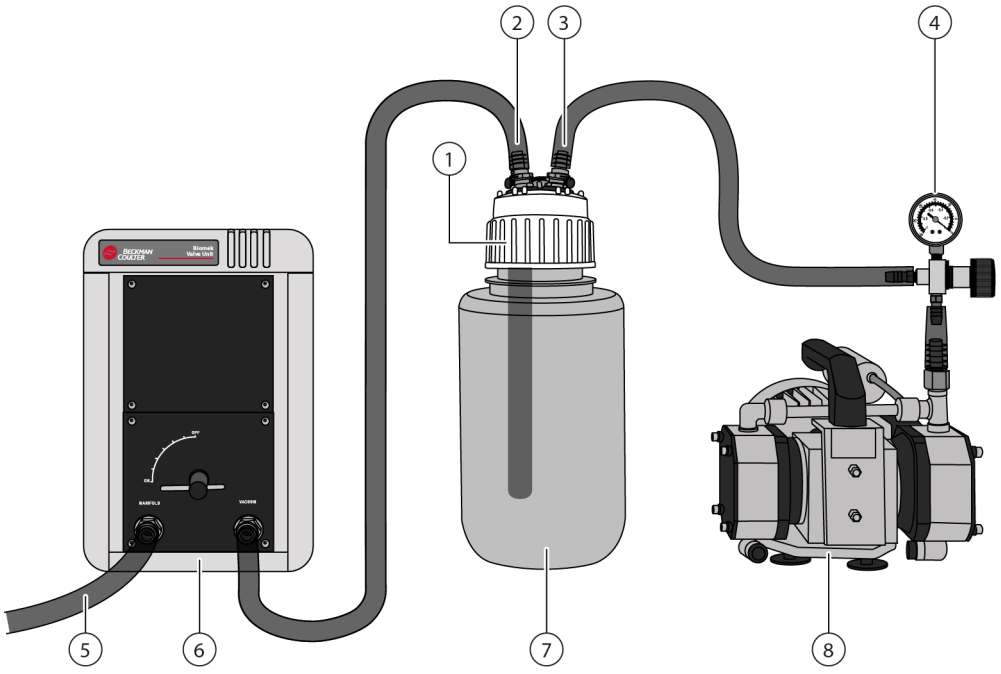
b. Cut the remaining tubing from step 17 in half.

1) Use one piece of tubing to connect the Vacuum Regulator (609674) to the **Regulator** port on the Venting Cap.

2) Use the other piece of tubing to connect the **Valve** port of the Venting Cap to the **Vacuum** port of the Vacuum Valve Unit.

NOTE If desired, trim excess tubing length, but it is recommended to leave enough extra length to accommodate potential later repositioning of the vacuum, Vacuum Valve Unit, and waste bottle.

Figure 8.7 SPE Tubing Connections



1. Venting Cap
2. Valve Port
3. Regulator Port
4. Vacuum Regulator
5. To SPE ALP Base Connector
6. Vacuum Valve Unit
7. Waste Bottle
8. Customer Supplied Vacuum

23 Plug in the vacuum.

24 Turn the vacuum on. Turn the Valve on the Vacuum Valve Unit to the on position, and ensure vacuum is being drawn from the SPE ALP Base.

25 Frame the SPE ALP (see *Framing the SPE ALP Using the AccuFrame (Multichannel Pod Only)*), and the SPE Collar Stand (see *Framing the SPE Collar Stand Using the AccuFrame (Multichannel Pod only)*).

Installing the SPE ALP and SPE Collar Stand

The SPE ALP and SPE Collar Stand require the standard mounting plate to mount to the deck (see CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*).

Choosing Deck Positions for the SPE ALP Stand and Collar Stand

The 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 SPE Collar Stand.

NOTE After a deck position has been chosen on which to physically mount the SPE ALP, configure the ALP in the **Deck Editor** (refer to the *Biomek i-Series Software Reference Manual (B56358)*, *Preparing and Managing the Deck*).

Framing Instructions

The Multichannel Pod uses AccuFrame to frame the SPE ALP. The Span-8 Pod must use manual framing to frame the SPE ALP. See *Framing the SPE ALP Using Tips*.

Special framing instructions are necessary for the SPE ALP and the SPE Collar Stand. This section includes:

- *Framing the SPE ALP Using the AccuFrame (Multichannel Pod Only)*
- *Framing the SPE ALP Using Tips*
- *Manually Framing the SPE ALP Using the Gripper*
- *Framing the SPE Collar Stand Using the AccuFrame (Multichannel Pod only)*
- *Manually Framing the SPE Collar Stand*

Framing the SPE ALP Using the AccuFrame (Multichannel Pod Only)

The SPE ALP is framed using the AccuFrame.

To frame the SPE ALP:

1 Place the AccuFrame inside the SPE ALP.

2 Frame the ALP according to procedures outlined in the *Biomek i-Series Automated Workstations Hardware Reference Manual* (B54474), *Framing the Biomek i-Series 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 Reference Manual*, B56358.

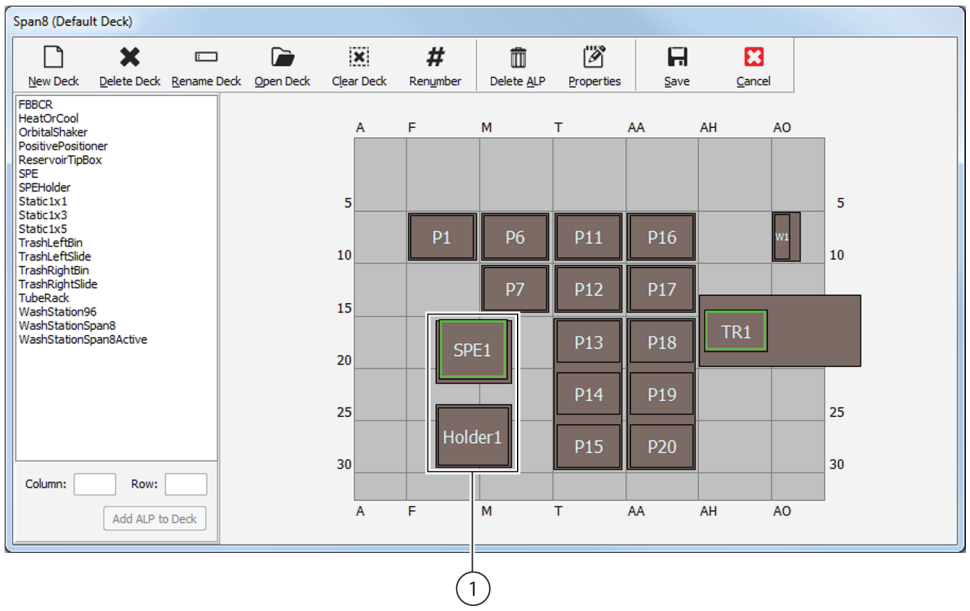
Framing the SPE ALP Using Tips

⚠ CAUTION

Framing the SPE 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.

Framing the SPE ALP with tips includes first framing an ALP position on the deck, which can load tips and then using that framed position to load tips which are used as a reference point to frame the SPE ALP.

Figure 8.8 Deck Editor with SPE ALP



1. First frame any deck position which can load tips, then use that framed position as a reference point to frame each position on the SPE ALP.

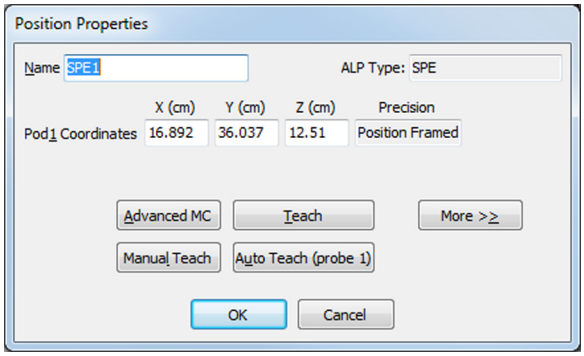
To Frame the SPE ALP:

1 Place a tip box on this framed position.

2 On the SPE ALP, create a stack with a collar on the bottom, and a BCFlat96 microplate on top.

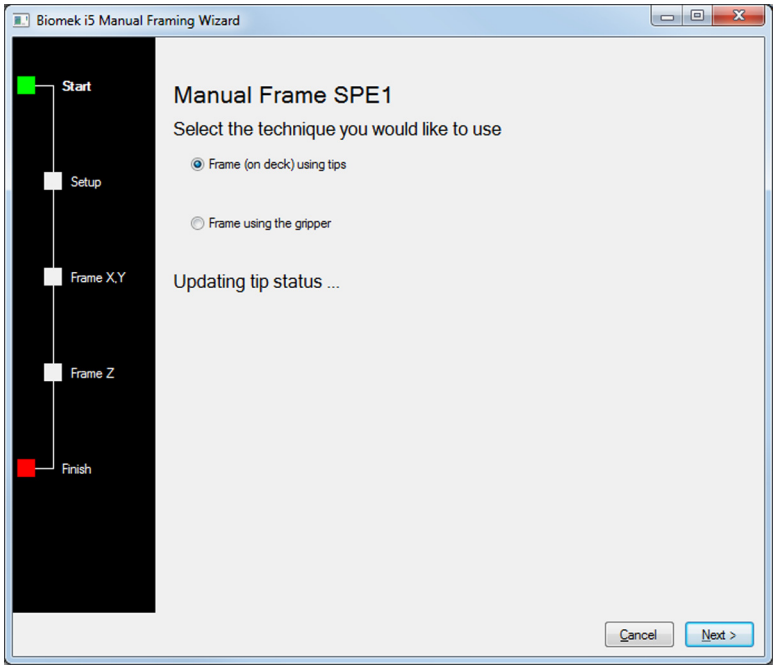
3 From the **Deck Editor**, double-click the SPE ALP position to be framed. Position Properties appears (Figure 8.9).

Figure 8.9 Position Properties



4 Choose **Manual Teach** (Figure 8.9). **Biomek i-Series Manual Framing Wizard — Start** appears (Figure 8.10).

Figure 8.10 Warning for Biomek i-Series Manual Framing Wizard

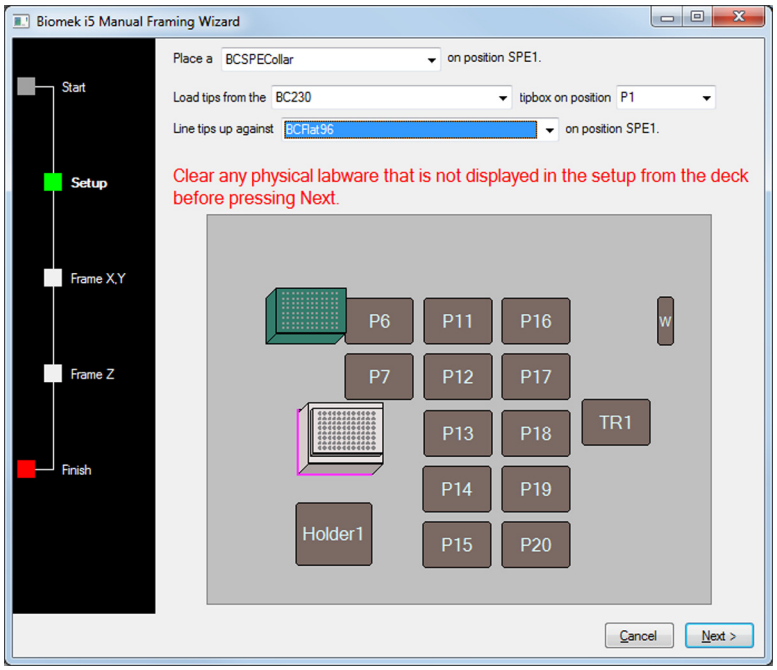


5 Select **Frame (on deck) using tips**. Choose **Next**. **Biomek i-Series Manual Framing Wizard - Setup** appears (Figure 8.11).

6 In **Place a,** choose the Collar placed on the SPE position to be framed (Figure 8.11).

7 In **tipbox on position**, choose the position that was framed in step 1 (Figure 8.11).

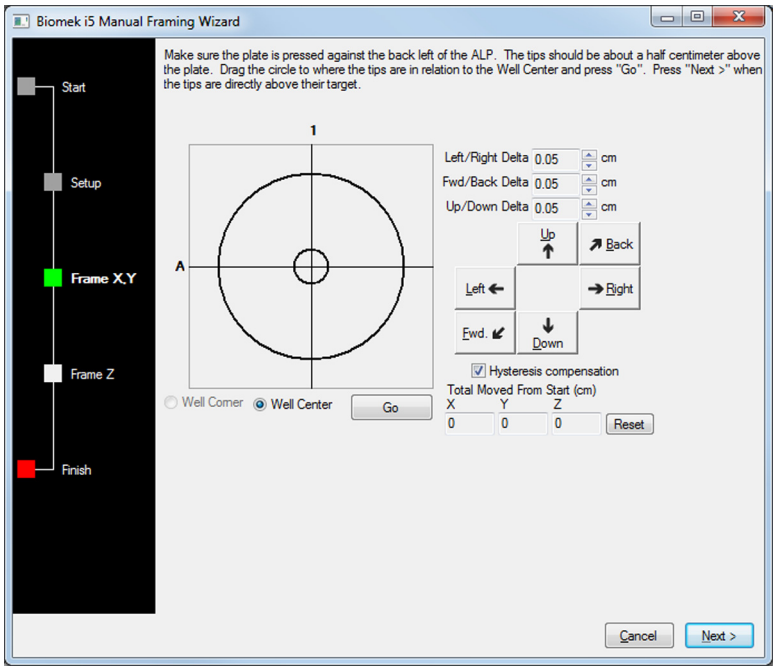
Figure 8.11 Biomek i-Series Manual Framing Wizard - Setup



8 In **Line tips up against**, choose **BCFlat96**.

9 **Biomek i-Series Manual Framing Wizard-Teach X,Y** appears (Figure 8.12). The pod loads the tips from the framed position and then moves approximately a half centimeter above the plate.

Figure 8.12 Biomek i-Series Manual Framing Wizard - Frame X,Y



10 Adjust the X and Y positions of the tips to position the tips above the center of the wells of the plate by either:

- *Using the Graphic Alignment Tool*

  or

- *Using the Delta Value and Directional Buttons*

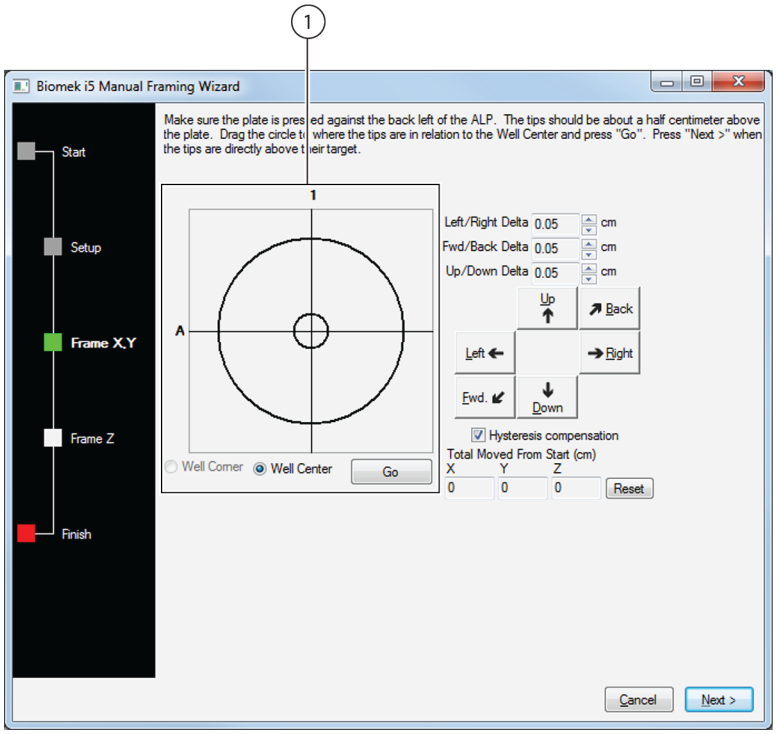
After the tips are correctly positioned, press **Next**.

11 Adjust the Z position (height) of the Pod to position the tips so they are just touching the bottom of the plate, 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 8.13) is used to instruct Biomek Software of the current position of the tips in relation to the position being framed. Biomek Software uses the information it is given to move the pod so the tips are directly above the target position.

Figure 8.13 Manual Teaching the X- and Y-Axes



1. The graphic alignment tool is a visual representation of the tips (small circle) and the well of the labware (large circle) at the position being framed. The small circle is moved until it represents the tips' current physical location in relation to the well of the labware.

To use the graphic alignment tool:

1 Drag the small circle until it represents the physical position of the tips in relation to the well. The small circle represents the tips, and the large circle represents the well.

NOTE The software uses this graphical representation of the physical position of the tips relative to the wells to know approximately how far in any direction the pod must move.

2 Select **Go**. The pod 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)** change 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 in relation to the well being framed. If the tips are still not accurately positioned above the well being framed, repeat steps 1 and 2 until the appropriate position is obtained.

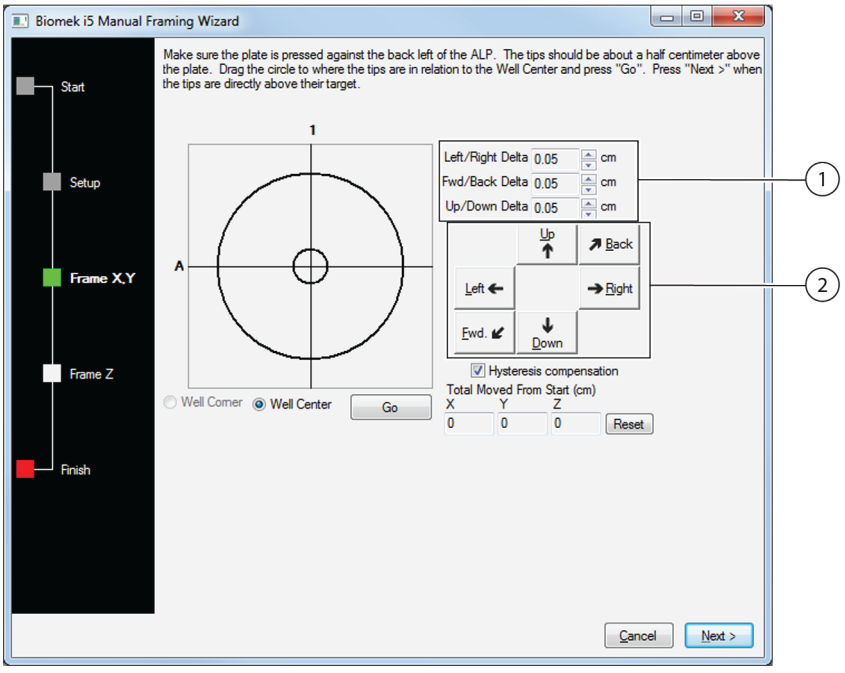
NOTE The tips may also be aligned with the position using the delta value and directional buttons (refer to *Using the Delta Value and Directional Buttons*).

4 Once the tips are centered in the well, select **Next**. **Frame Z** opens. (refer to *Using the Delta Value and Directional Buttons*).

Using the Delta Value and Directional Buttons

The tips can be positioned manually using the delta values and directional buttons to align it in X, Y, or Z (Figure 8.14). Pressing one of the directional buttons moves the pod in that direction by the distance specified in Delta. Use the directional buttons and delta values to place the tips appropriately.

Figure 8.14 Using delta values and directional buttons to position the tips



1. **Delta value** — The magnitude of change applied to the pod each time a directional button is selected.
2. **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 Tips:

1 In **Delta**, select the magnitude of change to be applied to the tips each time a directional button is selected (Figure 8.14). The default **Delta** value is 0.05 cm.

NOTE 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 make smaller adjustments to the position (minimum setting is 0.005 cm).

2 Select the **directional button** representing the motion required to physically move the tips to the desired location (Figure 8.14).

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 well 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**'.

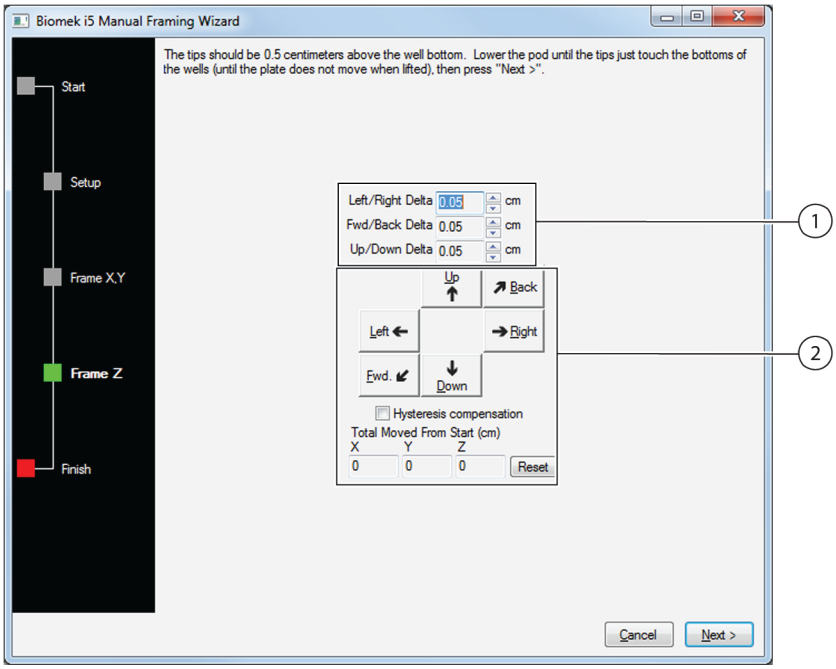
3 Visually verify the position of the tips in relation to the well. If the tips are still not in the desired locaton, repeat steps 1 and 2 until they are accurately positioned.

NOTE The tips may also be aligned in the X- and Y-axes using the graphic alignment tool, (refer to *Using the Graphic Alignment Tool*).

4 Click **Next**. **Frame Z** opens.

5 Use the Up and Down directional buttons and Delta Values to align the Z-axis so that the tips just touch the bottoms of the wells (Figure 8.15)

Figure 8.15 Use delta values and directional buttons to set the Z value for the tips



1. **Delta value** — The magnitude of change applied to the pod each time a directional button is selected.
2. **Directional buttons** — Move the pod by the amount shown in Delta with each press of a button.

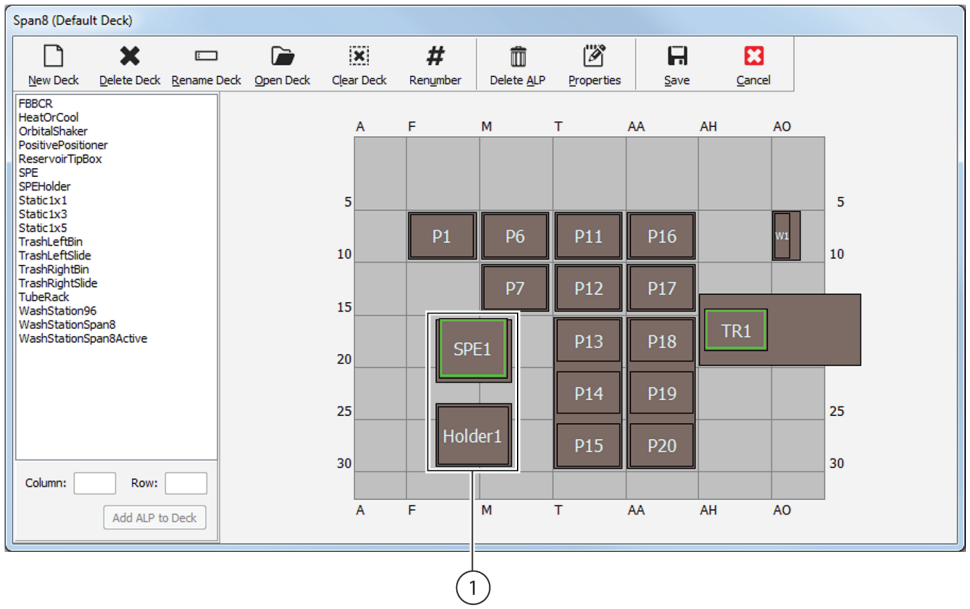
6 Choose **Next** to complete the procedure. **Biomek i-Series Manual Framing Wizard** closes.

Manually Framing the SPE ALP Using the Gripper

⚠ CAUTION

Framing the SPE 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.

Figure 8.16 Deck Editor with SPE ALP



1. First frame any deck position, preferably a Static 1 x 1 ALP, then use that framed position as a reference point to frame each position on the SPE ALP.

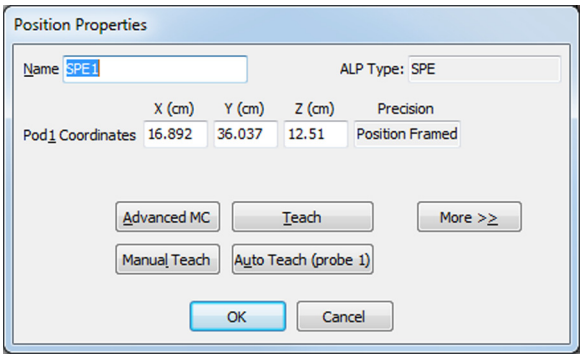
To Frame the SPE ALP:

1 Using the Accuframe, frame a standard deck position to create a reference point from which to frame the ALP (according to procedures outlined in the *Biomek i-Series Hardware Reference Manual* (B54474), *Framing Deck Positions on the Biomek i-Series Instrument Using AccuFrame.*

2 Place a 96-well microplate on this standard, framed position.

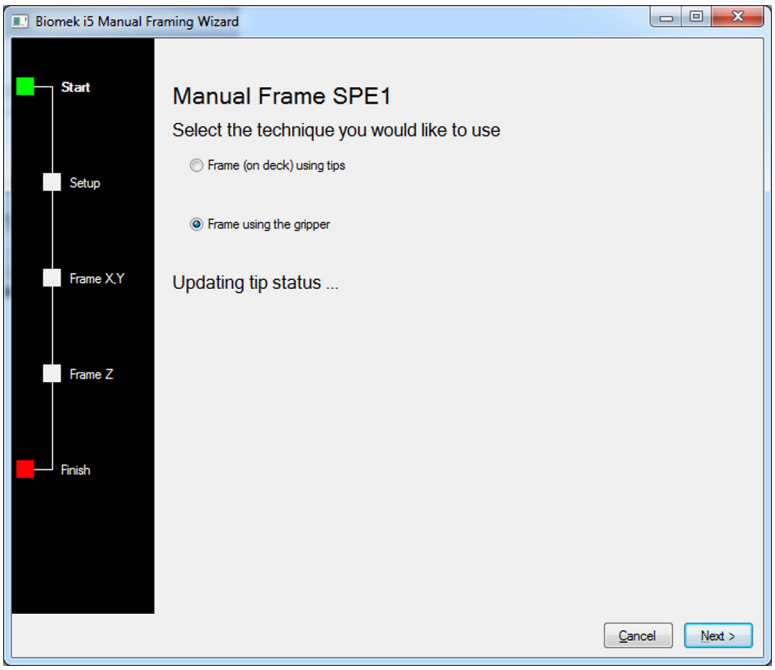
3 From the **Deck Editor**, double-click the SPE ALP position to be framed. **Position Properties** appears (Figure 8.17).

Figure 8.17 Position Properties



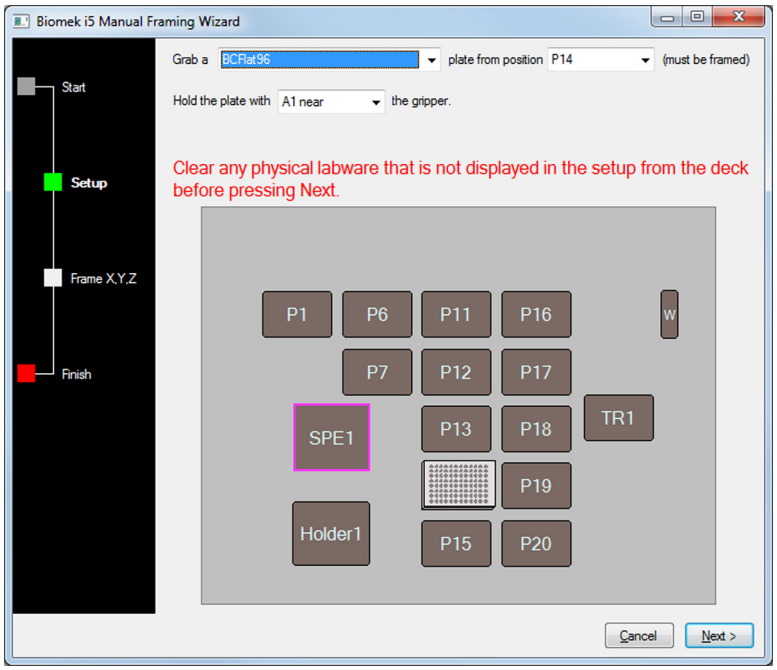
4 Choose **Manual Teach** (Figure 8.17). **Biomek i-Series Manual Framing Wizard — Start** appears (Figure 8.18).

Figure 8.18 Biomek i-Series Manual Framing Wizard



5 Choose **Frame using the gripper**. Then select **Next**. **Biomek i-Series Manual Framing Wizard — Setup** appears (Figure 8.19).

Figure 8.19 Biomek i-Series Manual Framing Wizard - Setup



6 In **Grab a**, choose the labware type placed on the position that was framed in step 1 (Figure 8.19).

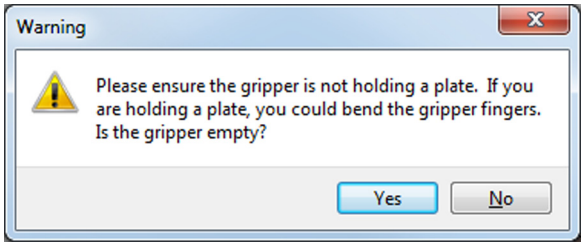
7 In **plate from position**, choose the position that was framed in step 1 (Figure 8.19).

8 In **Holding the plate with**, select the side to grasp the labware.

- **A1 near** means that the gripper picks up the plate with the fingers pointing towards the right.
- **A1 away** from means that the gripper picks up the plate with the fingers pointing towards the left.

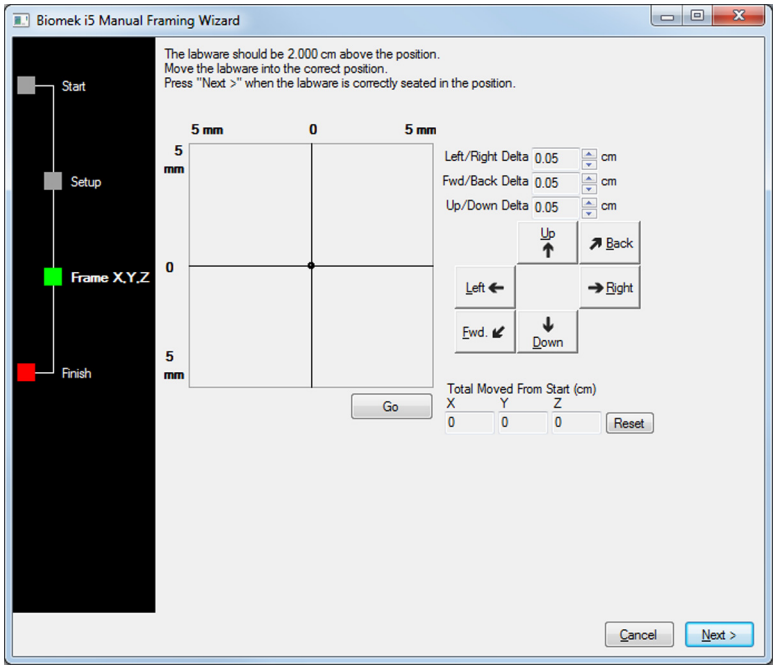
9 Choose **Next.** A **Warning** appears (Figure 8.20).

Figure 8.20 Warning to Ensure the Gripper is Not Holding A Plate



10 Ensure the gripper is not holding a microplate and choose **Yes. Biomek i-Series Manual Framing Wizard-Frame X,Y,Z** appears (Figure 8.21). The gripper picks up the labware from the framed position and moves it approximately 2 cm above the position on the SPE ALP.

Figure 8.21 Biomek i-Series Manual Framing Wizard - Teach X,Y



11 Adjust the X, Y, and Z positions of the gripper to position the microplate appropriately in the ALP by either:

- *Using the Graphic Alignment Tool*

  or

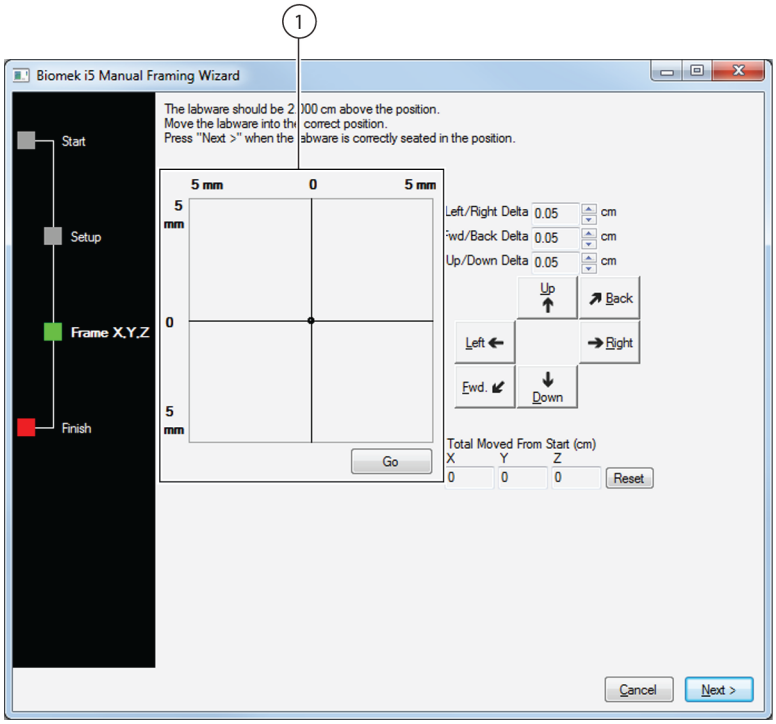
- *Using the Delta Value and Directional Buttons*

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 the Up/Down Delta value (refer to *Using the Delta Value and Directional Buttons*).

Using the Graphic Alignment Tool

The graphic alignment tool (Figure 8.22) 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 8.22 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.

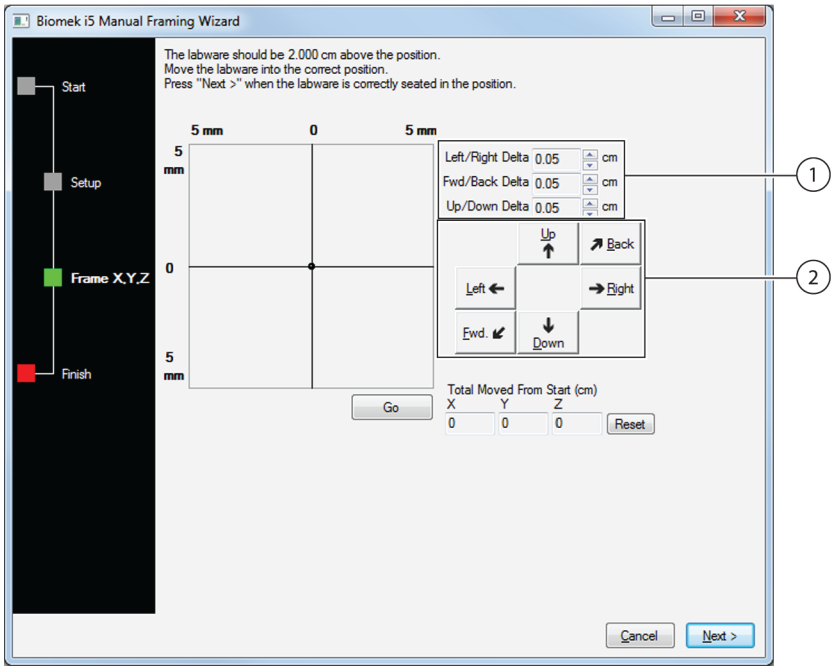
NOTE The microplate may also be aligned with the position using the delta value and directional buttons (refer to *Using the Delta Value and Directional Buttons*).

4 Once the microplate is aligned in the X, Y, and Z-Axes to the position being framed, press **Next** to complete the framing procedure.

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 8.23). 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 8.23 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 8.23). 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 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 microplate into the appropriate position at the position being framed (Figure 8.23).

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. 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 i-Series Manual Framing Wizard** closes and the gripper moves the labware to the original framed position.

Framing the SPE Collar Stand Using the AccuFrame (Multichannel Pod only)

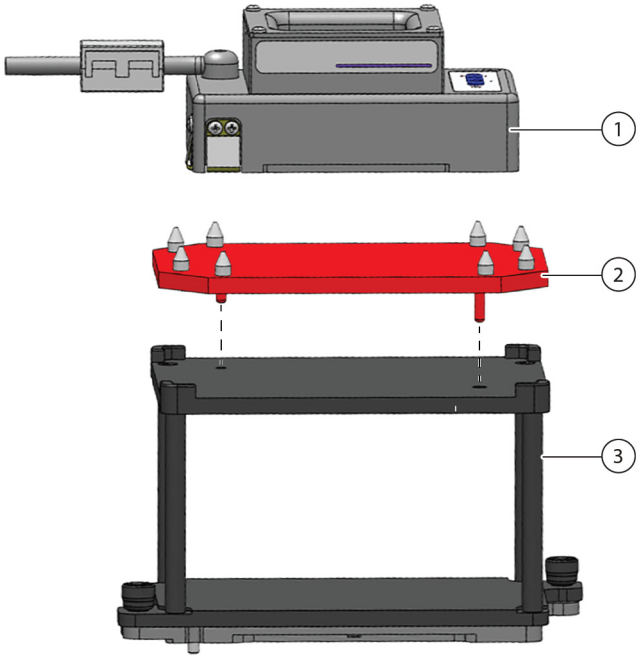
NOTE For a Span-8 Pod, the SPE Collar Stand must be framed using manual framing. See *Framing the SPE ALP Using Tips*.

The SPE Collar Stand is framed using the AccuFrame and the Framing Tool Adaptor.

To frame the SPE ALP Collar Stand:

1 Manually place the AccuFrame onto the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down onto the Adaptor (Figure 8.24).

Figure 8.24 Placing the Framing Tool Adaptor and AccuFrame on the SPE Collar Stand



1. **AccuFrame**
2. **Framing Tool Adaptor**
3. **SPE Collar Stand**

2 Frame the SPE Collar Stand according to the instructions outlined in the *Biomek i-Series Hardware Reference Manual* (B54474), *Framing Deck Positions on the Biomek i-Series Instrument Using AccuFrame*.

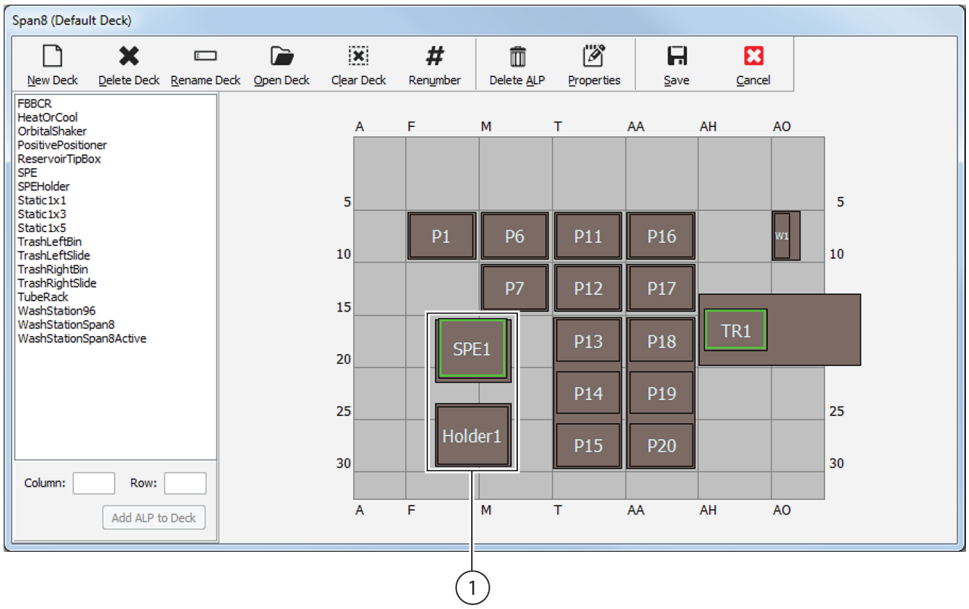
Manually Framing the SPE Collar Stand

⚠ CAUTION

Framing the SPE Collar Stand 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.

Framing the SPE Collar Stand includes first framing the SPE ALP, and then using that framed position as a reference point to frame the SPE Collar Stand.

Figure 8.25 Deck Editor with SPE Collar Sand



1. First frame the SPE ALP, then use that framed position as a reference point to frame the SPE Collar Stand

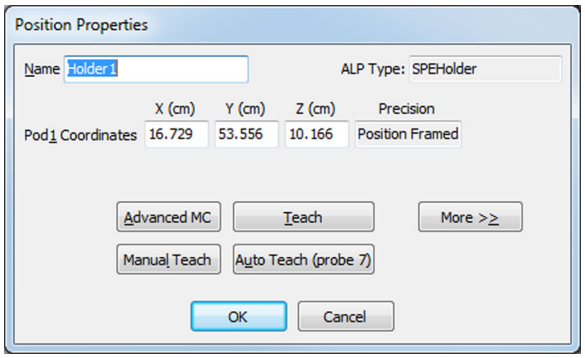
To Frame the SPE Collar Stand:

1 Using the AccuFrame, frame the SPE ALP to create a reference point from which to frame the SPE Collar Stand (refer to *Framing the SPE ALP Using the AccuFrame (Multichannel Pod Only)*).

2 Place a collar, such as the 36mm collar, on the SPE ALP.

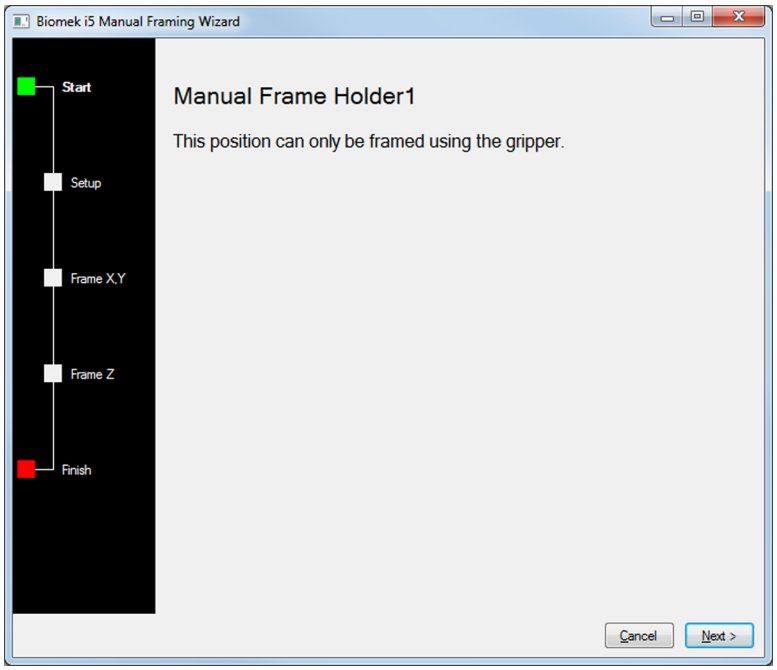
3 From the **Deck Editor**, double-click the SPE Collar ALP position to be framed. **Position Properties** appears (Figure 8.26).

Figure 8.26 Position Properties



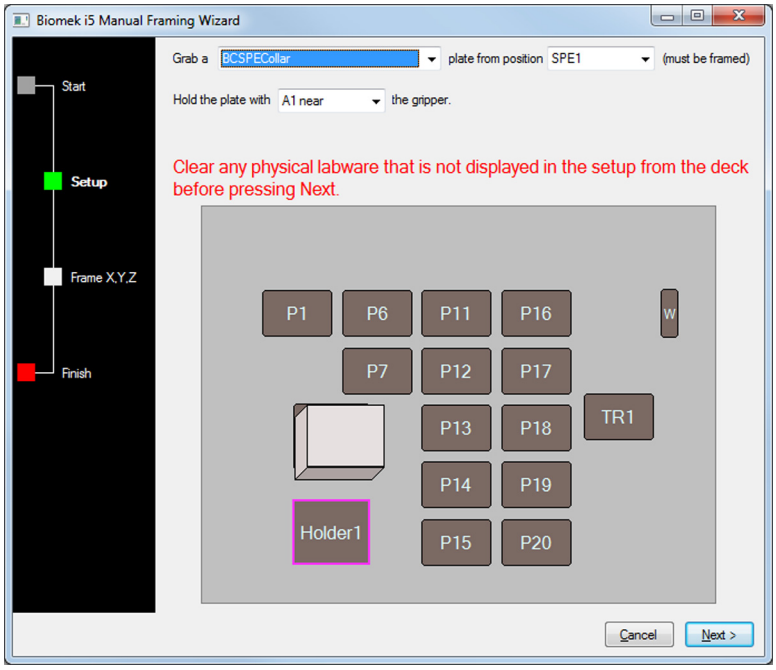
4 Choose **Manual Teach. Biomek i-Series Manual Framing Wizard — Start** appears (Figure 8.27). Select **Next.**

Figure 8.27 Framing Wizard — Start



5 In **Grab a,** choose the Collar placed on the SPE ALP that was framed in step 1 (Figure 8.28).

Figure 8.28 Biomek i-Series Manual Framing Wizard - Setup



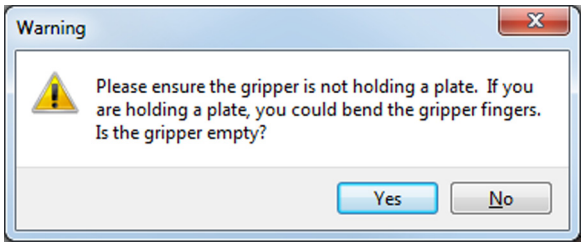
6 In **plate from position**, choose the SPE ALP that was framed in step 1 (Figure 8.28).

7 In **Holding the plate with**, select the side to grasp the labware.

- **A1 near** means that the gripper picks up the plate with the fingers pointing towards the right.
- **A1 away** from means that the gripper picks up the plate with the fingers pointing towards the left.

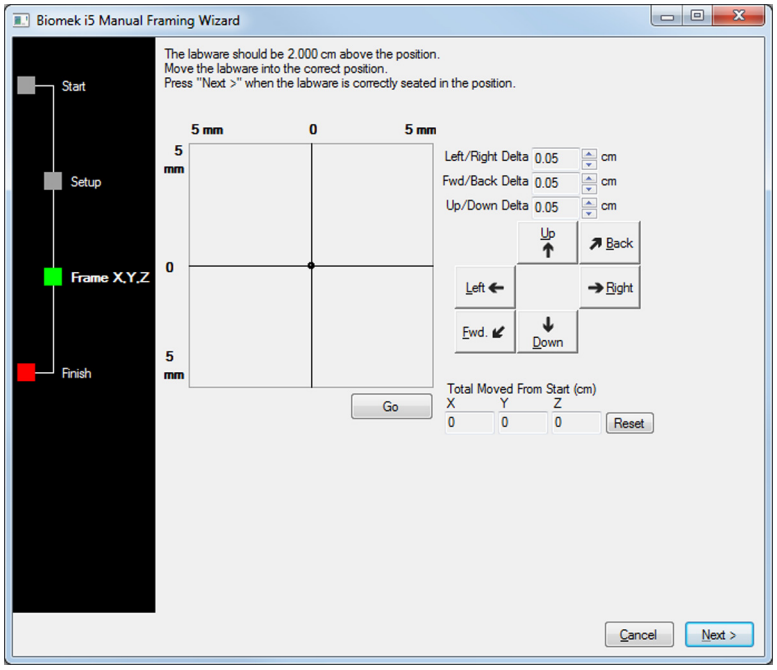
8 Choose **Next**. A **Warning** appears (Figure 8.29).

Figure 8.29 Warning to ensure the gripper is not holding a plate



9 Ensure the gripper is not holding a microplate and choose **Yes**. **Biomek i-Series Manual Framing Wizard-Frame X, Y, Z** appears (Figure 8.30). The gripper picks up the labware from the framed position and moves it to approximately 2 cm above the position on the SPE Collar Stand.

Figure 8.30 Biomek i-Series Manual Framing Wizard Frame X,Y,Z



10 Adjust the X, Y, and Z positions of the gripper to position the microplate appropriately in the ALP by either:

- *Using the Graphic Alignment Tool*

  or

- *Using the Delta Value and Directional Buttons*

11 Press **Next** to complete the Wizard.

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 i-Series Software Reference Manual*, B56358, *Instrument Setup Step*) and configuration of the **SPE** step.

Configuring the SPE Step

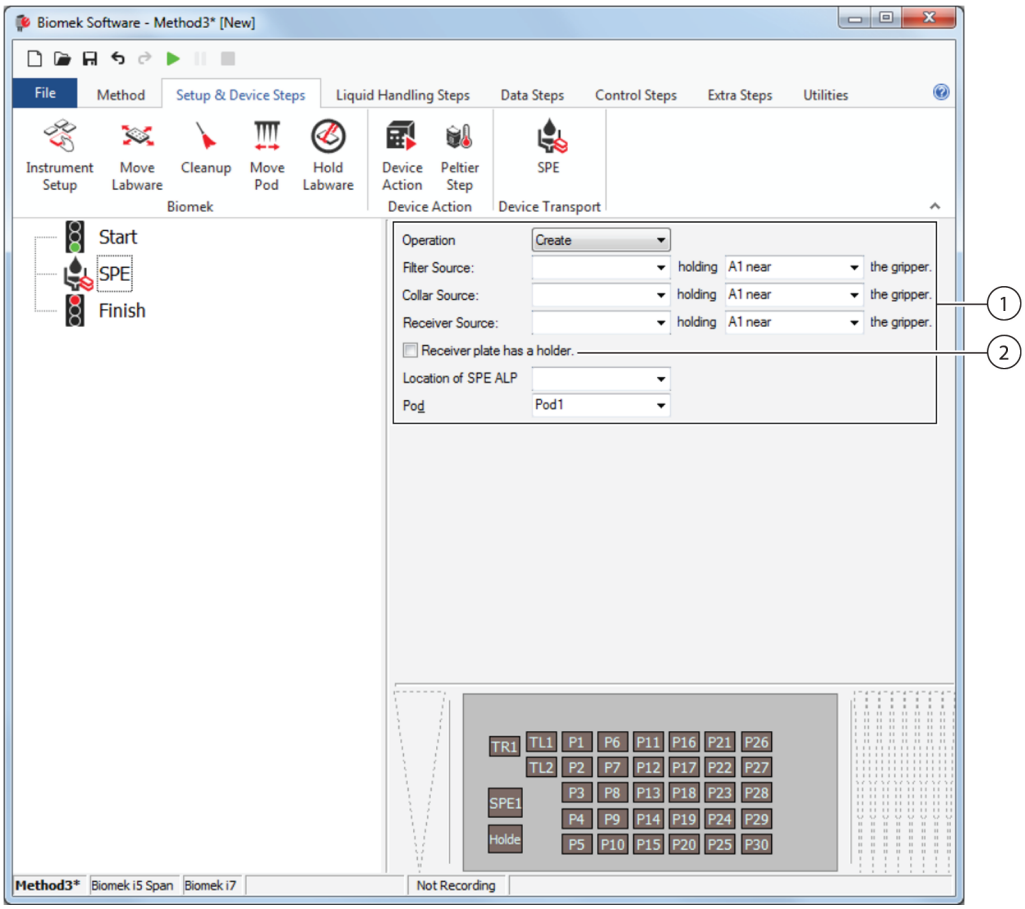
The **SPE** step is a convenient way of executing the assembly and disassembly of the SPE ALP system. An **SPE** step must be configured when an SPE ALP is required to complete a method. The configuration for the **SPE** step informs the Biomek Software of the:

- Operation required of the **SPE** step (Figure 8.31)
- Location of the filtered microplate used by the SPE ALP
- Location of the Collar
- Location of receiver plate, and whether the receiver has a holder
- Location of the SPE ALP on the deck
- Pod creating/destroying the SPE stack

To configure the SPE step:

1 In Biomek Software, choose the **Setup & Device Steps** tab, and in the **Device Transport** group, select (**SPE**). This will insert an SPE step into the Method View.(Figure 8.31).

Figure 8.31 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 In **Holding the labware with**, select the side to grasp the labware.

- **A1 near** means that the gripper picks up the plate with the fingers pointing towards the right.
- **A1 away from** means that the gripper picks up the plate with the fingers pointing towards the left.

Ensure appropriate clearance is available when choosing the side to grasp (see *Biomek i-Series Automation Workstations Software Reference Manual*, B56358 for more information on required clearance).

5 Select the location of the **Collar Source** for the SPE stack.

6 Select the location of the **Receiver Source** for the SPE stack. The **Receiver Source** is any microplate that is positioned inside the SPE Collar. 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**.

7 Select **Receiver plate has a holder** if the receiving microplate is positioned in a holder.

8 Select the **Location of SPE ALP** on the Biomek deck.

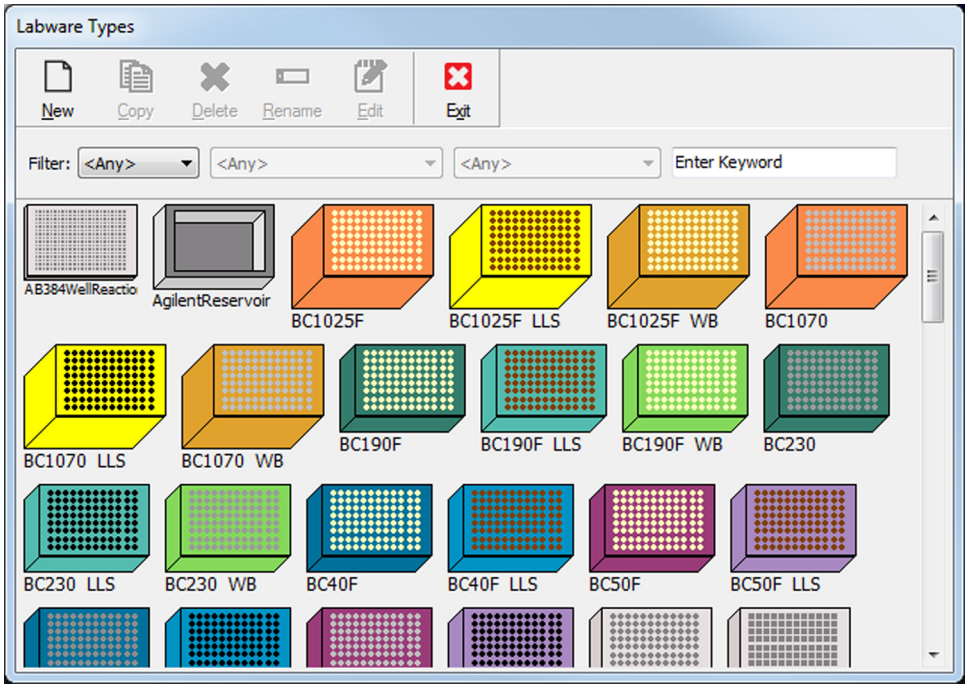
9 Specify the **Pod** accessing the SPE stack.

10 Select a step that occurs after the **SPE** step or the **Finish** step to validate the step configuration.

Adjusting Grip Height for Labware

1 In the Biomek Software, choose the **Utilities** tab. In the **Project** group, select **Labware Type Editor**.

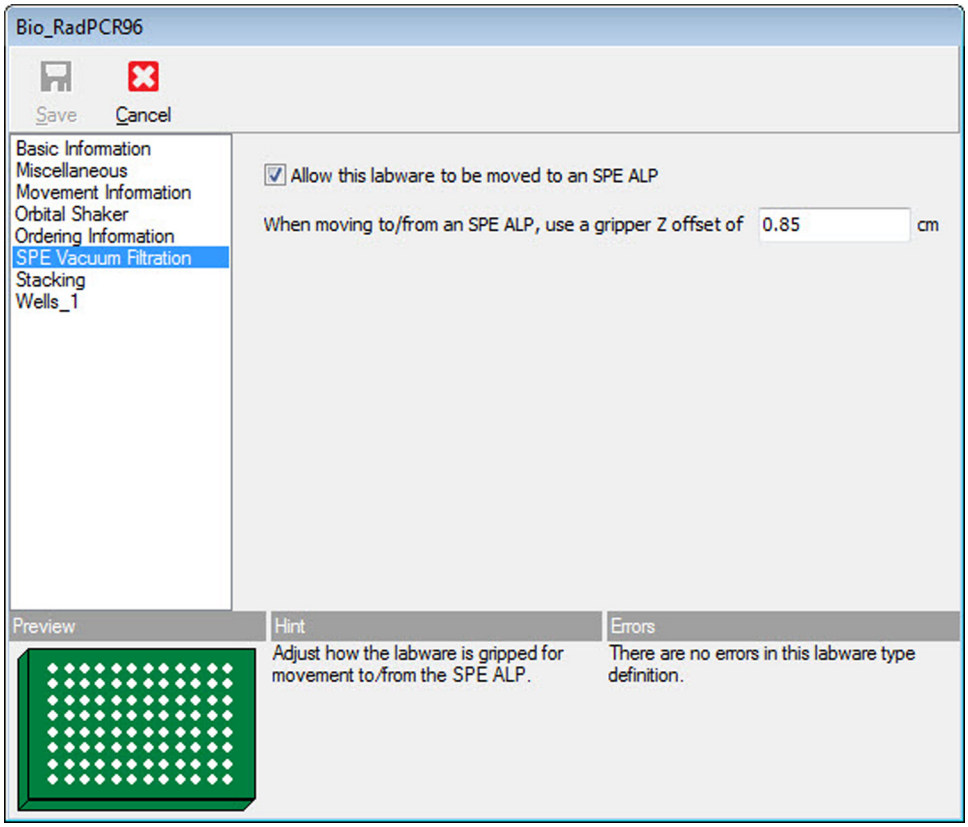
Figure 8.32 Labware Type Editor



2 Double click the appropriate titerplate.

3 Select **SPE Vacuum Filtration**, then check **Allow this labware to be moved to an SPE ALP**.

Figure 8.33 Allow labware to be Moved to an SPE ALP Checkbox



4 Specify the **Gripper Z Offset** as the height from the bottom of the labware that the grippers should grasp when moving to the SPE Stack.

5 Select **Save**. Press **Exit** to close the Labware Types window.

NOTE Receiver plates should specify a **Gripper Z Offset** that grasps the labware above the sides of the physical SPE ALP Base.

Defining Stack Offsets for Receiver Plates

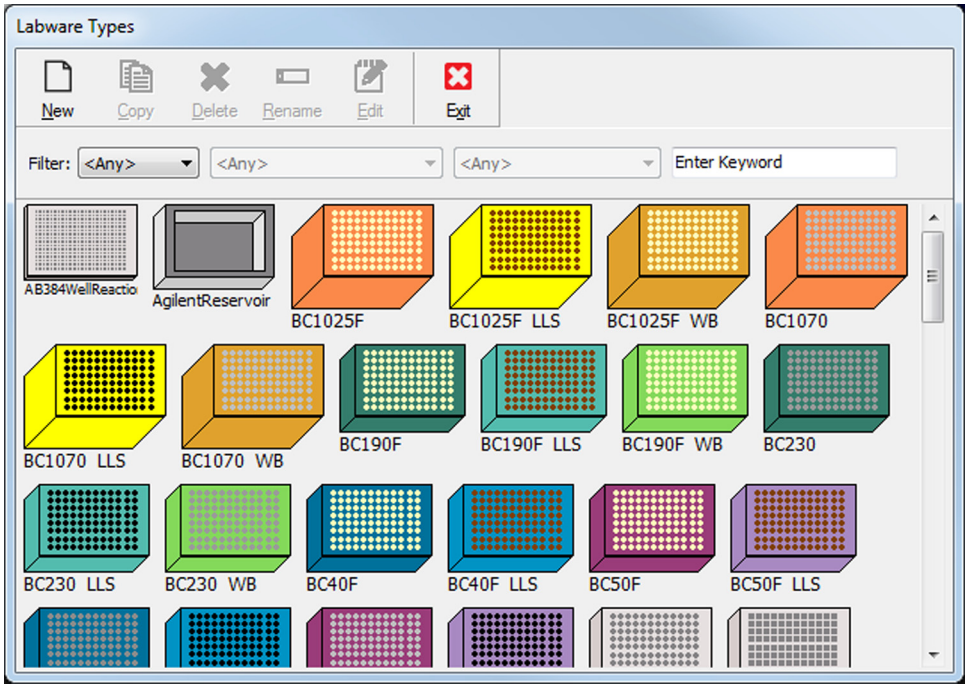
To use a receiver plate as part of an SPE Stack, the per labware offset must be defined.

1 If the receiver plate will not use a receiver holder, skip to step 6.

2 In the Biomek Software, choose the **Utilities** tab. In the **Project** group, select **Labware Type Editor** (Figure 8.34).

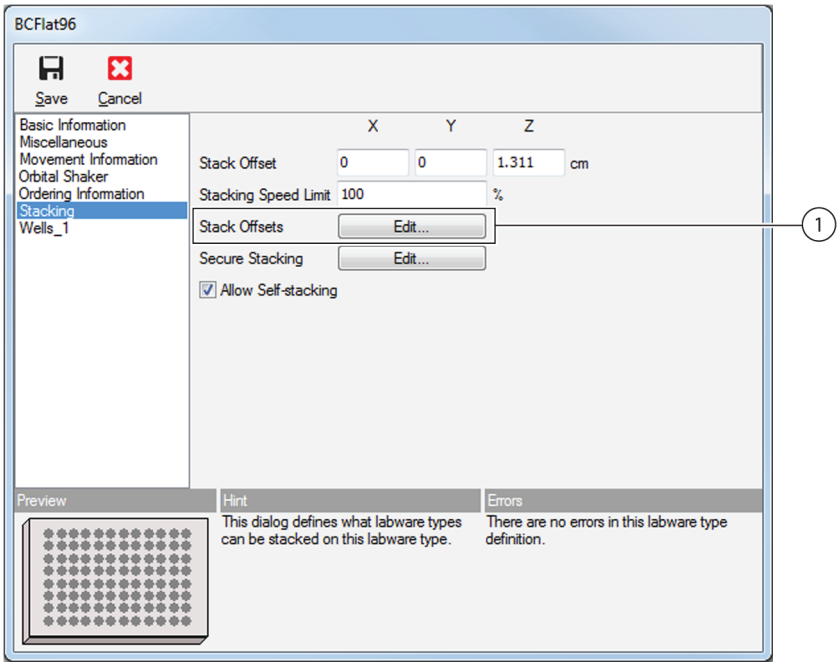
3 Double click the appropriate receiver holder.

Figure 8.34 Labware Type Editor



4 Select **Stacking**, then select the Stack Offsets **Edit...** button (Figure 8.35).

Figure 8.35 Stacking Options



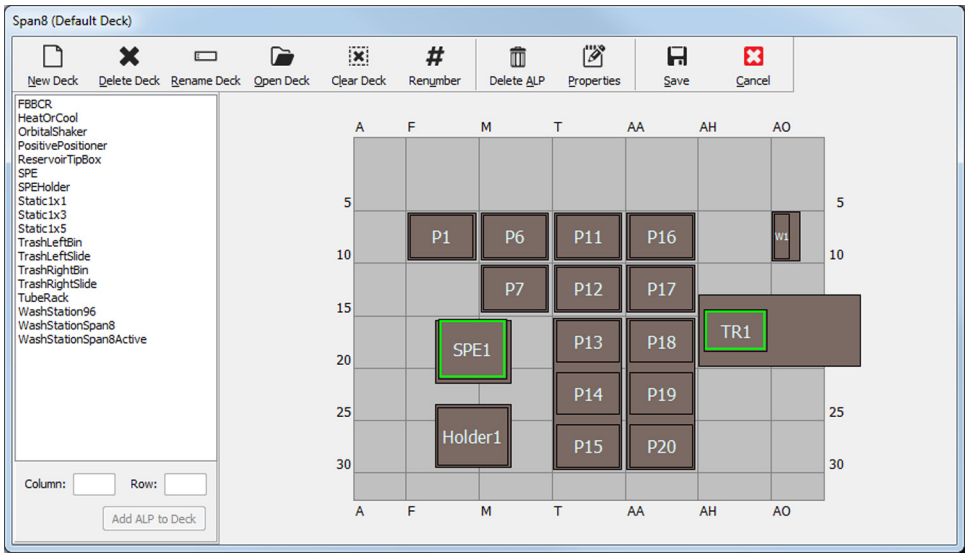
1. Stack Offsets **Edit...** Button

5 Check the box beside the appropriate receiver plate, and set the **Stack Offset Z** to be the measured distance in centimeters between the bottom of the receiver holder and the receiver plate. Remember this value as ***StackOffset*** for step 13. Select **OK**. Select **Save**. Press **Exit** to close the **Labware Types** window.

6 Follow the instructions for *Installing the SPE ALP and SPE Collar Stand* and *Framing Instructions*.

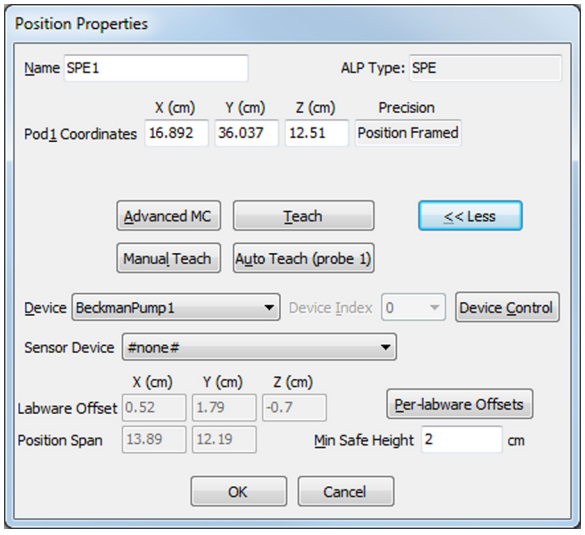
7 In the Biomek Software, choose the **Utilities** tab. In the **Instrument** group, select **Deck Editor**. The **Deck Editor** Dialog opens. (Figure 8.36).

Figure 8.36 Deck Editor Dialog



8 Double click the SPE ALP. The **Position Properties** dialog appears. Press More >> (Figure 8.37).

Figure 8.37 Position Properties expanded



9 Click the **Per-Labware Offsets** button.

10 Select the collar which will be used with the receiver plate. Record the Per-Labware Offsets for the collar, which will be used in step 13.

11 Press **OK** to close the **Per-Labware Offsets** window. Press **OK** to close the **Position Properties** window. Press **Save**.

12 Open the **Labware Type Editor**. Double click the receiver plate. Select **Stacking**, and **Edit Stack Offsets**.

13 Find the collar in the Stackable Item list. Check the checkbox beside the collar to make it stackable.

- **a.** Set the Stack Offset X and Stack Offset Y to be the **Per Labware X Offset** and **Per Labware Y Offset** values recorded in Step 10.
- **b.** If the receiver plate has a holder, set Stack Offset Z to the collar's **Per Labware Z Offset** (from step 10) - **StackOffset** (from step 5).
- **c.** If the receiver plate does not have a holder, set Stack Offset Z to be the Collar's **Per Labware Z Offset** (from step 10).

14 Press **OK** to close the Stackable Items window. Press **Save** to save the labware. Press **Exit** to close the Labware Type Editor.

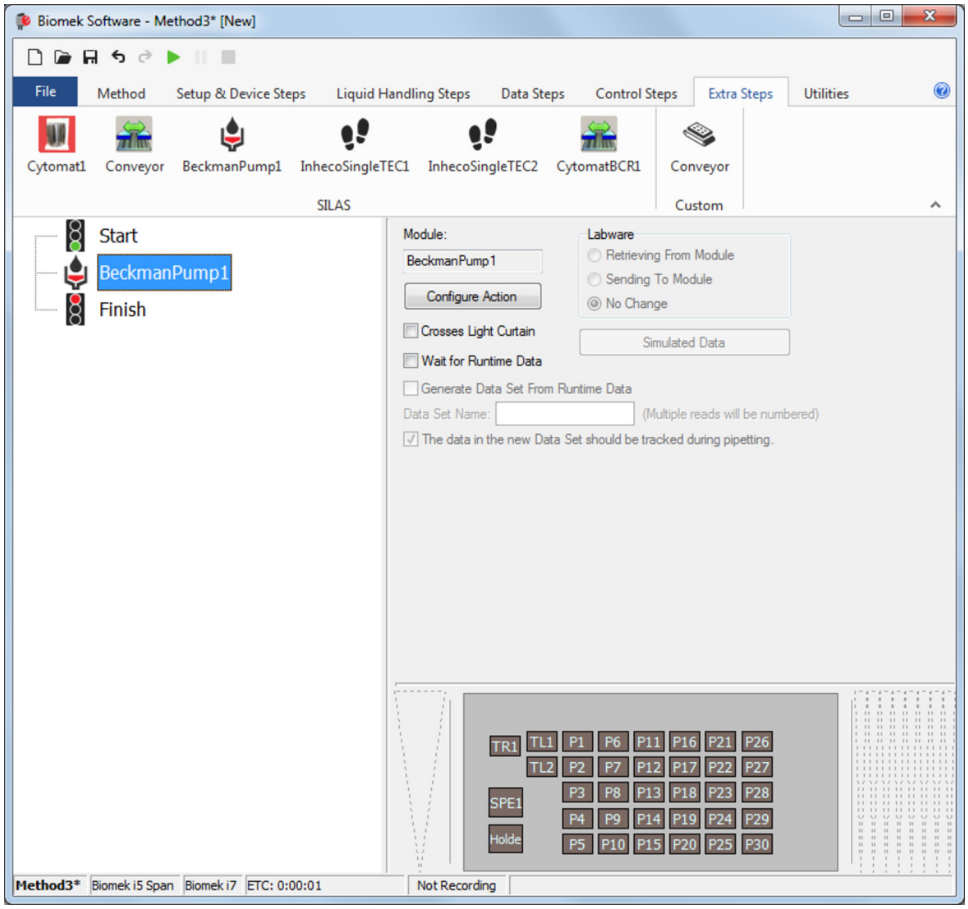
Controlling the Vacuum Valve Unit Inside a Method

The Vacuum Valve Unit can be controlled by the Beckman Pump step immediately after performing the Beckman Pump software installation.

In Biomek Software, choose the **Extra Steps** tab, and in the **SILAS** group, select **BeckmanPump**. This will insert a Beckman Pump step into the Method View (Figure 8.38).

To turn on the Vacuum Valve Unit for vacuum extraction:

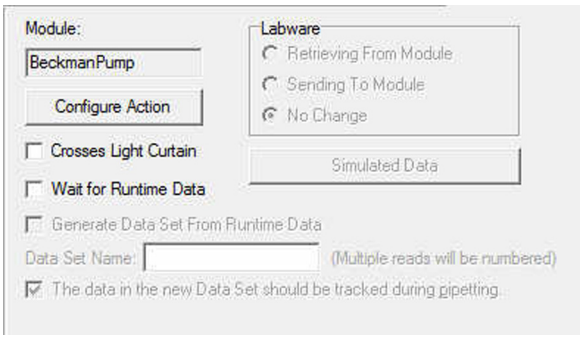
Figure 8.38 Configure action



1 Assemble the SPE Stack.

2 Add a **Beckman Pump** step and press **Configure Action** (Figure 8.39).

Figure 8.39 Configure Action button

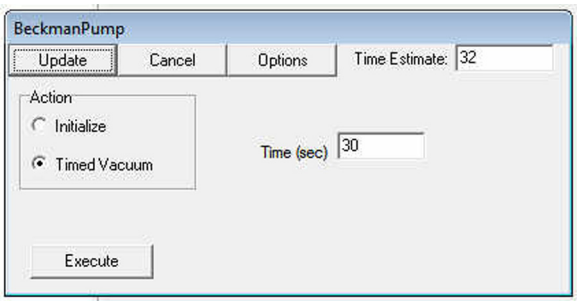


3 Configure the desired action. The following actions are available:

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 8.40 Timed Vacuum with specified number of seconds



4 Click **Update**.

Controlling the Vacuum Valve Unit Outside a Method

To control the Vacuum Valve Unit outside a method, do the following:

1 In Biomek Software, choose the **Utilities** tab, and in the Instrument group, select **Device Editor**. This will open the Device Editor.

2 In the **Device:** dropdown, select **beckmanpump**.

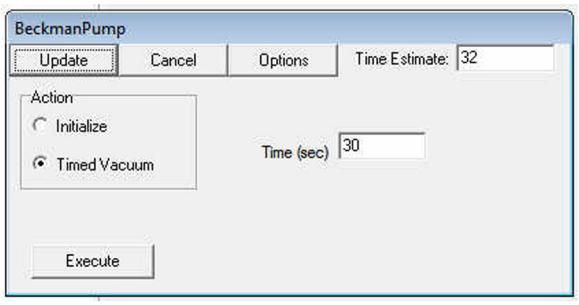
3 Select **Action Commands**.

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 8.41 Timed Vacuum with specified number of seconds



5 To execute the action, press **Execute**.

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.

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.

Troubleshooting

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

Table 8.1 Troubleshooting the SPE 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.

Table 8.1 Troubleshooting the SPE ALP

If...	Then...
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.
The SPE ALP Base sticks to the collar when moving the manifold off the SPE ALP.	Add a timed pause after the timed vacuum, using the SPE ALP as a resource, to allow the air pressure to return to equilibrium. A pause of 3 seconds may be enough to return to equilibrium, but confirm the pause length in your application, as conditions may vary.

CHAPTER 9

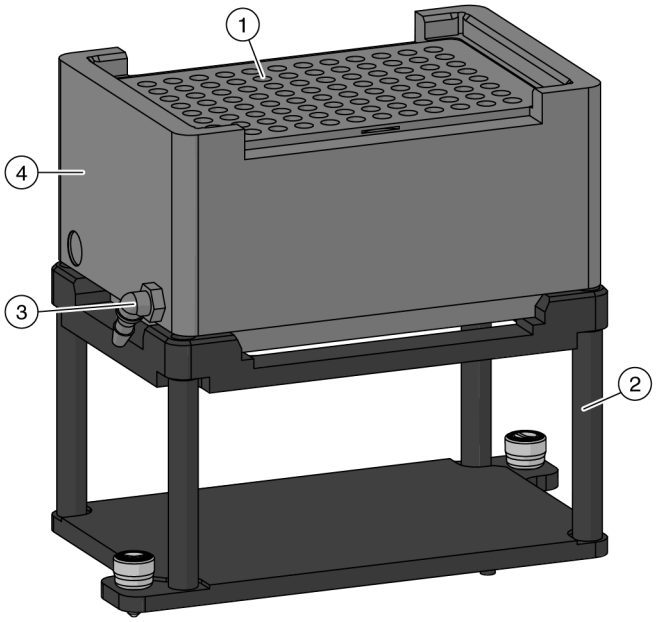
Circulating Reservoir/Tip Box ALP

Overview

The Circulating Reservoir/Tip Box ALP is an active ALP that conserves space on the deck by allowing a tip box or other labware to sit on top of a circulating reservoir, where a continuous supply of solvent, buffer, or reagent is provided (Figure 9.1). The ALP is designed to occupy one deck position and allow the pod head to fly over the reservoir/tip box stack.

Biomek Software is used to configure and operate the ALP in an automated liquid handling method. In a method, the tips in a tip box stored on top of the ALP can be used to transfer the contents of the reservoir or the contents of other labware. To transfer the liquid contained in the circulating reservoir, the tip box is first moved to another ALP with the grippers, making the reservoir accessible. Generally, after the transfer, the tips are unloaded back into the tip box, and the tip box is moved back to the ALP.

Figure 9.1 Circulating Reservoir/Tip Box ALP



1. **Circulating Reservoir Lid**
2. **Circulating Reservoir Stand**
3. **Inlet Fitting** (Outlet fitting on opposite side is not shown.)
4. **Circulating Reservoir**: Tip box (not shown) fits on top of the Circulating Reservoir

The sections in this chapter include:

Installing the Circulating Reservoir/Tip Box ALP

Physically installing the Circulating Reservoir/Tip Box ALP on the deck requires:

Choosing a Deck Position and Adding the ALP to the Deck Editor

The Circulating Reservoir/Tip Box ALP can be physically mounted on the deck in any standard position. Several Circulating Reservoir/Tip Box ALPs can be mounted on the deck at the same time when there is adequate space to correctly route the tubing.

A new Circulating Reservoir/Tip Box ALP is added to the deck using the **Deck Editor**. Appropriate deck positions for the ALP are displayed automatically when it is selected from the **ALP Types List**.

To select a deck position for a Circulating Reservoir/Tip Box ALP:

---

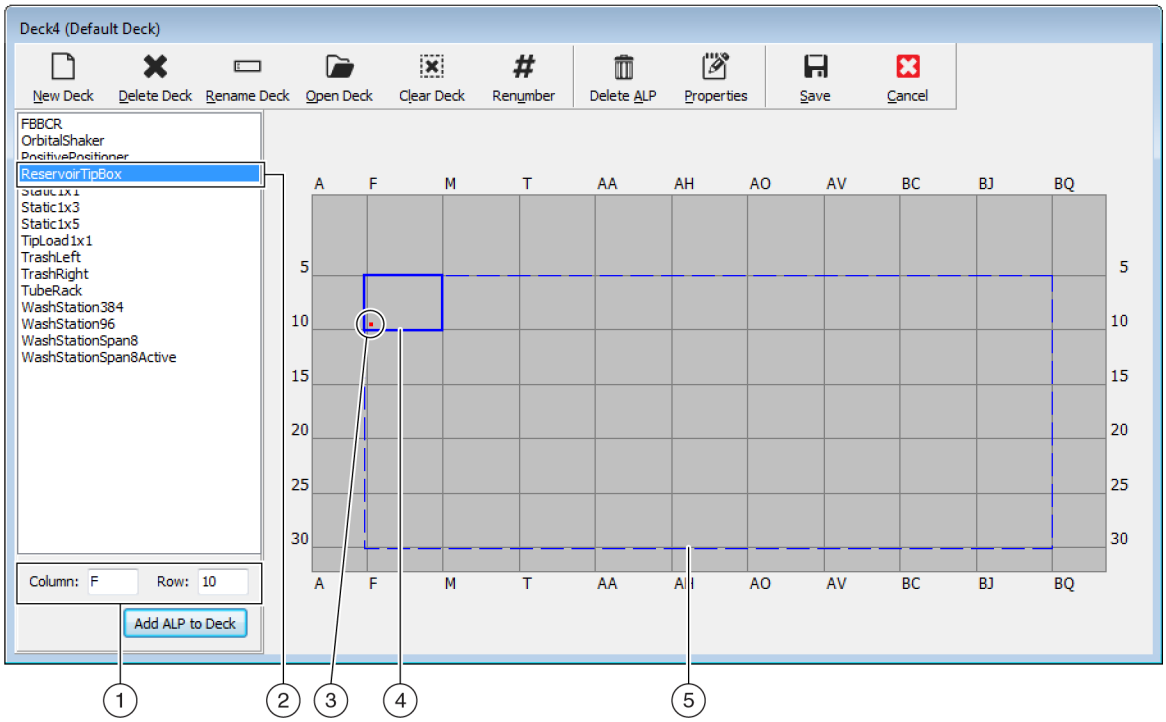
1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the **ReservoirTipBox** ALP in the ALPs Type List. The area capable of supporting the ALP is indicated by blue dashed lines. When adding the ALP to the **Deck Editor**, make sure that the position in the software does not currently contain an ALP.

In Figure 9.2, the **ReservoirTipBox** was selected on a cleared Biomek i7 instrument deck.

Figure 9.2 Area Capable of Supporting the Circulating Reservoir/Tip Box ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost notch) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, which is the location of the frontmost notch, as shown in Figure 9.1.

NOTE When choosing a position for a Circulating Reservoir/Tip Box ALP, keep in mind the following:

- If mounting the ALP next to a Static 1 x 1 or Static 1 x 3 ALP, make sure to allow at least one empty grid space of clearance between the two ALPs.
- If installing to the left or right of another ALP requiring a mounting plate, make sure to position them so that the tabs do not overlap.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added. Positions may be renamed as desired (refer to *Setting Circulating Reservoir/Tip Box ALP Position Properties*).

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Additional **Deck Editor** settings for this position will be configured in *Setting Circulating Reservoir/Tip Box ALP Position Properties*.

Mounting the Circulating Reservoir/Tip Box ALP to the Deck

Three components make up the on-deck ALP (Figure 9.1):

- Circulating Reservoir Stand
- Circulating Reservoir Labware
- Standard Mounting Plate

NOTE The circulating reservoir lid may be placed on top of the reservoir to help prevent liquid evaporation and limit exposure to light (Figure 9.1). When the lid is placed on the circulating reservoir, it is accessible only by a 96-channel head. A Span-8 pod cannot access a reservoir with a lid in place.

⚠ WARNING

Risk of personal injury or equipment damage. Turn off power to the instrument before mounting any active ALP. Failure to do so can cause electrical shock or equipment damage.

To mount the ALP to the deck:

1 Remove the circulating reservoir from the circulating reservoir stand and set it aside.

NOTE The circulating reservoir is not physically connected to the circulating reservoir stand with screws or pins. The weight of the reservoir, combined with the four corner guides on the stand, keep it firmly in place.

2 Install the mounting plate and ALP on the deck by completing the instructions in CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*.

3 Place the reservoir on the stand.

NOTE The reservoir has no specified left and right orientation, which allows it to be positioned on the stand facing either direction.

Installing the Peristaltic Pump, Reagent Bottle, and Tubing

Inlet and outlet tubing runs between the Circulating Reservoir/Tip Box ALP, the peristaltic pump, and reagent bottle. The inlet tubing has a smaller diameter than the outlet tubing.

⚠ WARNING

Risk of personal injury or contamination. Do not place the peristaltic pump or the reagent bottle(s) on the deck. Place the peristaltic pump and reagent bottles on a surface where they do not interfere with instrument movement.

To install the peristaltic pump, reagent bottle, and tubing:

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

2 Place the reagent bottle at an off-deck location near the peristaltic pump, in an accessible position lower than the deck height.

3 Attach the smaller diameter tubing to the inlet fitting on the ALP.

NOTE The inlet fitting is the smaller fitting centered on the side of the circulating reservoir (Figure 9.3).

4 Attach the larger diameter tubing to the outlet fitting on the ALP.

NOTE The outlet fitting is the larger fitting near the corner on the opposite side of the circulating reservoir from the inlet fitting.

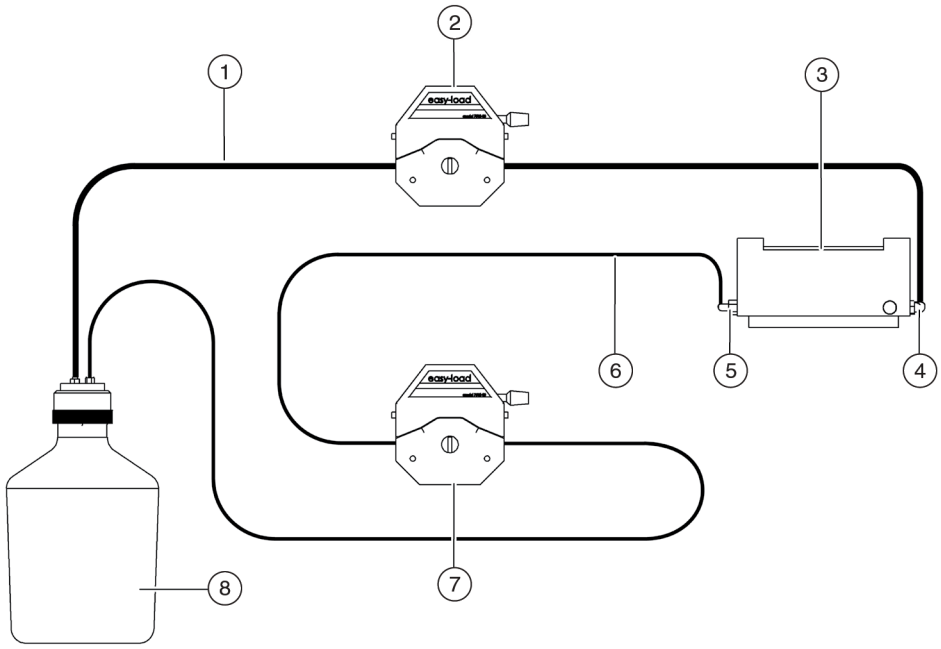
5 Route the inlet and outlet tubing off the deck either through the access holes in the back of the instrument, or between the light curtain and deck along the front of the workstation.

NOTE When routing the tubing between the light curtain and deck, make sure it does not interfere with the light curtain or the movement of the pod(s).

6 Route the inlet tubing through the front pump head of the peristaltic pump (Figure 9.3).

7 Route the outlet tubing through the rear pump head of the peristaltic pump (Figure 9.3).

Figure 9.3 Correctly Routed Tubing



1. Larger Diameter Outlet Tubing
2. Rear Pump Head
3. Circulating Reservoir
4. Outlet Fitting
5. Inlet Fitting
6. Smaller Diameter Inlet Tubing
7. Front Pump Head
8. Reagent Bottle

8 Insert the inlet tubing into the reagent bottle fitting that supplies fluid to the ALP.

NOTE The fitting that supplies fluid to the ALP extends to the bottom of the reagent bottle.

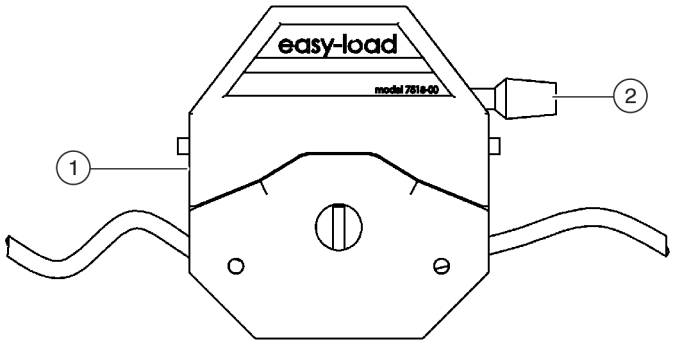
9 Insert the outlet tubing into the reagent bottle fitting that returns fluid from the ALP.

⚠ CAUTION

Risk of equipment damage. Improperly connecting the tubing into the pump heads could cause the peristaltic pump to malfunction. Make sure the tubing is locked into the pump heads.

10 Lock both pump heads by pushing the locking levers clockwise until they stop (Figure 9.4).

Figure 9.4 Pump Head with Tubing Locked in Place



1. Pump Head
2. Pump Head Locking Lever in Locked Position

11 Connect the peristaltic pump to one of the high voltage outputs on the Device Controller.

NOTE Use the included power adapter when connecting a peristaltic pump intended to run at 120 VAC to the Device Controller. The adapter is not required for a peristaltic pump intended to run at 220 VAC.

The Device Controller can handle 3.15 amps per high voltage port, or 6.3 amps maximum from all four high voltage ports. Do not exceed these limits when using multiple devices connected to the Device Controller.

Refer to the *ALPs Instructions for Use (PN 987836)* for more information about the Device Controller.

NOTE The peristaltic pump does not need to be connected to a Device Controller to operate the ALP. However, a pump not connected to the Device Controller cannot be controlled by **Device Action** steps in a method. It must be turned on and off manually using the switch on the pump itself.

Filling the Circulating Reservoir for the First Time

Before using the Circulating Reservoir/Tip Box ALP in a method, test it by using **Advanced Manual Control** to fill the circulating reservoir (refer to *Manually Controlling the Circulating Reservoir/Tip Box ALP*). Testing ensures that the tubing is connected properly, and helps determine the best operating speed for the peristaltic pump.

⚠ WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

⚠ CAUTION

Risk of method failure. Kinked tubing could cause blockage, causing an insufficient amount of fluid to be available for a method. Always thoroughly inspect all hoses before proceeding with a method run.

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

To fill the ALP for the first time:

1 Fill the reagent bottle with the desired fluid.

2 Turn on power to the instrument, Device Controller, and peristaltic pump.

3 Using **Advanced Manual Control** in the Biomek Software, turn on the peristaltic pump (refer to *Manually Controlling the Circulating Reservoir/Tip Box ALP*).

NOTE If the peristaltic pump is not connected to a Device Controller, turn on the pump manually using the switch on the pump itself.

⚠ WARNING

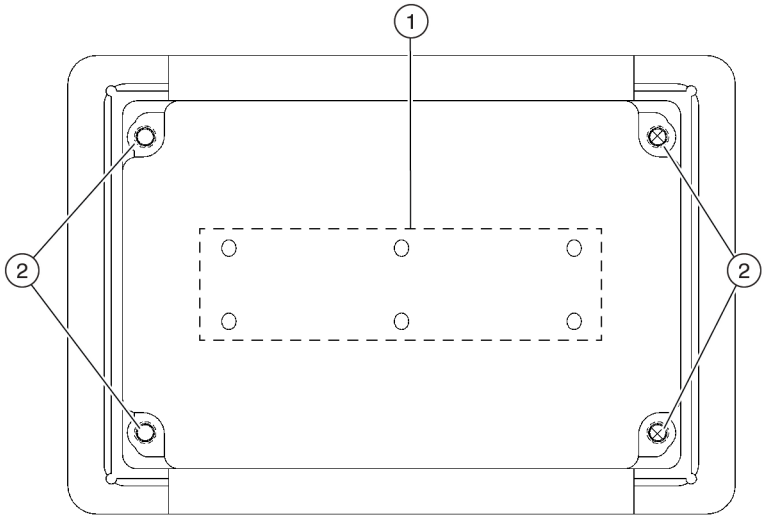
Risk of personal injury or contamination. Do not allow the reservoir to overflow. Clean up any spills immediately according to the procedures defined by your laboratory safety officer.

4 Starting at the minimum speed setting, adjust the peristaltic pump speed by turning the dial on the front of the pump clockwise until fluid fills the ALP and begins to drain through the outlet holes at each corner of the circulating reservoir (Figure 9.5).

NOTE The circulating reservoir fills through the six inlet holes in the center of the circulating reservoir (Figure 9.5). If fluid spills over the edges of the reservoir, slow down the pump.

NOTE Refer to the pump manufacturer's user manual for more information on using the peristaltic pump.

Figure 9.5 Top View of the Circulating Reservoir



1. **Inlet Holes**
2. **Outlet Holes**

Configuring the Circulating Reservoir/Tip Box ALP in Hardware Setup

The Biomek Software is used to configure, control, and operate the Circulating Reservoir/Tip Box ALP.

This section includes:

- *Adding and Configuring the Peristaltic Pump in Hardware Setup*

  NOTE Configuring **Hardware Setup** is not required if the peristaltic pump is not connected to a Device Controller.

- *Using the Circulating Reservoir/Tip Box ALP in a Method*
- *Manually Controlling the Circulating Reservoir/Tip Box ALP*

Adding and Configuring the Peristaltic Pump in Hardware Setup

After physically installing the ALP on the deck, the peristaltic pump must be properly added and configured in **Hardware Setup**.

NOTE **Hardware Setup** tells the 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 Configuring **Hardware Setup** is required only if the peristaltic pump is connected to a Device Controller.

NOTE For more information about adding, configuring, and removing devices in **Hardware Setup**, refer to the *Biomek i-Series Hardware Reference Manual, PN B54474*.

Adding a Peristaltic Pump in Hardware Setup

To add a peristaltic pump in **Hardware Setup**:

---

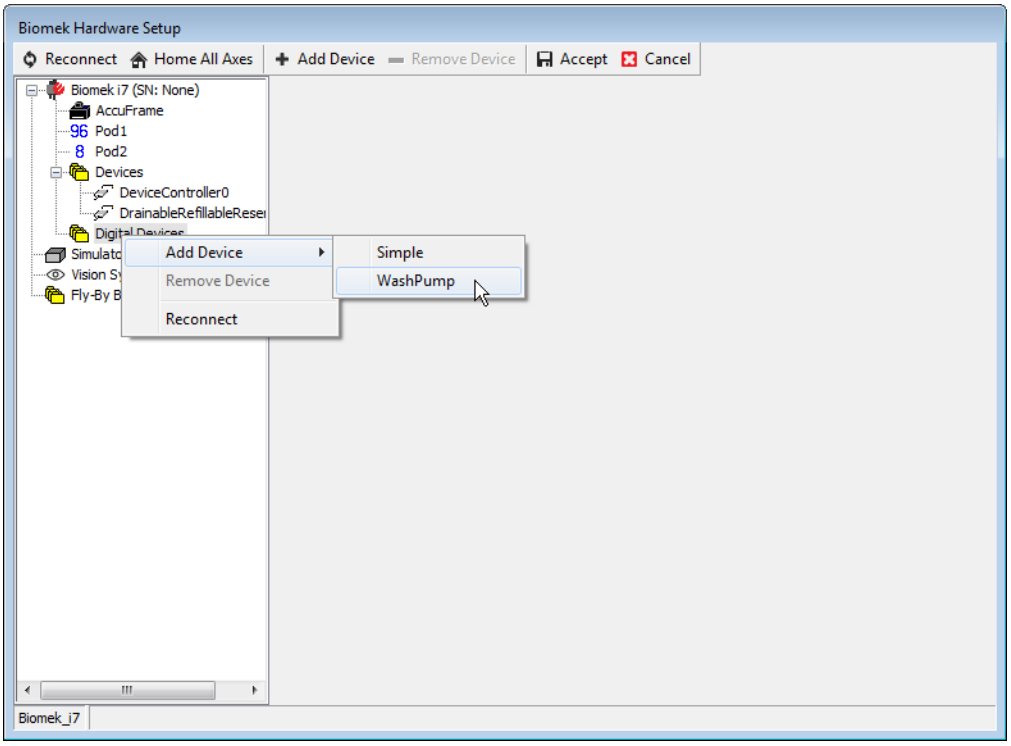
1 On the **Utilities** tab, in the **Instrument** group, choose 

(Hardware Setup). A **Connecting** notification window quickly appears while the software attempts to connect to the configured instrument. After connecting, **Hardware Setup** appears.

2 In the left pane of **Hardware Setup**, right click **Digital Devices** or any device listed under **Digital Devices**.

3 Choose **Add Device > WashPump**. A **WashPump** is added to the list of installed **Digital Devices** (Figure 9.6).

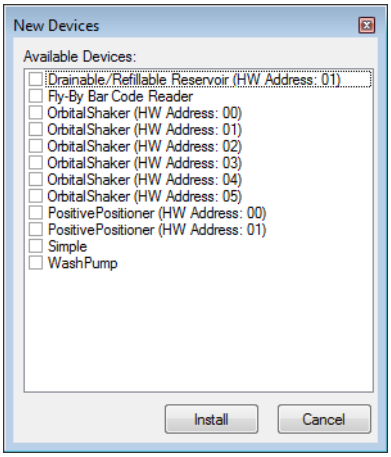
Figure 9.6 Hardware Setup - Adding a WashPump



A second method for adding a **WashPump** is available:

1 From the toolbar, choose **Add Device**. **New Devices** appears (Figure 9.7):

Figure 9.7 New Devices



2 Select **WashPump** and then choose **Install.** A **WashPump** is added to the list of installed **Digital Devices.**

NOTE When installing devices in **Hardware Setup**, note the following:

- An asterisk next to a device indicates the device has been modified since the instrument was loaded.
- A red question mark before an 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.

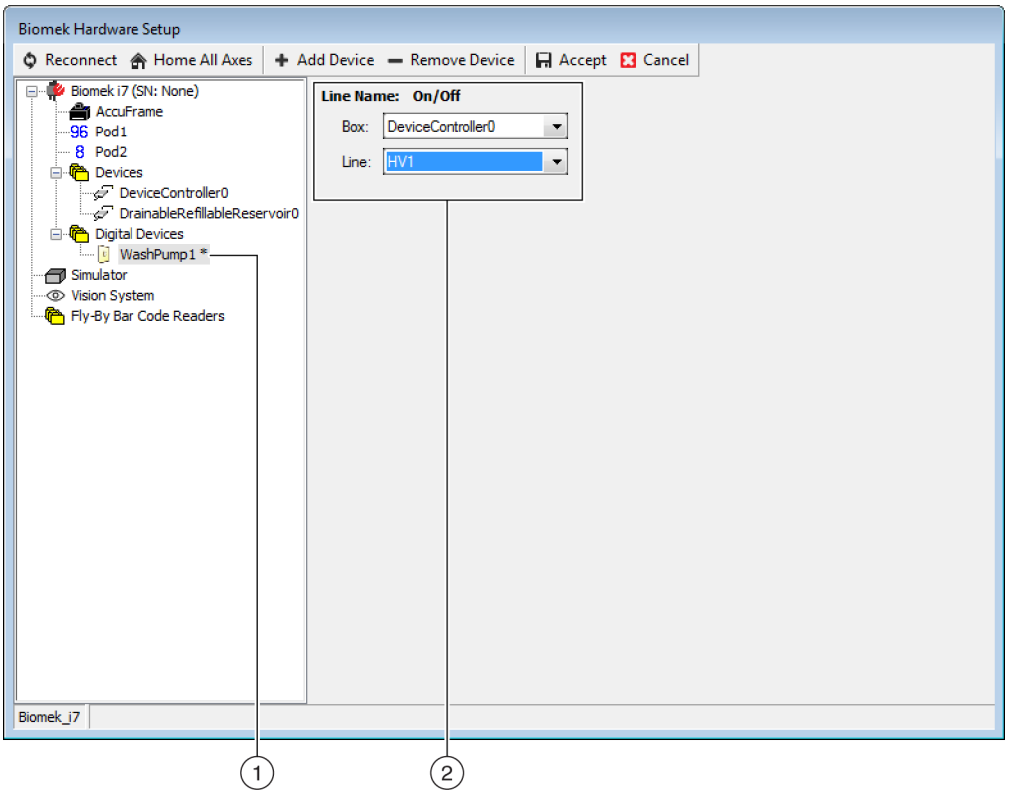
Configuring a Peristaltic Pump in Hardware Setup

After adding a peristaltic pump in **Hardware Setup**, it must be configured in **Hardware Setup** before the ALP can be used in a method.

To configure a peristaltic pump:

1 In the left pane of **Hardware Setup**, select the appropriate **WashPump** from the list of **Digital Devices**. The right pane displays option that may be configured for the **WashPump** (Figure 9.8).

Figure 9.8 Hardware Setup — Configuring a WashPump



1. **WashPump1** selected on the Devices list.
2. Wash Pump configuration

2 Select the appropriate **Box**. The **Box** is the Device Controller that the peristaltic pump is connected to for power; for example, **DeviceController0**.

3 Select the appropriate **Line**. A peristaltic pump is always connected to a high voltage port; for example, **HV1**.

4 Choose **Accept** to save changes and close **Hardware Setup**.

Setting Circulating Reservoir/Tip Box ALP Position Properties

Before a Circulating Reservoir/Tip Box ALP can be used in a method, the software needs to know the position of the ALP on the deck (*Choosing a Deck Position and Adding the ALP to the Deck Editor*) and the appropriate **WashPump** to associate with the ALP. Both attributes are configured in the **Deck Editor**, a software representation of the instrument deck.

After a Circulating Reservoir/Tip Box ALP is placed on the deck, set the properties of the ALP and related deck position. Properties that can be set include position **Name, Device** associated with the position, and **Per-labware Offsets**, which customize the offsets for specific types of labware.

NOTE For descriptions of all ALP and deck position properties, refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

To set deck position properties:

---

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

---

2 Select the position for which you wish to set the position properties. The selected position is highlighted with a pink border.

---

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

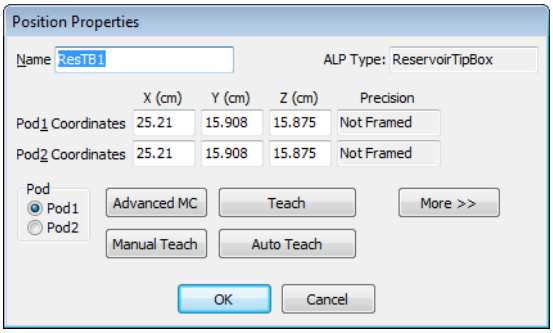
OR

- Double-click the desired deck position to set.

OR

- Right click the desired position and select **Properties** from the menu. **Position Properties** appears (Figure 9.9).

Figure 9.9 Position Properties for a Circulating Reservoir/Tip Box ALP



4 In **Name**, rename the deck position, if desired.

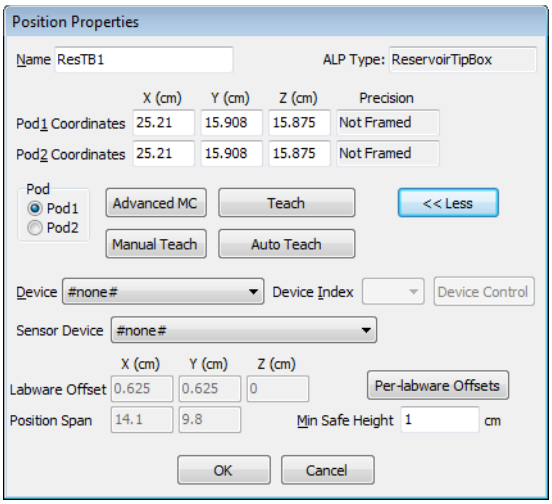
NOTE Names for deck positions must be alphanumeric with no spaces; the only non-alphanumeric character allowed is "_" (underscore). The first character must be a letter.

5 Specify the **X**, **Y**, and **Z coordinates** of the appropriate pod by framing the ALP (refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

NOTE If a position is accessible by both pods in a dual-pod system, each pod must be framed to the position.

6 Select **More>>** to display the device association and labware offset options (Figure 9.10).

Figure 9.10 Position Properties with Device Association and Labware Offset Options Displayed



7 In **Device**, choose the appropriate **WashPump** to associate with the deck position.

8 If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to the *Biomek i-Series Software Reference Manual, PN B56358*).

9 Adjust the **Min Safe Height**, if necessary (refer to the *Biomek i-Series Software Reference Manual, PN B56358*).

NOTE The **Labware Offsets and Position Span** are predefined in the software.

10 Choose **OK** to save the deck position properties and return to the **Deck Editor**.

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

NOTE The deck must be framed (taught) using the framing tools after creating or modifying a deck (refer to *Framing the Circulating Reservoir/Tip Box ALP*).

Framing the Circulating Reservoir/Tip Box ALP

A newly installed Circulating Reservoir/Tip Box ALP must be framed before it can be used in a Biomek Software method.

IMPORTANT Framing an ALP sets the correct position for the current deck only; 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.

To frame the ALP:

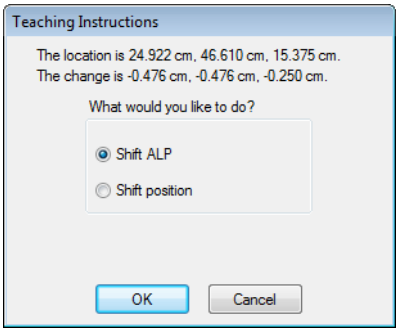
1 Place the reservoir on top of the stand (Figure 9.1).

2 Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474), to gently install the AccuFrame on the circulating reservoir.

3 Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474) on the instrument to frame the ALP. **Teaching Instructions** appears (Figure 9.11).

NOTE A Span-8 pod cannot access a Circulating Reservoir/Tip Box ALP when the reservoir lid is in place.

Figure 9.11 Teaching Instructions



4 Select **Shift ALP** (Figure 9.11).

5 Choose **OK**. **Position Properties** appears, and the ALP is framed for the pod.

6 Choose **OK** to close **Position Properties**.

NOTE If two pods are installed on a Biomek i7 instrument, frame the second pod using the above directions.

Using the Circulating Reservoir/Tip Box ALP in a Method

Using a Circulating Reservoir/Tip Box ALP in a Biomek Software method includes:

- *Configuring an Instrument Setup Step for a Circulating Reservoir/Tip Box ALP*.
- *Configuring a Device Action Step to Control a Circulating Reservoir/Tip Box ALP*.
- *Configuring a Move Labware Step For a Circulating Reservoir/Tip Box ALP*.
- *Configuring a Transfer Step For a Circulating Reservoir/Tip Box ALP*.

Configuring an Instrument Setup Step for a Circulating Reservoir/Tip Box ALP

In a method using a Circulating Reservoir/Tip Box ALP, an **Instrument Setup** step located at the start of the method is necessary to:

- Specify in Biomek Software where the ALP is placed on the deck (refer to *Choosing a Deck Position and Adding the ALP to the Deck Editor*).
- Configure **Labware Properties** for the circulating reservoir (refer to *Configuring Labware Properties for a Circulating Reservoir*).
- Configure **Labware Properties** for the tip box or other labware stacked on the circulating reservoir (refer to *Increasing the Usage Count for Tips*).

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information.

To configure an **Instrument Setup** step for a Circulating Reservoir/Tip Box ALP:

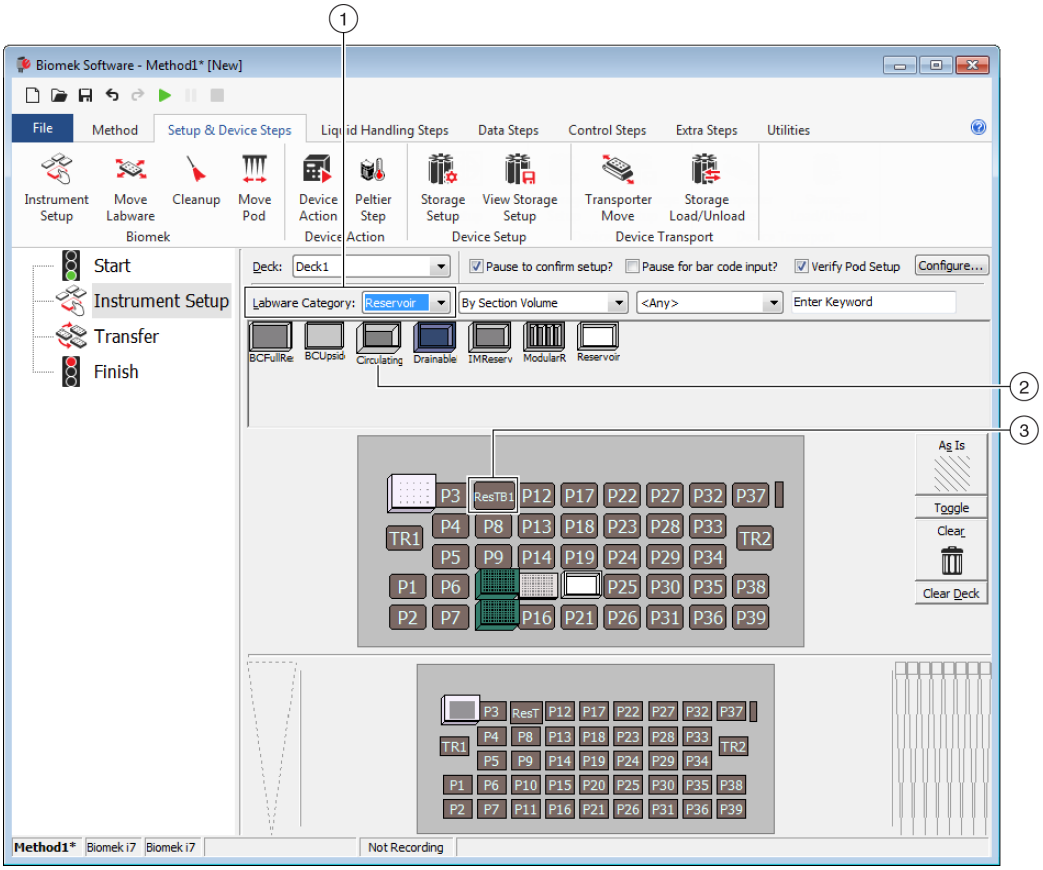
1 In Biomek Software, choose the **Setup & Devices Steps** tab, and in the **Biomek** group, select the

(**Instrument Setup** step).

OR

Select the first **Instrument Setup** step found in the method. The **Instrument Setup** step configuration appears (Figure 9.12).

Figure 9.12 Instrument Setup Step Configuration



1. **Labware Category** — Used to filter labware types to display only labware of a selected category
2. **Circulating Reservoir**
3. **Deck Position** for the Circulating Reservoir/Tip Box ALP.

2 Drag a **CirculatingReservoir** labware type onto a **ResTB** position.

NOTE **ResTB** is an ALP associated with a **WashPump** in the **Deck Editor**.

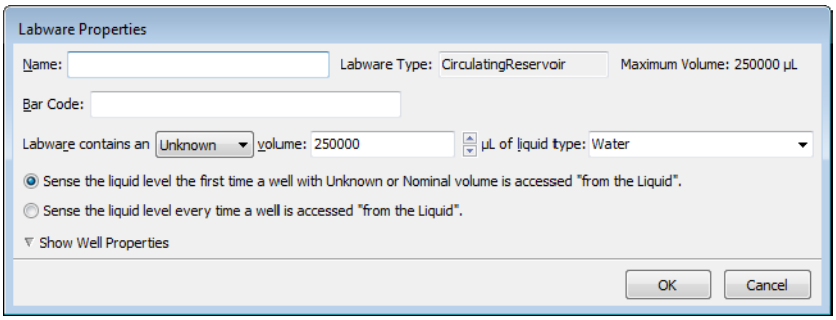
NOTE If a tip box or other labware is to be placed on the circulating reservoir, it must be dragged onto the **CirculatingReservoir** in the **Instrument Setup** step and configured using **Labware Properties** (refer to *Increasing the Usage Count for Tips*).

Configuring Labware Properties for a Circulating Reservoir

The circulating reservoir is a piece of labware and may have several parameters configured using **Labware Properties**.

1 Double click the **CirculatingReservoir** labware type to configure the liquid type. **Labware Properties** appears (Figure 9.13).

Figure 9.13 Labware Properties for a Circulating Reservoir



2 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.

3 If a Multichannel pod is used in the method, leave **Labware contains a** set to the **Known** setting.

NOTE **Known volume** is the default setting for a **CirculatingReservoir** and should not be changed when a Multichannel pod is used in the method. This information is used by many of the techniques supplied with the Biomek 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. However, this ability is not useful with a Circulating Reservoir/Tip Box ALP because the volume of the circulating reservoir is not adjustable. If **Known** is selected, the liquid level is not detected during method run and the default or entered value is used during validation and method run.

4 Select the **Liquid Type** contained in the labware. The liquid type is useful information when the instrument 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 i-Series Software Reference Manual* (PN B56358).

5 Choose **OK** to save **Labware Properties** and return to the **Instrument Setup** step configuration.

NOTE To turn the circulating reservoir(s) on or off, use a **Device Action** step to activate the desired wash pump (refer to *Configuring a Device Action Step to Control a Circulating Reservoir/Tip Box ALP*).

Increasing the Usage Count for Tips

To use the tips in the tip box that sits on top of the circulating reservoir more than once, the usage count in **Labware Properties** for the specific tip box must be increased.

To increase the usage count for tips in a specific tip box:

1 In an **Instrument Setup** step, right click the specific tip box setting on the circulating reservoir and choose **Properties** for the specific tip box (Figure 9.14). **Labware Properties** appears (Figure 9.15).

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information on configuring an **Instrument Setup** Step.

Figure 9.14 Properties Menu

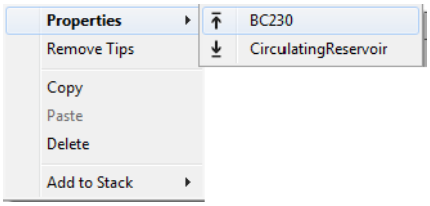
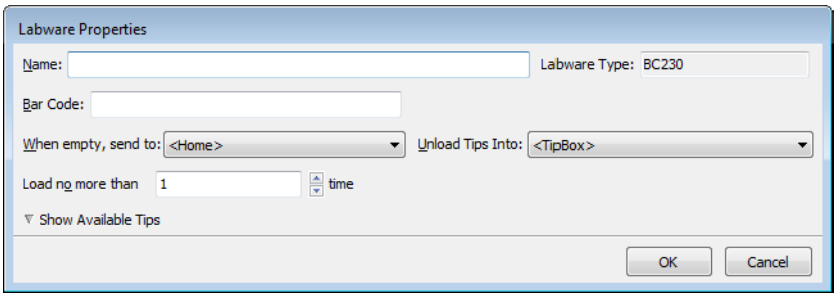


Figure 9.15 Labware Properties for a Tip Box



2 In **Load no more than**, enter a number to increase the usage count.

NOTE The number of times tips can be reused is dependent on a variety of factors, including liquid type, tip type, and volumes transferred. The appropriate number of times to reuse tips should be determined through proper testing.

3 Choose **OK**. The usage count for the specific tip box used with the circulating reservoir is increased.

Configuring a Device Action Step to Control a Circulating Reservoir/Tip Box ALP

After a Circulating Reservoir/Tip Box ALP has been physically mounted to the deck and associated with a device and deck position in the **Deck Editor**, the instrument understands the attributes of the ALP and has the ability to control it using a **Device Action** step during a method. A **Device Action** step is not required if the pump is not connected to a Device Controller or to turn off the pump when the method run is finished.

The ALP must be associated with a device and deck position in the **Deck Editor** (refer to *Adding and Configuring the Peristaltic Pump in Hardware Setup*) prior to using it 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.

NOTE **Device Action** steps that have not been appropriately configured generate errors when a method is validated or run.

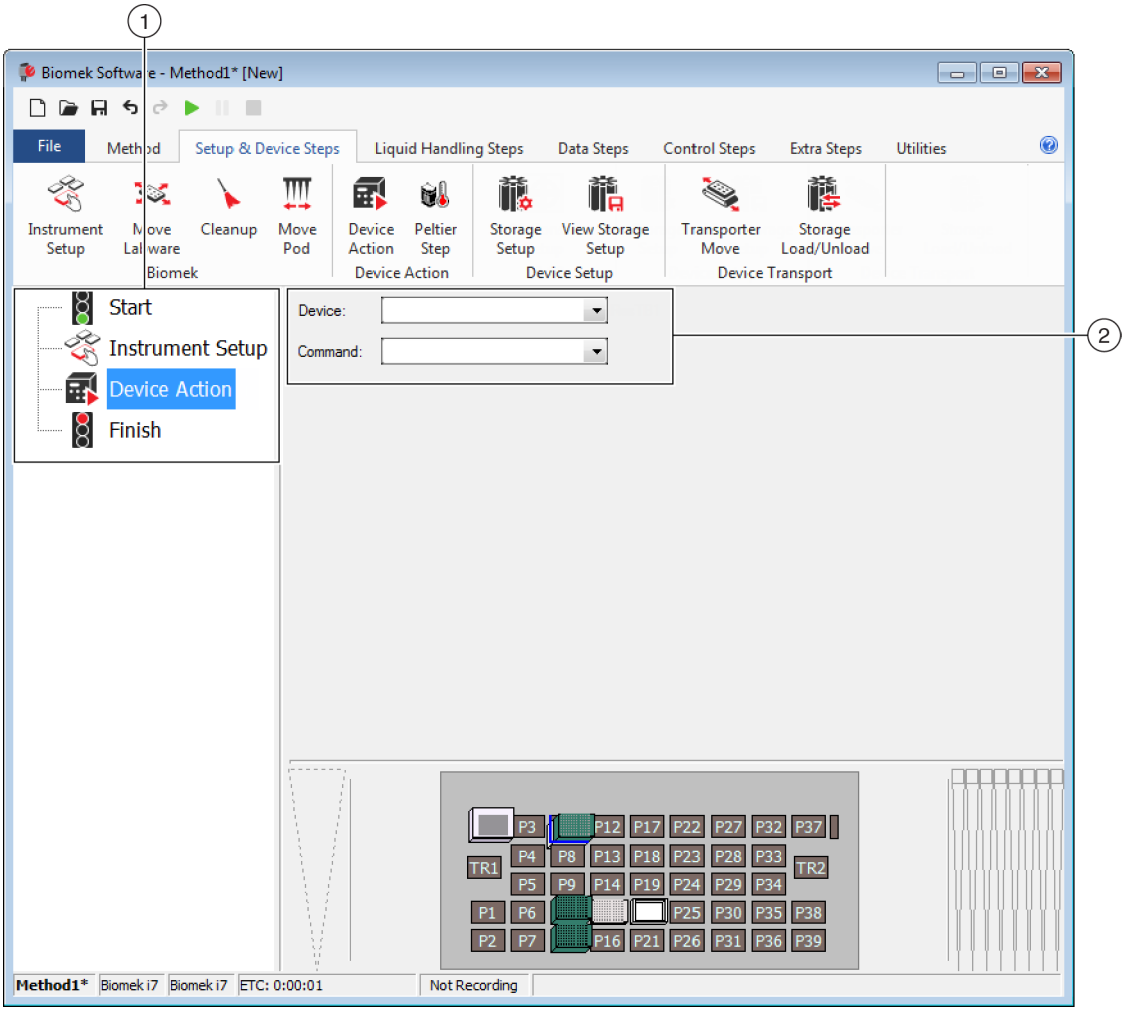
To configure the **Device Action** step for the ALP:

1 Choose the **Setup & Devices Steps** tab, and in the **Device Action** group, select the 

(**Device Action** step).

2 Insert a **Device Action** step into the **Method View** (Figure 9.16).

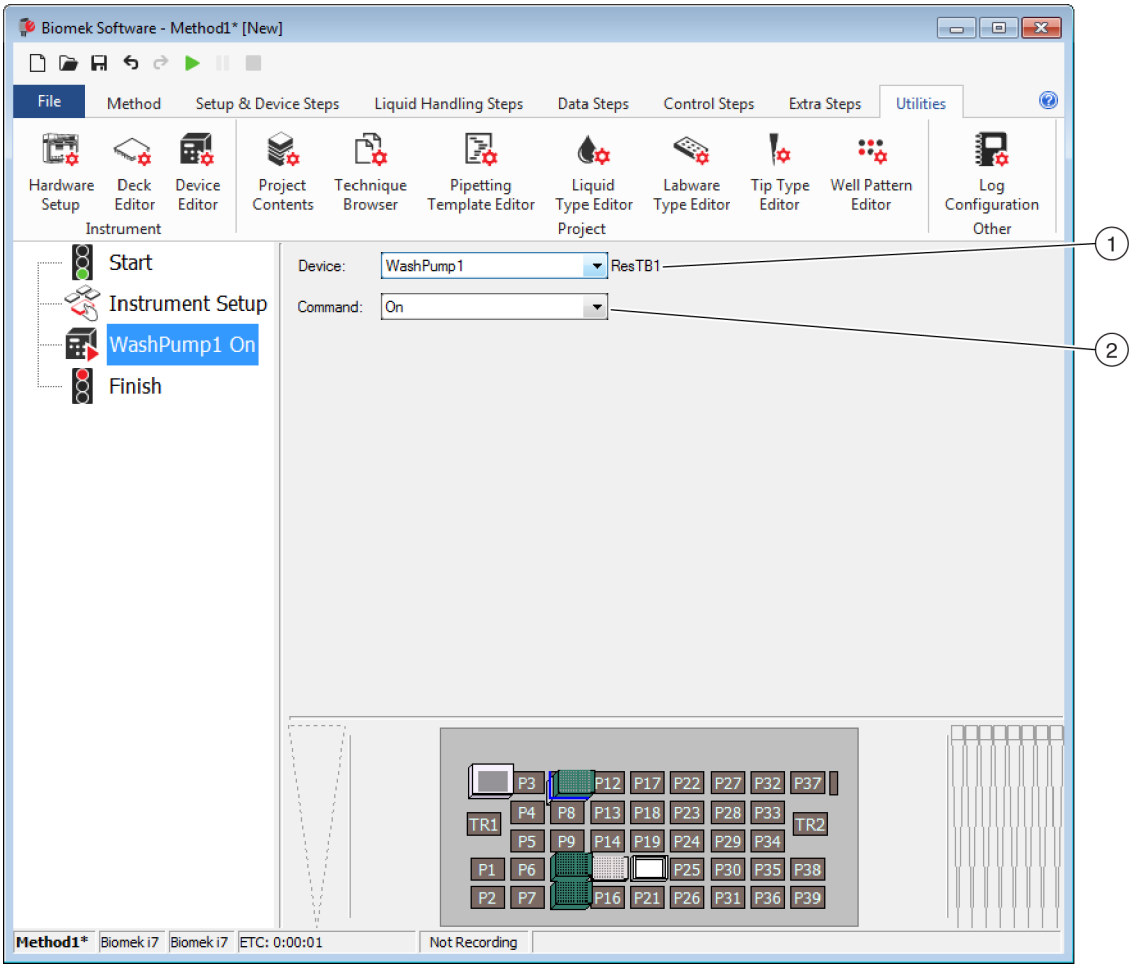
Figure 9.16 Device Action Step Inserted in the Method View



1. **Method View**
2. **Device Action** step configuration
3. **Current Instrument Display**

3 In **Device**, select the desired **WashPump**. The configuration for the ALP appears (Figure 9.17).

Figure 9.17 Device Action Step Configuration for a Circulating Reservoir/Tip Box ALP



1. **Command** — Select the action (**On** or **Off**) for the WashPump to execute.
2. **Device** — Select the **WashPump** connected to the Circulating Reservoir/Tip Box ALP.

4 In **Command**, select the desired action for the **WashPump**:

- **On** — turns on the peristaltic pump to begin circulating fluid through the circulating reservoir.
- **Off** — turns off the peristaltic pump to stop circulating fluid through the circulating reservoir.

NOTE The peristaltic pump is automatically turned off when a method run is completed. Adding a **Device Action** step to turn off the pump at the end of the method is not required.

Configuring a Move Labware Step For a Circulating Reservoir/Tip Box ALP

A **Move Labware** step is required each time a tip box or other labware is moved to or from a Circulating Reservoir/Tip Box ALP to another position on the deck. There are two rules that must be followed when configuring a **Move Labware** step for the ALP:

- When moving a tip box or other labware from the ALP to another deck position, select **Move stack, leaving the bottom piece of labware at the source position** to prevent moving the circulating reservoir.
- To return tip boxes to the ALP, always use a **Move Labware** step. Using a **Cleanup** step rather than a **Move Labware** step results in an error, the most common being **Unable to get labware in TL1 back to its home location at ResTB**.

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information about configuring a **Move Labware** step.

Configuring a Transfer Step For a Circulating Reservoir/Tip Box ALP

Use a **Transfer** step to load tips and transfer liquid from the circulating reservoir to other labware on the deck.

NOTE When configuring a new **Transfer** step, the tip touch feature is enabled by default. However, it provides no benefit unless a 96-Channel head is used to access the circulating reservoir with the reservoir lid in place.

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information about configuring a **Transfer** step.

Operating the Circulating Reservoir/ Tip Box ALP

⚠ WARNING

Risk of method failure. The Circulating Reservoir/Tip Box ALP could run out of fluid during a method run if contents are too low. Prior to running a method, make sure there is enough fluid in the container for the method.

The Circulating Reservoir/Tip Box ALP is turned off and on:

- In a method using a **Device Action** step (refer to *Using the Circulating Reservoir/Tip Box ALP in a Method*).
- Manually using **Advanced Manual Control** in the Biomek Software (refer to *Manually Controlling the Circulating Reservoir/Tip Box ALP*).

  NOTE The peristaltic pump must be connected to a Device Controller to be turned on and off with a **Device Action** step or **Advanced Manual Control** (refer to the *ALPs Instructions for Use, PN 987836*).

- Manually using the on/off switch on the pump, if the pump is not connected to a Device Controller.

Manually Controlling the Circulating Reservoir/Tip Box ALP

When the peristaltic pump is connected to a device controller, it may be turned on and off outside of a method using **Manual Control**.

NOTE **Manual Control** is not possible when the peristaltic pump is not connected to a device controller. Instead, turn the peristaltic pump on and off using the switch on the pump itself.

To turn the peristaltic pump on and off using **Manual Control:**

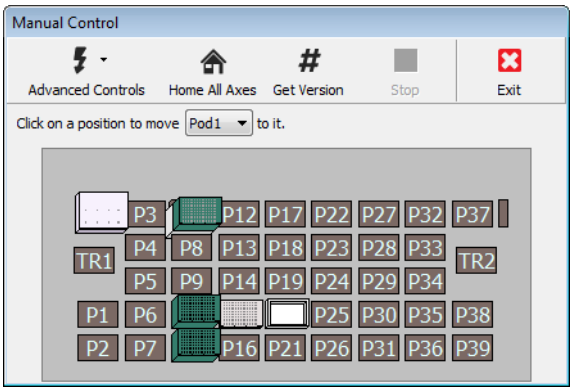
1 In Biomek Software, choose the **Method** tab, and in the **Execution** group, select 

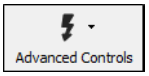
(**Manual Control**). After successfully establishing a connection with the instrument, **Manual Control** appears (Figure 9.18).

NOTE **Manual Control** is available only when a method is not being executed. To access **Manual Control** during a method run, stop the method using the **Stop** button 

(refer to the *Biomek i-Series Software Reference Manual*, PN B56358).

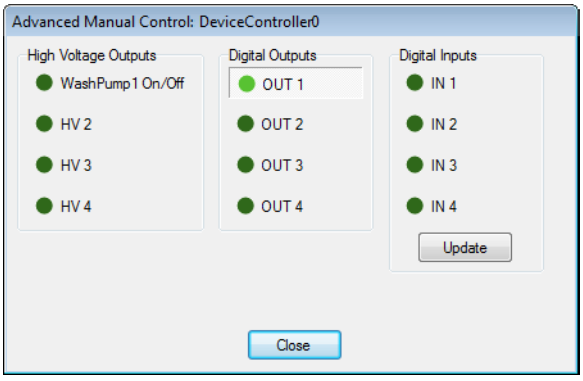
Figure 9.18 Manual Control



2 Select 

(Advanced Controls) and choose the **Device Controller** the peristaltic pump is connected to. **Advanced Manual Control** appears (Figure 9.19).

Figure 9.19 Advanced Manual Control for a Device Controller



3 Select the desired **WashPump On/Off**. The button lights up when the peristaltic pump is running.

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

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

Removing the Circulating Reservoir/Tip Box ALP From the Deck

WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

WARNING

Risk of personal injury or contamination. The ALP poses a potential spill hazard. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer.

WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

WARNING

Risk of method failure. Kinked tubing could cause blockage, causing an insufficient amount of fluid to be available for a method. Always thoroughly inspect all hoses before proceeding with a method run.

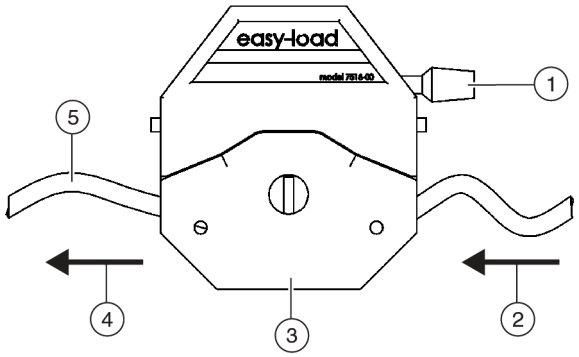
To remove the Circulating Reservoir/Tip Box ALP from the deck:

1 Remove the outlet tubing from the rear pump head of the peristaltic pump, and set aside (Figure 9.4).

2 Remove the inlet tubing from the front pump head of the peristaltic pump.

3 Reverse the direction of the inlet tubing and route it so that it runs right to left through the front pump head (Figure 9.20).

Figure 9.20 Front View of *Front* Pump Head with Inlet Tube Routing Reversed



1. Pump Head Locking Lever in Locked Position
2. From Reagent Bottle
3. To Circulating Reservoir
4. Smaller Diameter Inlet Tubing

⚠ CAUTION

Risk of contamination. The circulating reservoir will not drain correctly unless the reversed inlet tubing is locked into the pump head. Make sure the tubing is locked into the pump head.

4 Lock the front pump head by pushing the locking lever clockwise until it stops (Figure 9.20).

5 If the ALP is connected to a Device Controller, use **Advanced Manual Control** in the Biomek Software to turn on the peristaltic pump and let it run until the circulating reservoir drains (refer to *Manually Controlling the Circulating Reservoir/Tip Box ALP*).

OR

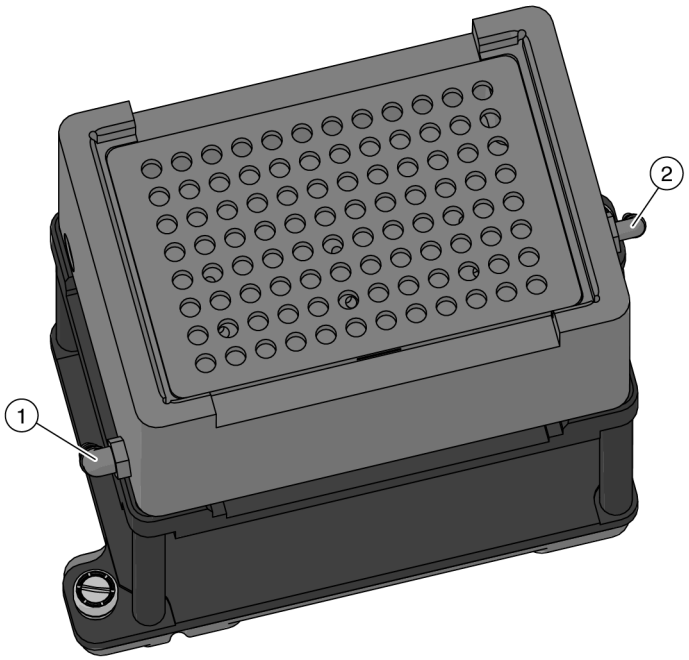
Turn on the peristaltic pump using the switch on the pump itself.

NOTE The circulating reservoir drains through the six inlet holes in the bottom of the reservoir (Figure 9.5).

6 Turn off power to the instrument, the Device Controller, and the peristaltic pump.

7 Disconnect the inlet and outlet tubing from the reservoir by gently pulling the tubes off their respective fittings (Figure 9.21).

Figure 9.21 Inlet/Outlet Fittings



1. **Inlet Fitting**
2. **Outlet Fitting**

8 Lift the circulating reservoir off the stand.

9 Loosen the thumbscrews from the mounting plate.

10 Lift the stand vertically to clear the mounting pins from the holes on the deck.

11 If necessary, remove the mounting plate by following instructions in CHAPTER 11, *Removing Mounting Plates from the Deck*.

Troubleshooting

Table 9.1 Troubleshooting Problems and Solutions

Problem	Solution
The circulating reservoir is not functioning correctly.	Make sure the circulating reservoir, peristaltic pump, and Device Controller are all properly connected to the instrument.
The circulating reservoir is not filling correctly.	1. Reverse the inlet and outlet tubing. The smaller diameter tube fills the reservoir; the larger drains it. 2. Make sure there are no kinks in the inlet tube. 3. Make sure the reagent bottle fitting that supplies the circulating reservoir is in contact with the solution.
The error **Unable to get labware in TL1 back to its home location at ResTB**, appears.	Use a **Move Labware** step instead of a **Cleanup** step to return tip boxes from the Tip Loader ALP to the Circulating Reservoir/Tip Box ALP.

Storage

To store the Circulating Reservoir/Tip Box ALP:

1 Remove the ALP from the deck (refer to *Removing the Circulating Reservoir/Tip Box ALP From the Deck*).

NOTE The ALP should be allowed to air dry before it is repackaged for storage.

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

NOTE Refer to the pump and tubing manufacturer user manuals for more information on storing them.

Preventive Maintenance

⚠ WARNING

Risk of contamination. The ALP might be contaminated from method solutions. Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

The Circulating Reservoir/Tip Box ALP requires minimal maintenance. Observe the following guidelines:

- Do not overflow the reservoir.
- Empty any solutions from the circulating reservoir when not in use and follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

  NOTE Refer to *Removing the Circulating Reservoir/Tip Box ALP From the Deck* for more information about draining the circulating reservoir.

- Periodically inspect the tubing for wear and stress fractures.
- Periodically inspect the tubing connections for leakage.

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.

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 that circulates cold or hot water through the ALP.

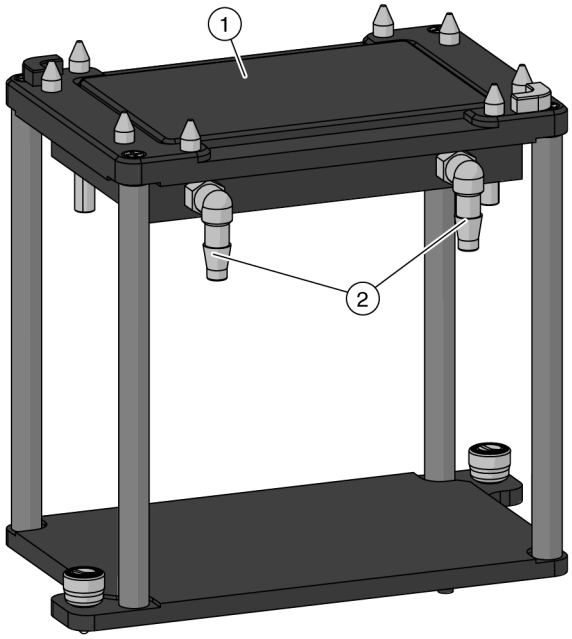
NOTE The Heating and Cooling ALP since it cannot be turned on and off via Biomek Software and must be controlled from the circulating bath.

The sections in this chapter include:

⚠ WARNING

Risk of personal injury. 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



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 a deck position, installing a mounting plate (not pictured) on the deck, and then attaching the ALP to the mounting plate.

Choosing a Deck Position and Adding the ALP to the Deck Editor

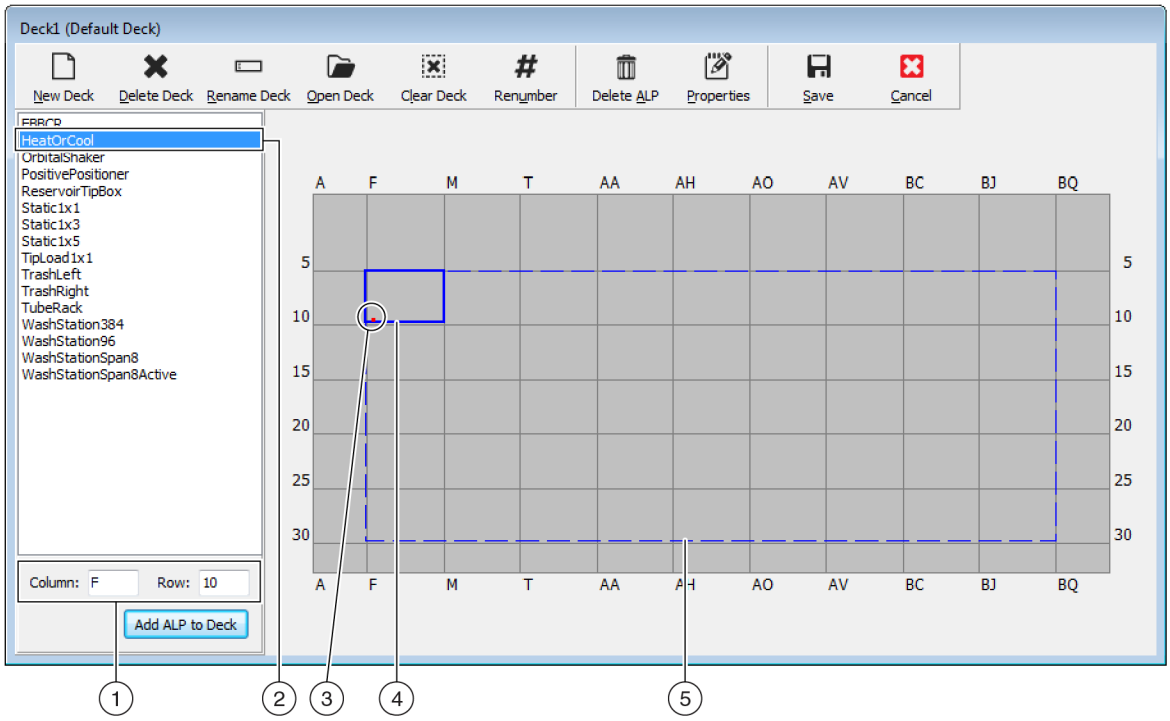
To choose a deck position and add the ALP to the **Deck Editor:**

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the **HeatOrCool** ALP in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP. In Figure 10.2, the **HeatOrCool** was selected on a cleared Biomek i7 instrument deck.

Figure 10.2 Area Capable of Supporting the Heating and Cooling ALP on a Biomek i7 Instrument



1. **Column** and **Row** fields: The location of the mounting point when the ALP is physically installed on the deck.
2. **Selected ALP**
3. **Mounting Point**: The location of the pointing feature (frontmost notch) on the physical ALP. This location corresponds to the **Column** and **Row** coordinates, as shown on **(1)**, which is indicated by the red dot.
4. **Current Position**: The solid blue lines show the location based on the coordinates listed in **Column** and **Row**. Upon initial selection of an ALP, the location defaults to the first position at which this ALP can be placed, regardless of whether an ALP currently resides in the same location.
5. **Available Area**: The ALP can be placed anywhere within the blue dashed lines.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the coordinates (**Column**/**Row**) of the pointing feature, as shown in Figure 10.1.

NOTE When choosing a position for a Heating and Cooling ALP, keep in mind the following:

- Make sure to select a location that includes one row of clearance in front of and behind the ALP to allow room for the hoses.
- If mounting the ALP next to a Static 1 x 1 or Static 1 x 3 ALP, make sure to allow at least one empty grid space of clearance between the two ALPs.
- If installing to the left or right of another ALP requiring a mounting plate, make sure to position them so that the tabs do not overlap.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

Refer to Chapter 4, ***Adding ALPs and Deck Positions***, in the *Biomek Software Reference Manual* (PN B56358) for additional information.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Mounting the Heating and Cooling ALP to the Deck

⚠ WARNING

Risk of personal injury, contamination, and property damage. Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, radioactive, and biological materials. Always use appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

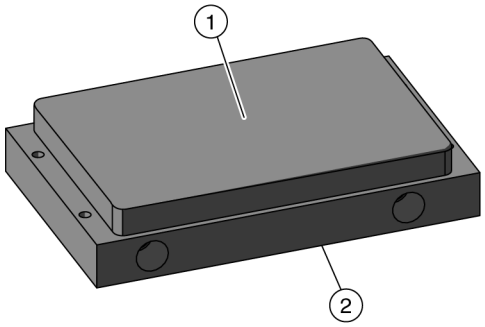
⚠ WARNING

Risk of personal injury or contamination. Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by your laboratory safety officer. Always use the appropriate Personal Protective Equipment (PPE) when handling hazardous materials.

To install the Heating and Cooling ALP:

1 Turn the ALP stand upside down and mount the heating & cooling unit (Figure 10.3) to the underside of the ALP stand using the four screws provided (Figure 10.4).

Figure 10.3 Heating & Cooling Unit



1. **Top** of Heating and Cooling ALP
2. **Bottom** of Heating and Cooling ALP

2 Install the mounting plate and ALP by completing the instructions in CHAPTER 11, *Installing Standard Mounting Plates and Associated ALPs*.

3 Attach the in and out hoses to the fittings (Figure 10.1).

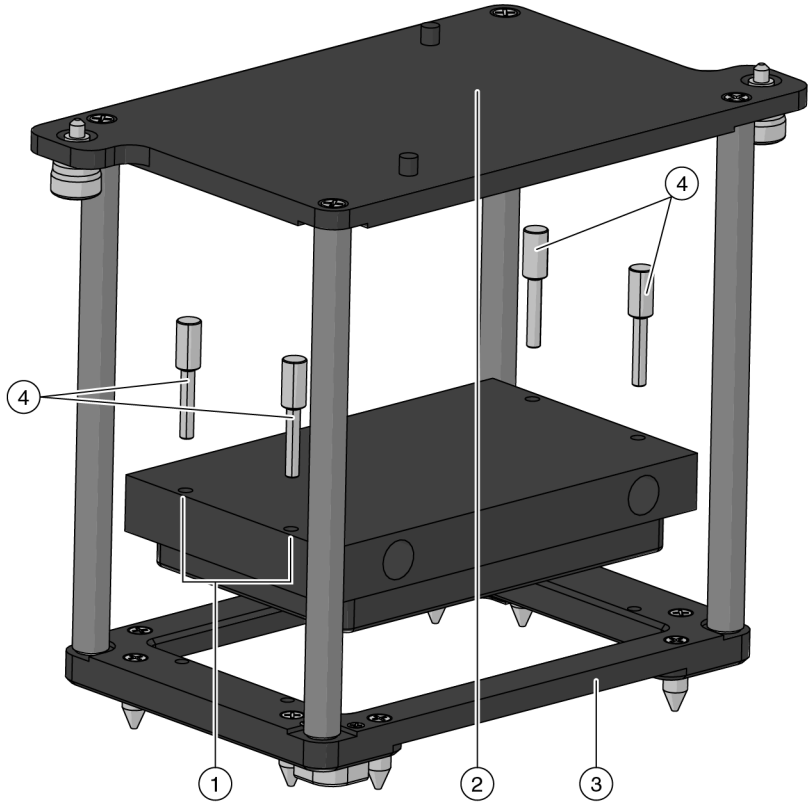
NOTE The hoses can be attached to either fitting, since the fluid circulation in the Heating and Cooling ALP is not directionally specific.

NOTE Make sure the hose routing does not interfere with the operation of the Biomek instrument.

4 Follow the manufacturer's instructions for hooking up the circulating bath (refer to *Circulator Bath Specifications*).

5 Apply power to the circulating bath.

Figure 10.4 Heating and Cooling Unit Mounting — Bottom View



1. **Screw Placement**
2. **Bottom** of ALP Stand
3. **Top** of ALP Stand
4. **Thumbscrews**

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 *Biomek i-Series Hardware Reference Manual* (PN B54474).

Removing the Heating and Cooling ALP

⚠ CAUTION

When detaching hoses, there is a potential for leaks. Do not detach the hoses over the 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 thumbscrews from the mounting plate.
3. Lift the stand vertically to clear the mounting pins from the holes on the deck.
4. Remove the hoses over a sink or reservoir container.
5. If necessary, remove the mounting plate by following instructions in CHAPTER 11, *Removing Mounting Plates from the Deck*.

Preventive Maintenance

⚠ WARNING

Risk of contamination. ALPs might be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

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.

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.

Troubleshooting

Contact us before attempting to repair the Heating and Cooling ALP.

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

Mounting Plates

Overview

Compatible Biomek FX^P/NX^P ALPs (Table 11.1) operate in the same manner as they previously did; however, to attach these ALPs to the Biomek i-Series deck, a mounting plate, which works as an adapter between Biomek FX^P/NX^P and Biomek i-Series mounting styles, must be used.

To mount compatible Biomek FX^P/NX^P ALPs to the deck, you will need to:

1. Determine the appropriate mounting plate type for the compatible ALP by reviewing the table in *Mounting Plate Types*.
2. Choose the location for the ALP by following instructions in *Choosing a Deck Position*.
3. Install the ALP on the deck by following instructions in the applicable section:
   - *Installing Standard Mounting Plates and Associated ALPs*
   - *Installing the Vibration Isolation Mounting Plate and Associated ALPs*

If necessary, remove the mounting plate by following the instructions in: *Removing Mounting Plates from the Deck*.

Mounting Plate Types

The type of mounting plate required depends on the type of ALP; refer to Table 11.1 for the mounting plate required for ALPs, as well as where to find instructions for the use of each ALP.

Mounting Plates are sold separately. Contact us to order the mounting plates for your ALPs.

Table 11.1 ALP Mounting Plate Types & Reference Information

ALP	Mounting Plate Type	Mounting Plate Part Number	For Complete Instructions, Refer to...[a]
96-Channel Tip Wash	Standard	B87485	CHAPTER 7, *Multichannel Wash Station ALPs*
384-Channel Tip Wash	Standard	B87485	CHAPTER 7, *Multichannel Wash Station ALPs*
Circulating Reservoir/Tip Box	Standard	B87485	CHAPTER 9, *Circulating Reservoir/Tip Box ALP*
Heating and Cooling	Standard	B87485	CHAPTER 10, *Heating and Cooling ALP*
Orbital Shaker	Vibration Isolation	C02750	*Automated Labware Positioners (ALPs) Instructions for Use*, PN 987836
Positive Positioner	Standard	B87485	*Automated Labware Positioners (ALPs) Instructions for Use*, PN 987836

Table 11.1 ALP Mounting Plate Types & Reference Information *(Continued)*

ALP	Mounting Plate Type	Mounting Plate Part Number	For Complete Instructions, Refer to...[a]
Shaking Peltier	Vibration Isolation	C02750	*Shaking Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments*, PN A99393, Rev. AC and up.
SPE ALP	Standard	B87485	CHAPTER 8, *Solid Phase Extraction (SPE) Vacuum Filtration System*
SPE Collar Holder	Standard	B87485	CHAPTER 8, *Solid Phase Extraction (SPE) Vacuum Filtration System*
Static Peltier	Standard	B87485	*Static Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments*, PN A99392, Rev. AC and up.

a. If the instructions require you to configure the software as part of installing and using the ALP, note that software images are likely from a previous version of Biomek Software, where the locations of the menu options have been changed. Refer to *Getting Started* in the *Biomek i-Series Software Reference Manual* (PN B56358) to find new location of each menu item.

Choosing a Deck Position

To select a deck position for the ALP:

1 In Biomek Software, choose the **Utilities** tab, and in the **Instrument** group, select 

(**Deck Editor**). The **Deck Editor** opens.

2 Select the appropriate ALP in the ALPs type list. The area capable of supporting the ALP is indicated by blue dashed lines; make sure to choose a position within this area that does not currently contain an ALP.

3 Compare the virtual Biomek Software deck to your instrument deck, and then determine the appropriate position for the ALP. Note the deck coordinates (**Column**/**Row**) for the location of the pointing feature, which is the frontmost notch, as shown in Figure 11.1 and Figure 11.6.

IMPORTANT When choosing a position for an ALP requiring a mounting plate, keep in mind the following:

- If mounting the ALP next to a Static 1 x 1 or Static 1 x 3 ALP, make sure to allow at least one empty grid space of clearance between the two ALPs.
- If installing two ALPs requiring mounting plates side-by-side, make sure to position them so that the tabs do not overlap.
- Mounting plates provide the flexibility of mounting the ALP in any location on the deck that is within the confines designated in the **Deck Editor** for each specific ALP.

4 Enter the coordinates of the selected location into the **Column** and **Row** fields, and then select **Add ALP to Deck** to complete the process. Deck positions are automatically named when a new ALP is added.

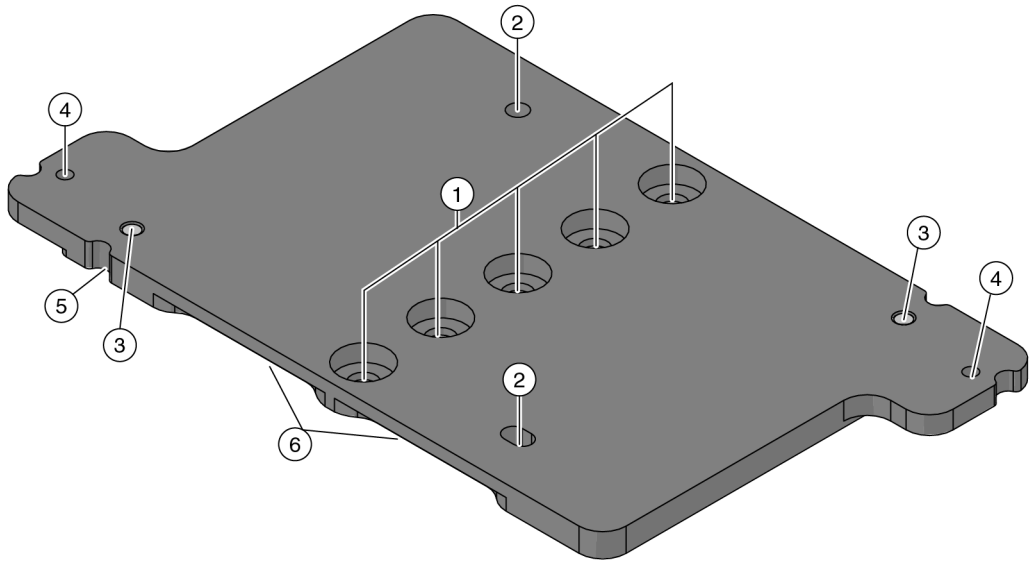
For complete instructions on using the **Deck Editor**, refer to the chapter/manual listed in Table 11.1.

5 Select **Save** to save the changes to the deck and to exit the **Deck Editor**.

Installing Standard Mounting Plates and Associated ALPs

When a standard mounting plate (Figure 11.1) is required, you must first attach the mounting plate to the deck, and then attach the ALP to the mounting plate/deck.

Figure 11.1 Standard Mounting Plate



1. **Screw Hole** options
2. **Mounting Interface**: Holes that align with the pins on the bottom of ALPs.
3. **Mounting Pin** locations (top view)
4. **Threaded Holes** for the thumbscrews at the base of the ALP.
5. **Pointing Feature** (frontmost notch)
6. **Finger Grips**

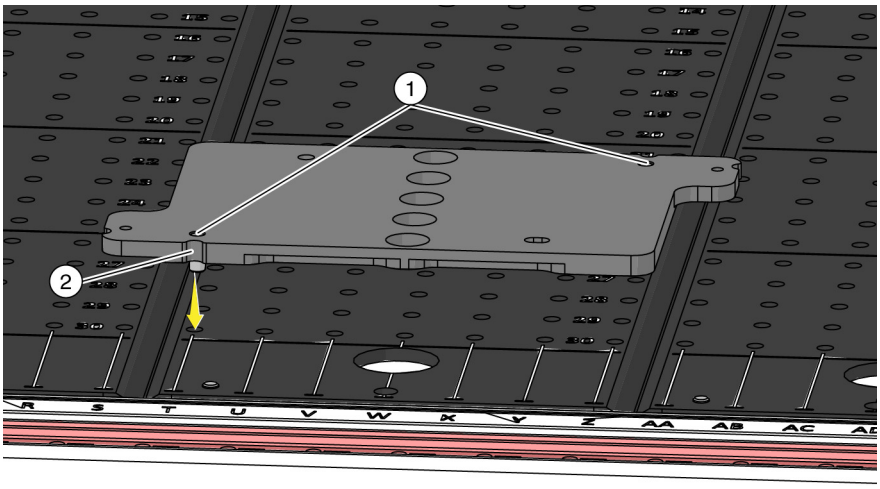
Installing the Standard Mounting Plate on the Deck

To install a standard mounting plate onto the deck:

1 If not already completed, choose an appropriate deck location to mount the ALP to the deck (refer to *Choosing a Deck Position*).

2 Align the pointing feature to the deck coordinates defined in the **Deck Editor**, making sure that the mounting pins on the bottom of the mounting plate slip into the mounting holes on the deck (Figure 11.2). When in place, firmly press down.

Figure 11.2 Placing the Mounting Plate on the Deck



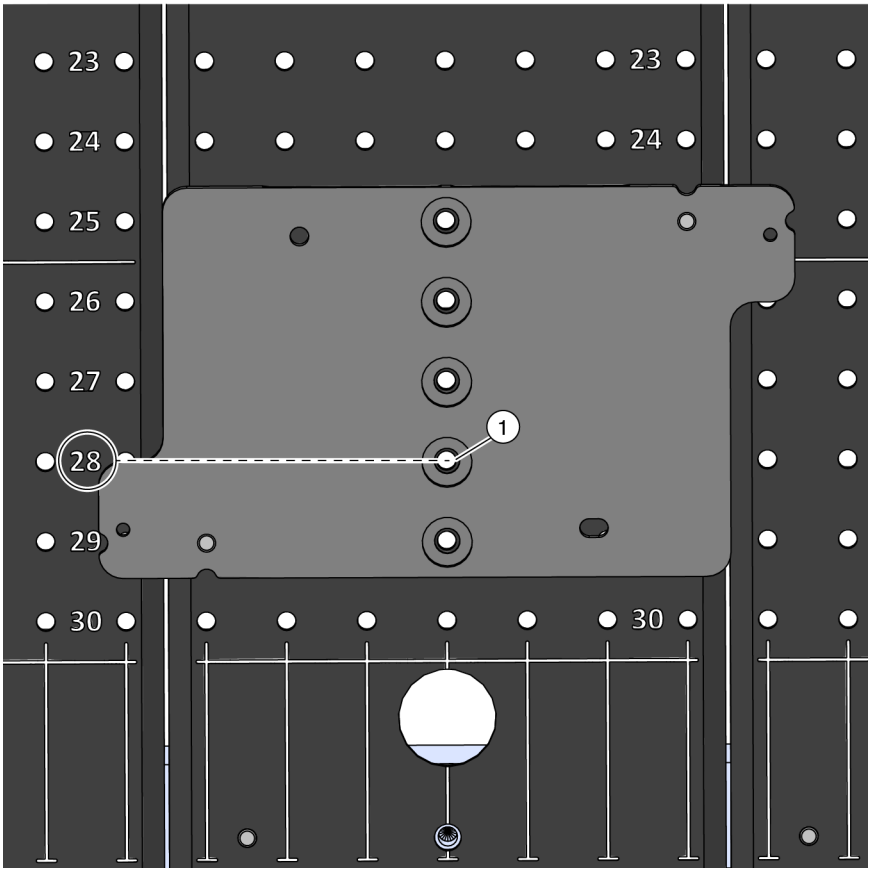
1. **Mounting Pin** locations
2. **Pointing Feature** (frontmost notch)

3 A threaded screw is used to ensure a secure hold to the deck. The mounting plate is equipped with five hole options for the screw, providing the flexibility to place the ALP in any location on the deck. The appropriate hole for the screw is determined by the row on the deck, as described below. Secure the mounting plate follows:

a. Place the screw into the hole that corresponds with the deck row containing tapped holes:

- Tapped holes comprise every fifth row, starting at **Row 3**, and therefore, the screw should be placed in the hole located in **Row 3**, **8**, **13**, **18**, **23**, or **28**. The row that intersects with the mounting plate is the appropriate hole; place the screw into that hole (Figure 11.3).

Figure 11.3 Appropriate Hole for Threaded Screw



1. In this example, the threaded screw is placed in the hole located on **Row 28**.

b. Insert the tip of the screwdriver into the slot on the head of the screw, making sure it is secured into position.

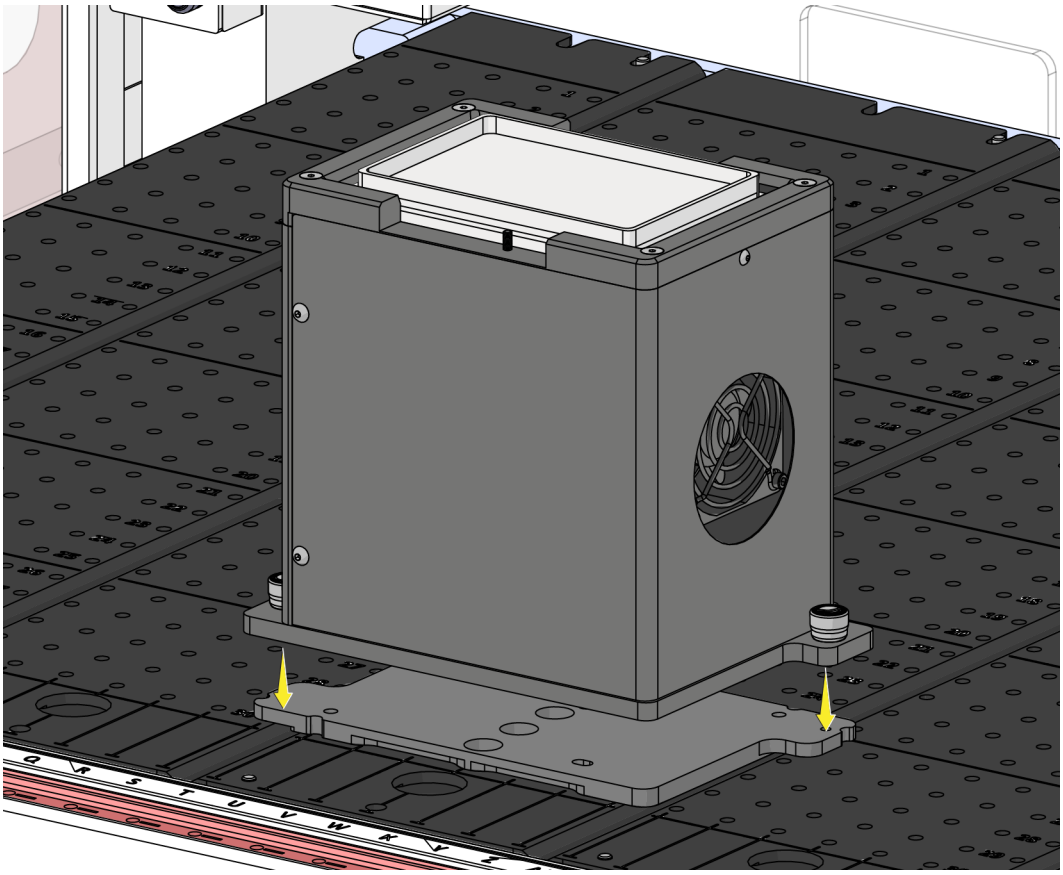
c. Tighten the screw by turning it clockwise until it can no longer move.

Attaching an ALP to the Standard Mounting Plate

After the mounting plate is secured to the deck, the ALP can be placed on the mounting plate as follows:

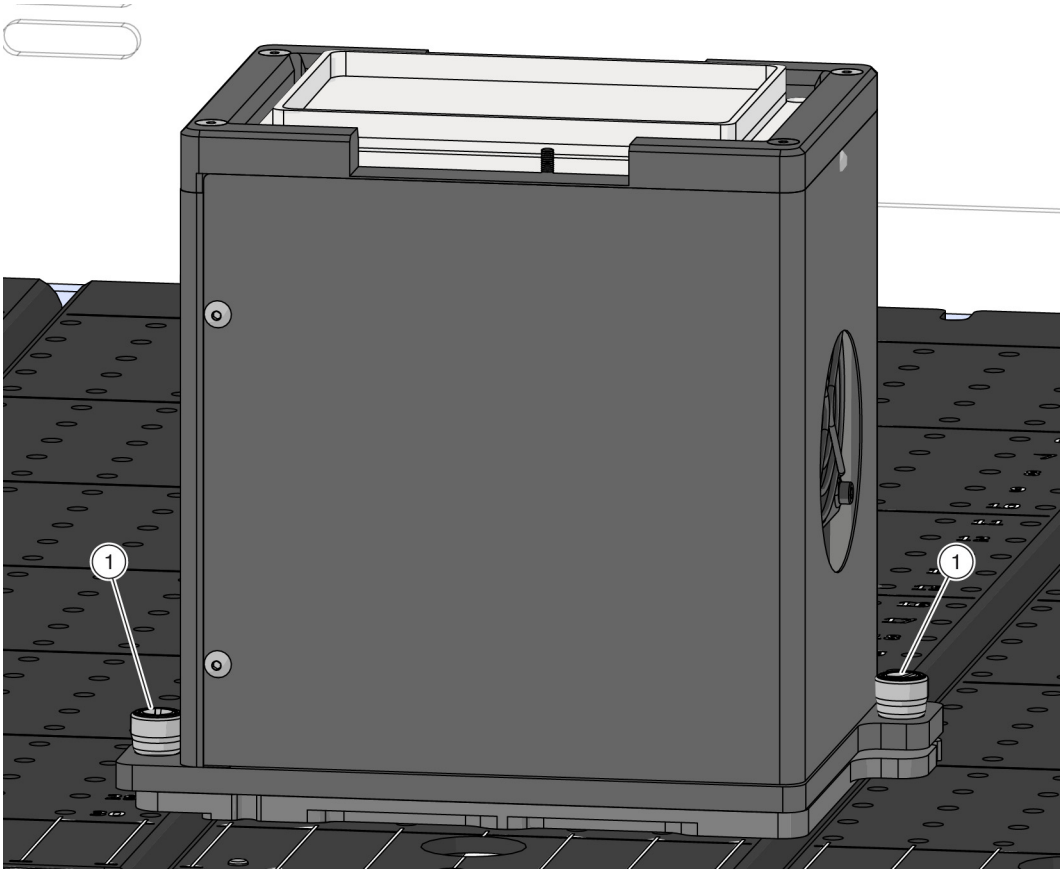
1 Position the ALP so the mounting pins on the bottom of the ALP slip into the mounting interface on the mounting plate. As an example, Figure 11.4 shows the Static Peltier ALP being attached to the Standard Mounting Plate.

Figure 11.4 Attaching the Mounting Plate



2 Fasten the ALP to the mounting plate by tightening the thumbscrews on the base on the ALP. As an example, Figure 11.5 shows the location of the thumbscrews on a Static Peltier ALP.

Figure 11.5 Thumbscrew Locations

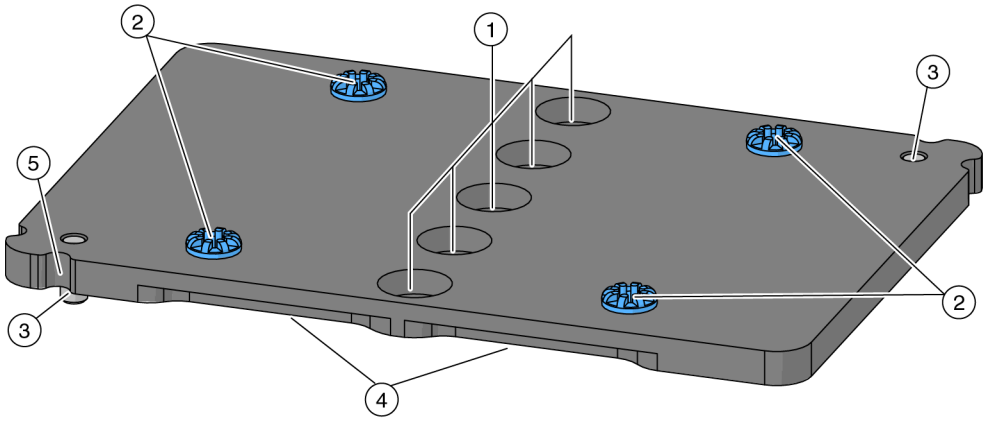


1. Thumbscrews

Installing the Vibration Isolation Mounting Plate and Associated ALPs

When a vibration isolation mounting plate (Figure 11.6) is required, you must first attach the mounting plate to the deck, and then mount the ALP to the mounting plate.

Figure 11.6 Vibration Isolation Mounting Plate



1. **Screw Hole** options
2. **Grommeted Holes**: The two dowel pins on the ALP align with two of the grommeted holes. These holes are designed to dampen the vibration generated while using this ALP.
3. **Mounting Pin** locations (back, right is the top view)
4. **Finger Grips**
5. **Pointing Feature** (frontmost notch)

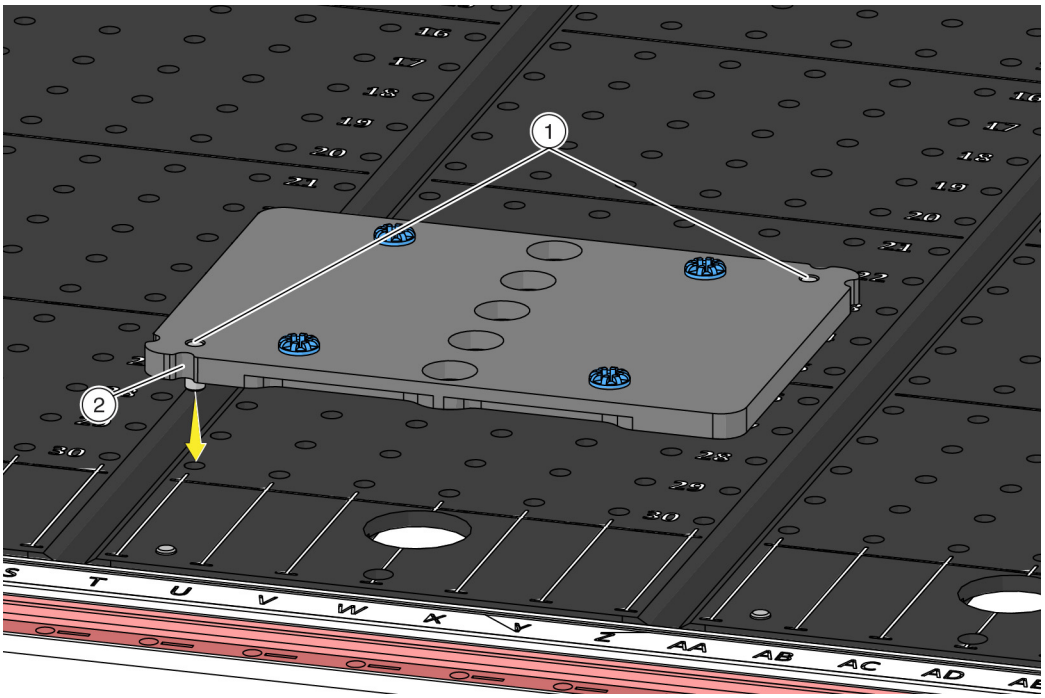
Installing the Vibration Isolation Mounting Plate on the Deck

Prior to installing the ALP on the deck, the mounting plate must be connected to the deck. To mount the vibration isolation mounting plate to the deck:

1 Choose an appropriate deck location to mount the ALP to the deck (refer to *Choosing a Deck Position*).

2 Align the pointing feature to the deck coordinates defined in the **Deck Editor**, making sure that the mounting pins on the bottom of the mounting plate slip into the mounting holes on the deck (Figure 11.2). When in place, firmly press down.

Figure 11.7 Placing the Vibration Isolation Mounting Plate on the Deck



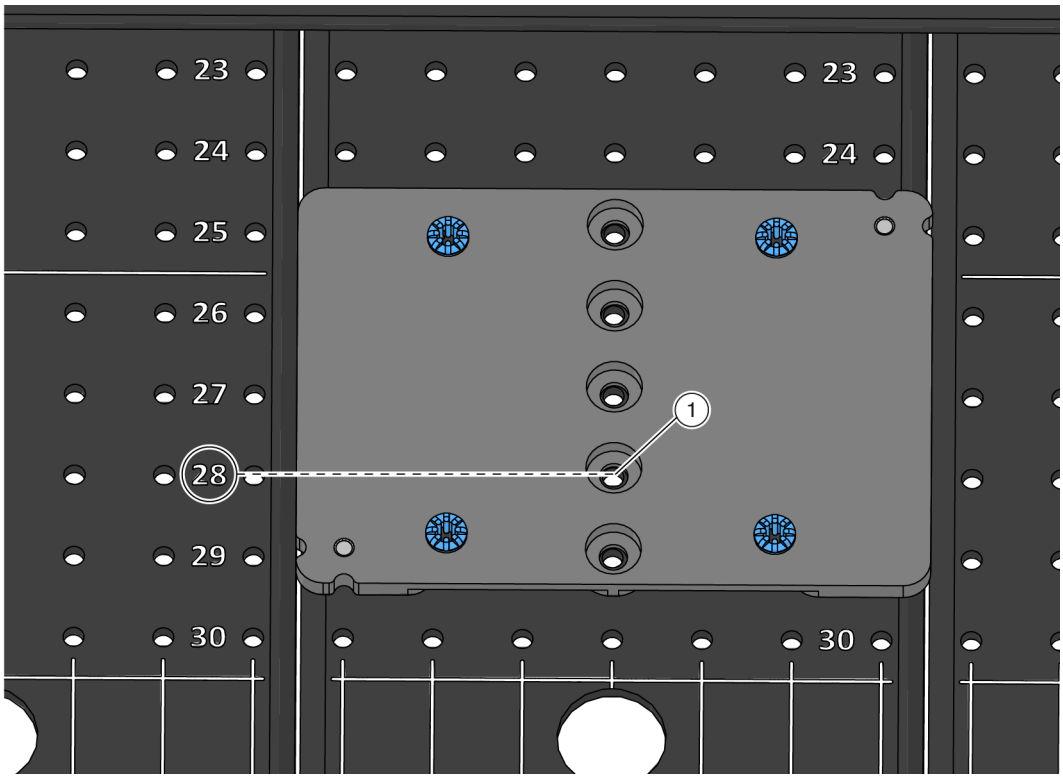
1. **Mounting Pin** locations
2. **Pointing Feature** (frontmost notch)

3 A threaded screw is used to ensure a secure hold to the deck. The mounting plate is equipped with five hole options for the screw, providing the flexibility to place the ALP in any location on the deck. The appropriate hole for the screw is determined by the row on the deck, as described below. Secure the mounting plate follows:

a. Place the screw into the hole that corresponds with the deck row containing tapped holes:

- Tapped holes comprise every fifth row, starting at **Row 3**, and therefore, the screw should be placed in the hole located in **Row 3**, **8**, **13**, **18**, **23**, or **28**. The row that intersects with the mounting plate is the appropriate hole; place the screw into that hole (Figure 11.3).

Figure 11.8 Appropriate Hole for Threaded Screw



1. In this example, the threaded screw is placed in the hole located on **Row 28**.

b. Insert the tip of the screwdriver into the slot on the head of the screw, making sure it is secured into position.

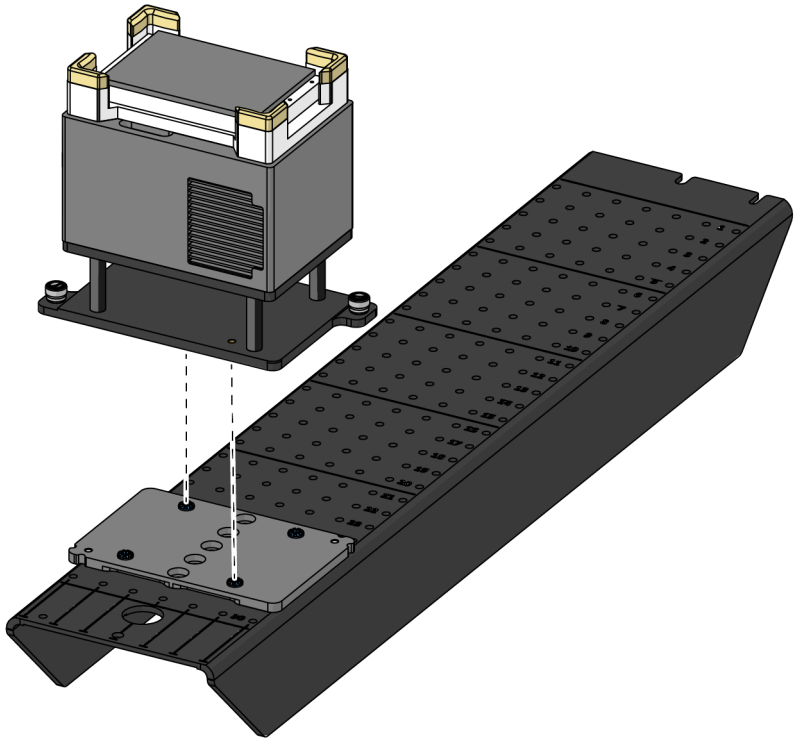
c. Tighten the screw by turning it clockwise until it can no longer move.

Attaching an ALP to the Vibration Isolation Mounting Plate

To attach the vibration isolation mounting plate to the ALP:

1. Position the ALP on the secured mounting plate so that the two pins on the bottom of the ALP slip into the center of the mating rubber grommets. As an example, Figure 11.9 shows a Shaking Peltier ALP being placed on the vibration isolation mounting plate.

   Figure 11.9 Mounting the ALP to the Deck



2. Firmly press down on the ALP until it is fully seated on the mounting plate.

Removing Mounting Plates from the Deck

The removal process for mounting plates is as follows:

1. Remove the ALP according to the instructions in the appropriate chapter/manual (see Table 11.1 for a list of references).

2 Locate the screw designated to secure the ALP to the deck. This screw will be in one of the five holes aligned vertically on the center of the plate.

3 Insert a screwdriver into divot on the top of the screw and turn counterclockwise until it is clear of the mounting plate.

4 Using the finger grips on the side of the plate, pull straight up on the mounting plate until the mounting pins are clear of the mounting holes.

Abbreviations

% — percent

°C — degrees Celsius

°F — degrees Fahrenheit

µL — microliter

ALP — automated labware positioner

ANSI — American National Standards Institute

API — application programming interface

BCAP — Beckman Coulter accounts and permissions

BIOS — basic input output system

CAN — controller area network

CSV — comma-separated values

cm — centimeter

ESD — electro-static discharge

ETC — estimated time of completion

FBBCR — fly-by bar code reader

Hz — hertz

MC — multichannel

PCR — polymerase chain reaction

PN — part number

ID — identification

IFU — instructions for use

I/O — input/output

LLS — liquid level sensing

MC — multichannel

MSDS — material safety data sheet

OS — operating system

PN — part number

PSI — pounds per square inch

RoHS — restriction of hazardous substances directive

SDS — safety data sheet

SPE — solid phase extraction

S8 — Span-8

UI — user interface

USPTO — United States patent and trademark office

WEEE — waste electrical and electronic equipment

Glossary

384-Channel Pod [384 MC, MC-384]
A Multichannel pod with 384-channel head that pipettes liquid volumes from 384 wells in one transfer.

384-Channel Wash Station ALP
Active ALP used to clean disposable tips loaded on a 384-channel head.

96-Channel Pod [96 MC, MC-96]
Multichannel pod and 96-channel head that pipettes liquid volumes from up to 96 wells in one transfer.

96-Channel Wash Station ALP
Active ALP used to clean disposable tips loaded on a 96-channel head.

AccuFrame
A device that automates the process of teaching Biomek Software the location of positions on ALPs on the deck.

Active ALP
A removable and interchangeable platform structure that is installed on the Biomek deck to allow automated assays to be performed. Active ALPs contain mechanisms that may hook to power and/or air sources for mechanical operations, such as tip washing, mixing, stirring, shaking, and precisely positioning labware.

Alarm
Alerts the user of any errors generated or user interaction required during a Biomek method run. (Note that the Biomek Power Pack custom software includes an additional alarm mechanism.)

ALP
See *Automated Labware Positioner [ALP]*

American National Standards Institute
American National Standards Institute. An organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

ANSI/SLAS Microplate Standards
"Specifications for various aspects of microplate labware. Comprised of the following:
ANSI/SLAS 1-2004: Microplates — Footprint Dimensions
ANSI/SLAS 2-2004: Microplates — Height Dimensions
ANSI/SLAS 3-2004: Microplates — Bottom Outside Flange Dimensions
ANSI/SLAS 4-2004: Microplates — Well Positions
ANSI/SLAS 6-2012: Microplates — Well Bottom Elevation"

Artel Multichannel Verification Systems [Artel MVS]
Measurement system that verifies liquid transfer precision and accuracy.

Automated Labware Positioner [ALP]
ALPs are removable and interchangeable platform structures that are installed on the deck. There are two types of ALPs: Active ALP and Passive ALP. An ALP typically has one or more positions to hold standard ANSI/SLAS labware and tip boxes, though some ALPs hold by-products from methods, such as waste fluid and disposed tips, tip boxes, and labware. Attaches to the deck in the workspace. Synonymous with labware positioner.

Biological Safety Enclosures [BSE]
An enclosed, ventilated hood or workspace that allows for safe handling of pathogens, contaminants, or other potentially hazardous materials. These are certified (usually by a third party).

Biomek
Registered trademark for a family of liquid handling robots produced by Beckman Coulter.

Biomek FX^P [FX^P]
Liquid handler designed for bench top use developed by Beckman Coulter. The open architecture design, along with the extensible operating software, provides a foundation for integrating current and future specific-use components. The Biomek FX^P instrument is capable of supporting up to two bridges; each bridge on the FX^P instrument holds one pod.

Biomek i5
Liquid handler developed by Beckman Coulter and designed for automated use. The open architecture design, along with the extensible operating software, provides a foundation for integrating current and future specific-use components. The Biomek i5 instrument uses a single pod for performing a variety of functions, including liquid transfer and moving labware around the deck.

Biomek i7
Liquid handler developed by Beckman Coulter and designed for automated use. The open architecture design, along with the extensible operating software, provides a foundation for integrating current and future specific-use components. The Biomek i7 instrument is capable of supporting up to two arms; each arm on the instrument holds one pod.

Biomek i-Series Automated Workstation
A laboratory instrument designed to perform liquid handling and other sample preparation steps, developed by Beckman Coulter. The open architecture design, along with the extensible operating software, provide a foundation for integrating current and future specific-use components. The Biomek i-Series instruments use pods for performing a variety of functions, including liquid transfer and moving labware around the deck.

Biomek NX^P [NX^P]
Liquid handler designed for bench top use developed by Beckman Coulter. The open architecture design, along with the extensible operating software, provides a foundation for integrating current and future specific-use components. The Biomek NX^P instrument uses a single pod for performing a variety of functions, including liquid transfer and moving labware around the deck.

Configuration View
Part of Biomek Software main editor where the configuration for each step appears. The view changes to correspond to the highlighted step in the Method View. (a.k.a. Step UI)

Conveyor ALP
An active ALP that transports labware between the integrated Cytomat device and Biomek deck.

Coordinates
Any set of numbers used to specify the location of a point in space. Can also include location of additional axes, such as the gripper twist and grip width.

Current Instrument Display
Display located at bottom of the main Biomek Software editor showing the location of labware on the deck during a method run.

Cytomat
Integrated off-deck storage device that is used to store labware.

Deck
The work surface of the instrument. Provides positions for ALPs via predrilled location holes.

Deck Editor
Editor in Biomek Software used to create the work surface of the instrument in the software corresponding with physical locations of ALPs and devices on the instrument.

Deck Layout
Current configuration of the deck.

Deck Position [Position]
Specific place on the instrument deck (as part of an ALP). Labware is placed on positions when used on the instrument.

Delta
Used in Manual Control to specify the amount of change that will be applied to the movement vector of a pod.

Encoder
Tracks the absolute position of an axis.

Expression
One-line combination of alphanumeric characters and/or variables combined using script operations. May be used in a Biomek Method anywhere a variable can be used.

External Device
Off-deck peripheral accessory that performs process functions.

Fly-By Bar Code Reader [FBBCR]
A device that scans bar code labels applied to labware. Labware is scanned by the gripper bringing it to the reader where an initial read or a confirmatory check can be made. The bar code read for each labware item is assigned to the labware in the software (for example to be reported later or for decision making).

Framing
Process of providing exact coordinates of positions on the deck or exact offsets for the gripper. Also called teaching.

Framing Tools
Tools used in the process of framing the deck or grippers.

Gripper
A mechanism for grasping labware, allowing them to be moved from one location to another.

Head
Pipetting device installed on a Multichannel pod that can access multiple wells at one time to aspirate or dispense liquid. The number of channels and capacity vary by head type.

Hertz [Hz]
Cycles per second

Homing / Home (verb)
Action that establishes the origin or zero point for each axis (must be done every time the instrument is powered up).

Hybrid
Biomek instrument with both a Multichannel pod and a Span-8 pod.

If Step
Step controlling actions in a method based upon a true/false condition. The condition can use variables or script expressions, including things such as liquid volume in labware or aspirate amount.

Instrument Setup
Biomek step that specifies the configuration of the instrument deck and pod in Biomek Software. Includes labware and labware contents for items on the deck.

Labware
Microplates (titerplates), lids, tubes, tube racks, reservoirs, or custom defined consumables. Does not include pipette tips, but does include their tip boxes.

Labware Offset
The coordinates difference (vector) from a framed deck position to the location where the back, bottom, left corner of labware rests on that position.

Labware Positioner
See *Automated Labware Positioner [ALP]*.

Labware Properties
Characteristics of labware for use in a method.

Lid
Solid, inflexible cover for labware (usually microplates). Cannot be pierced by tips. Lids are assumed to be able to be manipulated by grippers.

Light Curtain
A safety component that projects a diffused array of infrared light across the front of the instrument that, when penetrated by an object larger than 3.8 cm (1.5 in.) in diameter, immediately stops the instrument. The instrument will also stop if an object greater than 1.6 cm (0.625 in.) in diameter penetrates the upper corners of the instrument opening.

Locating Holes
Predrilled holes in the deck that are used to position ALPs on a Biomek deck or an off-deck position.

Locating Pin
Part of an ALP that protrudes from the bottom in order to engage with the deck. Locating pins fit into locating holes and are used for positively locating ALPs on deck.

Logs
Files that provide records of a method run. Biomek Software offers six standard types of text logs: Details, Errors, Pipetting, Sensor, UnifiedPipetting, and UnifiedTransfer.

Main Editor
Primary window in Biomek Software for building liquid-handling methods for a Biomek Instrument. Includes the Method View, Configuration View, Current Instrument Display, Ribbon, and Status Bar.

Method (Biomek)
Sequentially ordered list of steps comprising a liquid-handling procedure for operations on a Biomek Instrument.

Method View (Biomek)
The pane of the main editor that displays the steps in a method in Biomek Software.

Microplate
Labware used in liquid-handling procedures. Also referred to as a microtiter plate or titer plate. Microplate dimensions are specified in the standards ANSI/SLAS 1-2004 through ANSI/SLAS 4-2004.

Microtiter Plate [MTP]
See *Microplate*.

Mounting Plate
A piece of hardware that attaches legacy ALP types to the new Biomek i5 or Biomek i7 deck.

Mounting Point
The specific locations on a deck where ALPs are located. Mounting points are labeled by a grid system using letters and numbers, which are used in the **Deck Editor** to specify ALP locations.

Multichannel Pod [MC Pod]
A part of a Biomek instrument that holds various removable and interchangeable heads that perform liquid-handling operations via multiple mandrels.

Offset
The difference (vector) from one coordinate to another coordinate.

Orbital Shaker ALP
Active ALP that enables rotational mixing of labware contents.

Part Number [PN]
An alphanumeric identifier used to simplify reference to a unique inventory item.

Passive ALP
A removable and interchangeable platform structure that is installed on the Biomek deck to allow automated assays to be performed. Some passive ALPs hold labware in place on the deck; others act as receptacles for by-products from methods, such as system fluid and disposed tips, tip boxes, and labware.

Pointing Feature
Part of an ALP that indicates where the Mounting Point is for that ALP.

Port
An electrical connection point, frequently used for communications cables (such as USB, CAN, or serial cables).

Position (Biomek)
Also known as **Deck Position**. Specific place on the instrument deck (as part of an ALP). Positions may be named automatically or may be given custom names. Positions have many properties that are accessed via the **Deck Editor**. Labware is placed on positions when used on the instrument.

Project
Software feature that stores items of information about liquid types, labware and tip types, pipetting templates, techniques, and well patterns. Projects store a history of all changes, additions, and deletions of items.

Properties
Characteristics of objects and operations used within Biomek Software. For example, labware has properties for well volume and liquid type, and a pod has properties for speed limit and axes limits.

Restriction of Hazardous Substances Directive 2011/65/EU [RoHS]
Directive that restricts that use of hazardous materials found in electrical and electronic products.

Script Variable
A named value that has limited scope, meaning it can only be used within the code of the **Script Step** where it is defined, unless it is made into a **Global Variable** via the **Extend** function.

Shaking Peltier ALP
Active ALP that enables mixing and temperature-control functionality of labware contents.

Span-8 Active Wash ALP
The Span-8 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 Span-8 Active Wash ALP from a source reservoir to a waste reservoir.

Span-8 Pod
A hardware module (pod) that uses a series of eight probes to perform liquid handling operations independent of each other.

Span-8 Tip Wash ALP
The Span-8 Wash Station ALP is a passive ALP. The eight cleaning wells of the Span-8 Wash Station ALP 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 Wash Station ALP is used to dispose of system fluid used when priming the system and purging the tubing and syringes of air.

SPE (Solid Phase Extraction) ALP
Active ALP that filters fluid from samples by pulling the fluid through a filtered microplate. The fluid is directed to a waste container.

Static Peltier ALP
Active ALP that enables temperature-control functionality of labware contents.

Step Configuration [Step UI]
A portion of the main editor allowing for configuration of a highlighted step.

Steps (in Biomek Software)
User-configurable actions that may be included in a method and executed during a method run.

Teaching
See *Framing*.

Tips
See *Pipette Tips [Tips]*.

TiterPlate
See *Microplate*.

Trash ALP
A passive ALP that provides a means to dispose of pipette tips and labware during a method. This ALP has four configuration options in the **Deck Editor**; the version selected depends on the side of the deck and whether the self-contained bin option or the slide option is used.

Index

Numerics

A

B

C

D

E

F

G

H

I

L

M

O

P

R

S

T

Beckman Coulter, Inc.
Warranty and Returned Goods Requirements

All standard Beckman Coulter, Inc. policies governing returned goods apply to this product. Subject to the exceptions and upon the conditions stated below, the Company warrants that the products sold under this sales agreement shall be free from defects in workmanship and materials for one year after delivery of the products to the original Purchaser by the Company, and if any such product should prove to be defective within such one year period, the Company agrees, at its option, either (1) to correct by repair or at the Company's election by replacement, any such defective product provided that investigation and factory inspection discloses that such defect developed under normal and proper use, or (2) to refund the purchase price. The exceptions and conditions mentioned above are as follows:

1. Components or accessories manufactured by the Company which by their nature are not intended to and will not function for one year are warranted only to reasonable service for a reasonable time. What constitutes a reasonable time and a reasonable service shall be determined solely by the Company. A complete list of such components and accessories is maintained at the factory.
2. The Company makes no warranty with respect to components or accessories not manufactured by it. In the event of defect in any such component or accessory, the Company will give reasonable assistance to Purchaser in obtaining the manufacturer's own warranty.
3. Any product claimed to be defective must, if required by the Company, be returned to the factory, properly decontaminated of any chemical, biological, or radioactive hazardous material, transportation charges prepaid, and will be returned to the Purchaser with transportation charges collect unless the product is found to be defective.
4. The Company shall be released from all obligations under all warranties, either expressed or implied, if any product covered hereby is repaired or modified by persons other than its own authorized service personnel, unless such repair by others is made with the written consent of the Company.
5. If the product is a reagent or the like, it is warranted only to conform to the quantity and content and for the period (but not in excess of one year) stated on the label at the time of delivery.

It is expressly agreed that the above warranty shall be in lieu of all warranties of fitness and of the warranty of merchantability, and that the company shall have no liability for special or consequential damages of any kind or from any cause whatsoever arising out of the manufacture, use, sale, handling, repair, maintenance, or replacement of any of the products sold under the sales agreement.

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

Parts replaced during the warranty period are warranted to the end of the instrument warranty.

NOTE
Performance characteristics and specifications are only warranted when Beckman Coulter replacement parts are used.

Except as provided in writing signed by an officer to Beckman Coulter, Inc., this system and any related documentation are provided “as is” without warranty of any kind, expressed or implied, including that the system is “error free.” This information is presented in good faith, but Beckman Coulter does not warrant, guarantee, or make any representations regarding the use or the results of the use of this system and related documentation in terms of correctness, accuracy, reliability, currentness, omissions, or otherwise. The entire risk as to the use, results, and performance of this system and related documentation is assumed by the user.

Related Documents

Biomek i-Series Hardware Reference Manual
PN B54474

Biomek i-Series Preinstallation Manual
PN B54472

Biomek i-Series Software Reference Manual
PN B56358

Biomek i-Series Tutorials
PN B54475

Automated Labware Positioners (ALPs) Instructions For Use
PN 987836

Biomek i-Series Automated Labware Positioners, Accessories, & Devices Instructions for Use
PN B54477

Static Peltier ALP Integration Manual for Biomek FX/FX^{P}, NX/NX^{P}, and i-Series Instruments
PN A93392, Rev. AC and up

Shaking Peltier ALP Integration Manual for Biomek FX/FX^{P}, NX/NX^{P}, and i-Series Instruments
PN A93393, Rev. AC and up

Biomek i-Series Cytomat ALP and Devices User's Manual
PN B91265

SAMI EX Software for Biomek i-Series Automated Workstations Instructions for Use
PN B58997

SAMI EX Software for Biomek i-Series Automated Workstations Reference Manual
PN B59001

www.beckman.com

BECKMAN COULTER