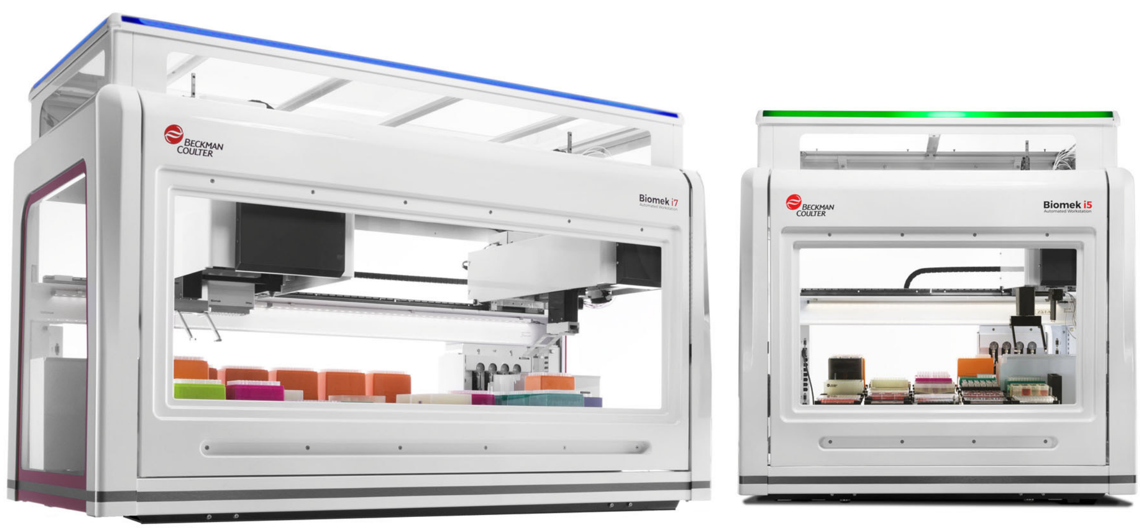
Instructions for Use

Biomek i-Series

Automated Workstations



B54473AC
August 2022

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

Biomek i-Series Automated Workstations
Instructions for Use
PN B54473AC (August 2022)

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Contact Us

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

- Worldwide, find us via our website at *www.beckman.com/support/technical*
- In the USA and Canada, call us at 1-800-369-0333.
- In Austria, call us at 0810 300484
- In Germany, call us at 02151 333999
- In Sweden, call us at +46 (0)8 564 859 14
- In the Netherlands, call us at +31 348 799 815
- In France, call us at 0825838306 6
- In the UK, call us at +44 845 600 1345
- In Ireland, call us at +353 (01) 4073082
- In Italy, call us at +39 0295392 456
- In other locales, contact your local Beckman Coulter Representative.

EC REP

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CH - 1260 Nyon 1, Switzerland
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May be covered by one or more pat. - see www.beckman.com/patents

Glossary of Symbols is available at beckman.com/techdocs (PN C24689).

Original Instructions

Revision Status

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

Initial Issue, 03/17
Software version 5.0 and 5.1

Issue AB, 09/17
Software version 5.1
Changes or additions were made to:

- System Specifications
- Table 1.12, Setup & Device Steps Tab Options
- CHAPTER 2, Framing Deck Positions Using AccuFrame
- CHAPTER 2, Attaching the Framing Shaft to the Span-8 Pod
- CHAPTER 2, Framing the Position, Step 14
- CHAPTER 6, Span-8 Pod Troubleshooting
- Table 6.5, Pod/Gripper Path to Destination Errors

Issue AC, 08/22
Software version 5.1
Changes or additions were made to:

- *Safety Notice*, *Multi-Compliance Label*
- *Safety Notice*, *Instrument/ALPs Labels*

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. 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

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 a Beckman Coulter Representative for any servicing of equipment requiring the removal of covers or panels.

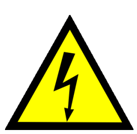
Equipment Ratings

- 100 - 240 VAC
- 50/60 Hz
- 10 A

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.

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

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 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 in accordance with the instructions outlined in this manual and take all the necessary precautions when using pathological, toxic, or radioactive materials.**
- **Splashing of liquids may occur; therefore, take appropriate safety precautions, such as using safety glasses and wearing protective clothing, when working with potentially hazardous liquids.**
- **Use an appropriately-contained environment when using hazardous materials.**
- **Observe the appropriate cautionary procedures as defined by your safety officer when using flammable solvents in or near a powered-up instrument.**
- **Observe the appropriate cautionary procedures as defined by your safety officer when using toxic, pathological, or radioactive materials.**

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

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 CHAPTER 7, *Preventive Maintenance*. Prior to cleaning equipment that has been exposed to hazardous material:

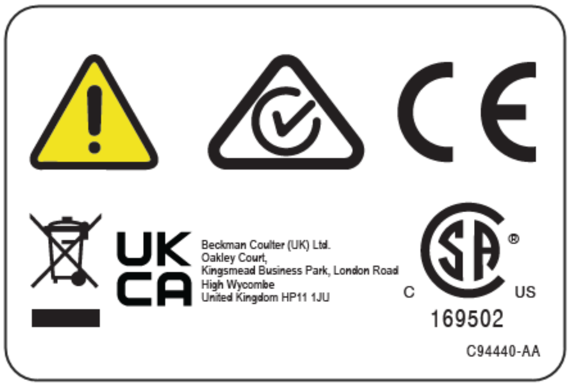
- Contact the appropriate Chemical and Biological Safety personnel.
- Review the *Chemical and Biological Safety* section (above).

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 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.

Multi-Compliance Label



This symbol indicates compliance with:

- 169502 – This label indicates recognition by a Nationally Recognized Testing Laboratory (NRTL) that the instrument has met the relevant product safety standards.
- The "RCM" (Regulatory Compliance Mark) is depicted as a triangle with a partial circle and check. The mark is applied to products that comply with the EMC requirements of the Australian Communications Media Authority (ACMA) for use in Australia and New Zealand.
- Recycling – Refer to the Recycling Label section in this document.
- 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.
- A “UKCA” mark indicates that a product has been assessed before being placed in the UK market, and has been found to meet UK safety, health, and/or environmental protection requirements.
- 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.

It is very important that you understand and follow all laws regarding the proper decontamination and safe disposal of electrical equipment. For Beckman Coulter products bearing this label, contact your dealer or local Beckman Coulter office for details on the take-back program that will facilitate the proper collection, treatment, recovery, recycling and safe disposal of the device.

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.

System Specifications

Item	Description	
	Open Enclosure	**Closed Enclosure (door closed)**
Dimensions — i5 Base Unit	**Width**: 112 cm (44 in.) **Depth**: 81 cm (32 in.) **Height**: 104 cm (41 in.)	**Width**: 112 cm (44 in.) **Depth**: 81 cm (32 in.) **Height**: 112 cm (44 in.)
Dimensions — i7 Base Unit	**Width**: 170 cm (67 in.) **Depth**: 81 cm (32 in.) **Height**: 104 cm (41 in.)	**Width**: 170 cm (67 in.) **Depth**: 81 cm (32 in.) **Height**: 112 cm (44 in.)
Maximum Height with Door Open	N/A	147 cm (58 in.)
Weight — i5 Base Unit Multichannel Span-8	 155 kg (341 lbs) 146 kg (322 lbs)	 181 kg (399 lbs) 172 kg (379 lbs)
Weight — i7 Base Unit Multichannel Dual Multichannel Span-8 Hybrid	 199 kg (439 lbs) 234 kg (516 lbs) 190 kg (419 lbs) 225 kg (496 lbs)	 234 kg (516 lbs) 269 kg (593 lbs) 225 kg (496 lbs) 260 kg (573 lbs)
Environment	Indoor use only	
Electrical Requirements	Base Unit — 100 – 240 VAC, 10A, 50/60 Hz Automation Controller — 100 – 240 VAC, 2.5A, 50/60 Hz Monitor — 100 – 240 VAC, 1A, 50/60 Hz I/O Box — 100 – 240 VAC, 6.3A, 50/60 Hz	
System Fluid Requirements **NOTE** Only instruments equipped with a Span-8 pod require system fluid.	• De-ionized or distilled water. • System Fluid should be de-gassed for 24 hours prior to use.	
Ambient Operating Temperature	10°C-30°C (50°F-86°F)	
Humidity Restrictions	20–85% (non-condensing) @ 30°C (86°F)	
Altitude Restrictions	Up to 2000 m (6562 ft.)	
Installation Category	Category II	
Pollution Degree	2	
Sound Pressure Level	• Maximum sound pressure: 70 dB(a) • Maximum sound pressure at 1 meter: 70 dB(a)	
Circuit Breaker	• **US**: 250VAC, 60Hz, 10 Amp, UL recognized, CSA certified, UL File E96454 • **Europe**: 250VAC, 50Hz, 10 Amp, VDE Certificate Number: 40011305	

Item	Description
Communications to Host and Cameras	USB 2.0
Communications to Active ALPs	CAN

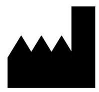
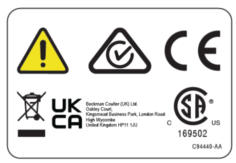
Protective Barriers

Refer to CHAPTER 1, *Protective Barriers*, for details on the protection system available for your Biomek i-Series instrument.

Instrument/ALPs Labels

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

Name	Label	Meaning
Biohazard		The Biohazard Symbol warns of the potential to be exposed to biological substances that carry a significant health risk.
Caution, Moving Parts Label		The Pinch Point Symbol warns that the instrument poses a risk of injury from moving parts.
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.

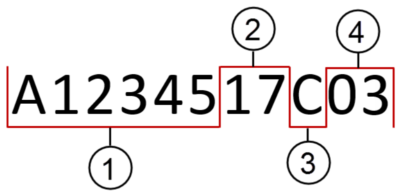
Name	Label	Meaning
Manufacturing Labels	EC REP	Located next to this symbol is the contact information for the EC (European Commission) representative.
	BECKMAN COULTER	The company name.
		The Manufacturer Symbol indicates the name and address of the manufacturer.
		Date of Manufacture Symbol indicates the date that the product was manufactured in the YYYY-MM-DD format.
Multi-Compliance Label		See *Multi-Compliance Label*.
Ratings Label		The Ratings Label provides the electrical rating and international caution symbol.

Serial Number

SN

Located next to the Serial Number symbol (shown above), the serial number can be found on the inside of the instrument on the right side of the X-Axis Linear Rail. The instrument part number, manufacture date, and unit number are coded into the serial number. For example, the third instrument manufactured in **March, 2017** with the part number of **A12345** is formatted as shown in the figure below.

Serial Number Format



1. Instrument Part Number
2. Year of Manufacture (formatted as YY)
3. Month of Manufacture (Month codes are provided in the table below.)
4. Unit Number

Serial Number Month Codes

Month	Code	Month	Code
January	A	July	G
February	B	August	H
March	C	September	J
April	D	October	K
May	E	November	L
June	F	December	M

Biomek i-Series Safety Messages

Please read and observe all cautions and instructions. Remember, the most important key to safety is to operate the Biomek i-Series instrument with care.

The safety messages found in Biomek i-Series user's manuals are provided below.

General Messages

WARNING

Risk of personal injury or contamination. 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.

ALPs, Accessories, & Devices Messages

WARNING

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

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 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.

⚠ WARNING

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

⚠ WARNING

Risk of contamination. The disposal bags shipped with the Trash 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.

⚠ WARNING

Risk of personal injury or contamination. ALPs can pose 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.

⚠ 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.

⚠ 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 or contamination.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.

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 contamination. Kinked tubing between the waste container, the Span-8 Tip Wash ALP, and drip tray can cause insufficiently cleaned labware or leaks. Always 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 equipment damage or contamination. A 384-Channel head will not fit into a 96-Channel Tip Wash ALP and may cause a crash or overflow. Use the 384-Channel Tip Wash 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 Tip Wash ALP and may cause a crash or overflow. Use the 384-Channel Tip Wash ALP only with the 384-Channel head.

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.

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.

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.

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.

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.

WARNING

Risk of personal injury or contamination. Some ALPs and external devices continue to run while the instrument is paused or stopped, and accessing the deck could result in injury or spills. Use caution when accessing the instrument deck while the method is paused.

WARNING

Pressing the Biomek Software Stop button immediately stops the Orbital Shaker. Care should be taken when immediately stopping devices, as this may result in unexpected spills or loss of sample.

WARNING

Risk of equipment damage or personal injury. Do not shake tip boxes, tip box lids, or reservoirs on the Orbital Shaker ALP. The clamps on the ALP cannot hold tip boxes, tip box lids, or reservoirs securely during a shaking procedure.

WARNING

Risk of contamination. Unsafe shaking speeds can cause liquid to fly out of labware on the Orbital Shaker ALP. Do not exceed the recommended maximum shaking speed to ensure labware stays securely clamped on the Orbital Shaker ALP.

WARNING

Risk of contamination. The type and amount of fluid being shaken impacts the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

WARNING

Risk of contamination. Uneven fluid distribution could compromise the ability of the clamping mechanism to securely hold the labware. Ensure liquid is distributed evenly prior to using the Orbital Shaker ALP. Maximum recommended shaking speed values in Table 27.2 in the *Biomek i-Series Software Reference Manual* (PN B56358) assume fluid is distributed evenly throughout the plate.

WARNING

Risk of personal injury or equipment damage. The Cytomat device weighs 80 - 141 kg (176 - 311 lbs). Do not attempt to lift it without first contacting your safety officer for instructions regarding lifting heavy objects.

WARNING

Risk of bodily injury. Side panels of the Cytomat packing crate are heavy and can fall when screws are removed. To prevent the side panels from falling on the person unpacking a Cytomat, a second person must hold each panel while the screws are removed. Follow your safety officer's instructions regarding lifting and moving heavy objects.

WARNING

Risk of personal injury. The top surface of the Peltier ALP may be very hot. Do not touch the top surface, otherwise you may get burned.

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.

CAUTION

Risk of personal injury or equipment damage. Turn off power to the instrument before mounting any active ALP. Failure to do so can result in personal injury or equipment damage.

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.

CAUTION

Risk of equipment damage. Do not plug the Fly-By Bar Code Reader into the instrument tower connection panel, as this can cause the Fly-By Bar Code Reader to malfunction. To work properly, the Fly-By Bar Code Reader 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.

CAUTION

Risk of equipment damage. The pod could collide into the Trash ALP if it is placed in the incorrect deck position. To avoid collisions, the self-contained Trash ALP *With Disposal Bin* must be mounted on the deck within the region defined in 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.

⚠ CAUTION

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

⚠ 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.

⚠ CAUTION

Risk of equipment damage. 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.

⚠ CAUTION

Risk of personal injury or equipment damage. Turn off the power to the instrument before attaching or removing the Orbital Shaker ALP. Failure to do so can cause personal injury or equipment damage.

⚠ CAUTION

Risk of equipment damage. Non-compliant labware might not be securely grasped by the Orbital Shaker ALP or might cause physical damage to the ALP. Only labware meeting the ANSI/SBS Microplate Standards listed below is recommended for use on the Orbital Shaker ALP.

- **ANSI/SLAS 1-2004: Microplates - Footprint Dimension**
- **ANSI/SLAS 2 2004: Microplates - Height Dimensions**
- **ANSI/SLAS 3-2004: Microplates - Bottom Outside Flange Dimensions**

⚠ CAUTION

Risk of equipment damage. Checking and changing coolant requires removing covers from the Shaking Peltier ALP. An electrical short could be caused by coolant spills. Therefore, remove covers with care and use caution when servicing the device.

⚠ CAUTION

Position the Peltier ALP to allow at least 2.5 - 5.1 cm (1 - 2 in.) of clearance around the vent openings. Covering or obstructing the vent openings on the Peltier ALP may result in reduced performance.

⚠ CAUTION

Use only the cables that were included with the Peltier ALP. Other cables may result in power or communications problems.

⚠ CAUTION

Do not use the Shaking Peltier ALP without an adapter plate for any labware other than flat-bottomed microplates. Labware other than flat-bottomed microplates requires an adapter to ensure proper heating and cooling.

⚠ CAUTION

Do not use the Static Peltier ALP without an adapter plate installed. Labware requires an adapter to ensure proper heating and cooling.

⚠ CAUTION

Do not overtighten the screws. There is a gap between the tabs on the adapter plate and the Shaking Peltier ALP. Overtightening may result in the adapter plate being uneven and affect heating and cooling performance of the Shaking Peltier ALP.

⚠ CAUTION

Do not overtighten the screws on the Static Peltier ALP. If a screw is overtightened, it may damage the threaded inserts.

System-Related Messages

⚠ WARNING

Risk of contamination or procedure failure. When transferring liquids using select liquid types, selecting an incorrect liquid type may result in poor pipetting performance. Use care when selecting liquid types.

⚠ WARNING

Risk of equipment damage or contamination. Incorrect labware definitions in the Biomek Software Labware Type Editor can cause system crashes or hazardous waste spills. Verify definitions are correct prior to executing a method run.

WARNING

Risk of equipment damage or contamination. The correct well properties must be defined in the Biomek Software Labware Type Editor according to the manufacturer's specifications. Inaccurate specifications may lead to inaccurate pipetting, especially when using Liquid Level Sensing.

WARNING

Risk of equipment damage and contamination. Incorrectly created Biomek Software methods can cause system crashes, resulting in equipment damage, or hazardous waste spills. Verify all methods are properly created prior to executing the method run.

WARNING

Risk of equipment damage or contamination. Always verify that the physical instrument setup matches the instrument setup in Biomek Software. Inaccurate instrument setup can result in inappropriate pipetting or pod collision, resulting in equipment damage or hazardous waste spills.

WARNING

Risk of equipment damage or contamination. Make sure the correct ALP is chosen when configuring the deck setup in the Deck Editor. ALPs vary in height, and failure to choose the correct ALP in the Deck Editor can result in collisions, causing equipment damage and/or hazardous waste spills.

WARNING

Risk of contamination or procedure failure. When transferring liquids using select patterns, selecting an incorrect pattern may result in transferring reagents to incorrect wells. Use care when selecting patterns at run time.

WARNING

Risk of equipment damage, contamination, and procedure failures. The Ignore error recovery option in Biomek Software is potentially dangerous since almost every action depends upon the successful completion of previous actions. Choosing Ignore can lead to mishandled labware and reagents or collisions and instrument damage. Choose Ignore only when the error cause is known and corrected, and instrument actions following Ignore are fully understood.

WARNING

Risk of contamination. Ignoring the error and continuing the method when a clot exists could contaminate the deck. Always address errors promptly.

WARNING

To avoid equipment damage and/or hazardous waste spills, no changes to the Biomek instrument state are permitted while a method is paused. Changes can be made to the labware contents, but not the deck or the devices.

WARNING

Risk of personal injury. Septa fluted tips are extremely sharp. Use care when handling septa fluted tips.

WARNING

Risk of contamination. Removing tips 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. Used disposable tips may be contaminated. Do not touch disposable tips with bare hands. Always wear protective gloves and other appropriate personal protection equipment as defined by your laboratory safety officer when removing the tips.

WARNING

Risk of contamination. Containers pose 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 equipment damage. The Biomek workstation weighs between 146 - 269 kg (322 - 593 lbs). Do not attempt to lift or move the Biomek workstation without first contacting your safety officer for instructions regarding lifting heavy objects.

WARNING

Risk of personal injury or equipment damage. The Biomek i5 instrument will overhang the edges of a 55 cm x 61 cm bench. Make sure there are no obstacles that will interfere with placement of the instrument and that the leveling feet are securely positioned on the bench.

WARNING

Risk of personal injury or equipment damage. The Biomek i7 instrument will overhang the edges of a 115 cm x 61 cm bench. Make sure there are no obstacles that will interfere with placement of the instrument and that the leveling feet are securely positioned on the bench.

WARNING

Risk of personal injury or equipment damage. Make sure the bench can support the total installed weight of the system. Refer to Table 1.4 in the *Biomek i-Series Preinstallation Manual* (PN B54472) to determine the total weight of the system.

WARNING

Risk of bodily injury and/or equipment damage. The optical table is heavy and cumbersome. To avoid injury, two or more people are needed to assemble and move the optical table. Follow your safety officer's instructions regarding lifting and moving heavy objects.

WARNING

Dark non-reflective material affects the sensitivity of the light curtain and adversely impacts its effectiveness. Typical light colored lab dress, such as lab coats and latex gloves, do not degrade light curtain operation; however, it is advisable to test the impact of all lab dress on light curtain sensitivity before operating the instrument. Verify lab dress impact on light curtain sensitivity as follows:

Use Manual Control in the software and insert the material no more than 2.54 cm (1 in.) past and approximately 66 cm (26 in.) above the light curtain panel. Make sure the scrolling green status indicator light bar changes to flashing red.

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.

⚠ CAUTION

Risk of equipment damage. After new tips are added, the correct properties must be defined in the Biomek Software Tip Type Editor according to the manufacturer's specifications. Inaccurate specifications may lead to collisions, resulting in equipment damage.

⚠ CAUTION

Risk of affecting pipetting performance. The light curtain should not be used to pause a method, as it may affect how pipetting occurs. Use it to stop a method only in an emergency.

⚠ CAUTION

Risk of equipment damage. Resuming a method in Biomek Software assumes that the instrument is in the same state as when the error occurred. The pod may be moved to deal with a problem and changes can be made to labware contents, but no changes can be made to the instrument deck or devices in Biomek Software. Doing so can lead to instrument damage.

⚠ CAUTION

Risk of equipment damage. Do not remove tower covers to access electrical wiring. Contact us if further access is required.

⚠ CAUTION

Risk of equipment damage. Electrical Static Discharge (ESD) can damage sensitive electrical equipment. To prevent damage due to electrical static discharge, wear a wrist ground strap when working around sensitive electronic equipment.

⚠ CAUTION

Risk of equipment damage. The head is connected to the multichannel pod by the shoulder screws. Before removing the fourth shoulder screw, take hold of the head firmly to make sure it does not fall once all of the screws are removed.

CAUTION

Risk of equipment damage. The gripper fingers could bend if not taught (correlated) properly. Use AccuFrame to properly correlate the grippers.

CAUTION

Risk of equipment damage. Septa fluted tips are extremely fragile. Use care when handling septa fluted tips.

CAUTION

Risk of contamination. Fixed tips can pull sample into the tubing, causing contamination of the tubing and system fluid. Avoid aspirating more sample than the fixed tip capacity. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

CAUTION

Risk of cross-contamination. Liquid drawn into the tubes can contaminate later fluid transfers. Use appropriate air gaps when pipetting on the Span-8 pod. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

CAUTION

Risk of equipment damage or contamination. Tips could become wedged inside labware, picking the labware up with the probe when the probe is raised. Use labware and tip combinations labeled as ‘Limited’ with caution.

CAUTION

Risk of method failure. Overtightening the tip shuck tube may result in problems with unloading the tips. Do not overtighten the tip shuck tube.

CAUTION

Risk of pipetting errors. Air bubbles in the system fluid could inhibit pipetting and cause errors. De-gas the system fluid by letting it rest in the supply container for 24 to 48 hours prior to attaching it to the instrument.

CAUTION

Risk of method failure or leaks. Tap water is not recommended due to high mineral content, which could cause blockages in the tubing and increase the possibility of leaks at tubing connections. Use de-ionized or distilled water as a system fluid for the Span-8 pod.

CAUTION

Risk of method failure. Using a dirty supply container could clog the tubing. Always check the supply container for debris prior to running a method.

CAUTION

Risk of equipment damage. Purging or operating the system without mandrels installed and tubing attached to tips could cause corrosion in the tip interface. Always make sure the mandrels are installed and the tubing is attached to tips prior to purging or operating the system.

CAUTION

Risk of equipment damage. Do not connect or disconnect any cables while the instrument is on. Turn off the main power before connecting or disconnecting cables.

CAUTION

Risk of equipment damage or contamination. Changing the axes limits can lead to the instrument contacting the physical limits of the arm or pod. Contact us before making any changes to the arm or pod axes limits in Hardware Setup.

CAUTION

Risk of equipment damage or inaccurate results. If the hardware configuration is not updated using Hardware Setup, hardware crashes or inaccurate liquid transfer could occur. Always use Hardware Setup to make changes to hardware settings.

CAUTION

Risk of equipment damage or contamination. Changing Correlate Pods can lead to the pods physically contacting each other. Contact us before using Correlate Pods in Hardware Setup.

CAUTION

Risk of equipment damage. Changing Correlate Axes may lead to crashes. Contact us before using Correlate Axes in Hardware Setup.

CAUTION

Risk of inaccurate pipetting. Do not choose Cancel while Test Sensitivities is in progress; if testing is stopped before the probe sensitivities have been completed, liquid level sensing will not function and Find Sensitivities must be repeated.

CAUTION

Risk of inaccurate pipetting. Do not choose Cancel during Find Clot Detection Sensitivities test. It takes nearly 30 minutes to complete the testing. If testing is stopped before the probe sensitivities have been completed, clot detection will not function and Find Clot Detection Sensitivities must be repeated.

CAUTION

Risk of affecting pipetting performance. Changing the purge settings may change the behavior of the Span-8 pod during pipetting. Contact us before making any changes to the purge settings.

CAUTION

Risk of method failure. Independent pump calibration may cause validated methods to have inaccurate pipetting. Previously validated methods will require re-validation before running them.

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.

CAUTION

Risk of equipment damage. Manually moving the Span-8 probes can cause the systems that move them to be damaged. Never pull or push the Span-8 probes manually. Always use Advanced Manual Control to move the probes.

⚠ CAUTION

In Biomek Software, before clicking OK to home all axes, make sure:

- **The pods and grippers are positioned as shown in the warning message illustration.**
- **The gripper fingers are not holding any labware.**
- **The grippers are able to rotate freely without contacting the Multichannel head, Span-8 probes, tips, or sides of the instrument.**
- **No disposable tips are loaded on either pod.**
- **The Framing Probe is NOT installed on the Multichannel pod.**
- **Either disposable tip mandrels or fixed tips are installed on the Span-8 pod.**
- **If fixed tips are installed on the Span-8 pod, no liquid is present in the tips.**

  Failure to do so can cause the pod to crash into other items on the workstation, causing equipment damage and/or hazardous waste spills.

⚠ CAUTION

Risk of equipment damage. Moving the gripper to Z-Max while the gripper is located under a pod can cause a collision with the pod. Prior to using Move Gripper Z-Max, ensure the gripper is in a position where there are no obstructions above the gripper fingers in the vertical travel path.

⚠ CAUTION

Risk of procedure failure. Make sure the proper communications port is selected in Hardware Setup. Simulate is used only when running methods on the Biomek Simulator. To run methods on the instrument, choose the USB port (in Name) to which the instrument is connected.

⚠ CAUTION

Risk of equipment damage. Make sure to connect the correct devices to the communication ports. Failure to make the correct port connections can cause equipment damage.

Contents

Illustrations

Tables

Introduction

Welcome to the Biomek i-Series Automated Workstations

This guide provides an overview of Biomek i-Series instruments, Biomek Software, ALPs, accessories, consumables, as wells as instructions for completing basic procedures.

Included in this manual are references to other Biomek i-Series user's manuals to further investigate topics that are particularly relevant to you. For a complete list of Biomek i-Series user's manuals, see *Biomek i-Series User Manuals*. Moving back and forth between this manual and the user's manuals, you will be able to learn about the Biomek i-Series instruments and software and become familiar with the other manuals and how chapters are arranged.

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

Product Description

Not for use in diagnostic procedures.

The Biomek i-Series Automated Workstation is a multi-axis liquid-handling instrument used in the life sciences or biomedical laboratory. The modular design, along with the extensible operating software, provides a foundation for configuring interchangeable specific-use accessories and for integrating peripheral process devices to automate laboratory workflows.

The primary purpose of the Biomek i-Series instrument is to pipette, or transfer liquid samples, from source labware to destination labware in an automated fashion. Automating such sample preparation processes improves pipetting accuracy and precision by reducing the variability inherent to manual pipetting techniques, which are subjected to operator-to-operator differences.

Liquid pipetting is implemented by way of air or liquid displacement technology using either Multichannel pipetting heads or Span-8 pods. Multichannel heads are designed in either 8 x 12 or 16 x 24 pipetting arrays that hold disposable pipette tips, allowing the pipetting action to be completed with up to 96 or 384 samples at one time. The use of Multichannel heads is found in pipetting to and from microplates of similar array densities. Span-8 pods are designed as eight independent pipetting probes, configured in a linear plane, and capable of being expanded and contracted with equidistant spacing from 9 to 50 mm between probes. Each probe holds one fixed or disposable pipette tip to enable the pipetting action. The use of the Span-8 pod is found in pipetting to and from labware of differing well spacings, for example, tube-to-tube, tube-to-microplate, or microplate-to-microplate, etc.

For Biomek i-Series Multichannel pipetting heads, disposable pipette tips are used to transfer liquid from the source labware, for example, tube or microplate, to the destination labware. When aspirating a sample, a hydraulic piston in the pipetting head mechanically pulls liquid into the pipette tip, which is immersed in the sample. The air in the pipette tip is displaced by the liquid entering the tip. In dispensing the liquid to the destination labware, the piston movement is reversed, and the liquid is dispelled from the pipette tip.

Span-8 pods pipette liquids using liquid displacement technology. A sample is aspirated into either a disposable pipette tip or a fixed tip, which is immersed in the liquid. On the Span-8 pod, a syringe pump connected to the disposable or fixed tip via a hydraulic tubing line mechanically moves system fluid, thereby displacing the air in the tip with the liquid entering the tip. In dispensing the liquid to the destination labware, the syringe pump movement is reversed, and the liquid is dispelled from the disposable or fixed pipette tip.

In addition to pipetting, the Biomek i-Series Automated Workstation allows movement of labware around the work surface by means of a 360° rotating gripper with offset fingers. The gripper mechanism enables stacking and unstacking of labware and movement of microplates from one deck position to another, including movement to peripheral process devices such as heating/cooling and shaking devices, as well as movement to off-deck instruments by means of shuttle transport systems.

All pipetting and labware movement actions are controlled by Biomek Software. The extensible operating software provides a user interface that enables instrument deck layouts and labware types to be defined and sample preparation methods to be imported and exported, all through the use of icon-driven steps designed to create and configure methods.

Instrument Performance

Biomek pipetting performance capabilities represent pipetting performance that can be achieved from an optimally-configured Biomek instrument. Stated performance values are established using aqueous media, measured spectrophotometrically, and using Biomek Software. Actual results can be optimized through the flexibility of Biomek Software, which allows default settings that control pipetting performance to be modified for labware, tips, liquid types, and pipetting techniques and templates specific to the physical properties of the sample and reagent types being pipetted.

Post-installation operational verification is available through an Operational Qualification (OQ), which is performed by a Beckman Coulter Representative. For more information, or to setup an OQ for your instrument, contact us.

What You'll Learn in this Manual

Use this manual to learn how to optimally configure and run your Biomek i-Series instrument. Topics include the following:

✓ **Introduction to the Biomek i-Series instrument, software, ALPs, and accessories:**

- CHAPTER 1, *Biomek i-Series Instruments*
- *Glossary*
- *Abbreviations*

✓ **Configuring Biomek Software to match the hardware:**

- CHAPTER 2, *Preparing to Run*

✓ **Optimizing performance:**

- CHAPTER 3, *Best Practices*
- CHAPTER 4, *Understanding Pipetting Techniques*
- CHAPTER 6, *Troubleshooting*
- CHAPTER 7, *Preventive Maintenance*

✓ **Using advanced features:**

- CHAPTER 5, *File Management and Compliance*

✓ **Creating a simple method:**

- CHAPTER 8, *Introduction to Method-Building*
  — CHAPTER 9, *Creating a Simple Multichannel Method*
  — CHAPTER 10, *Creating a Simple Span-8 Method*

IMPORTANT The comprehensive Biomek i-Series documentation set is provided in *Biomek i-Series User Manuals*. Consult these manuals for detailed information on the topics presented above.

Advancing Your Skills

Biomek Software has many additional features and functions that are beyond the scope of this manual. To learn more about using your instrument, you have several options:

- **Instructor-Led Courses:**
  — *Biomek i-Series - The Fundamentals, Basic Operation and Hardware*
  — *Biomek i-Series - Software Basics with Method Programming and Pipetting*
  — *Biomek i-Series - Advanced Method Programming with Additional Software Tools*

- **E-Modules:**
  — *The Theory of Liquid Handling*
  — *Basic System Overview, Hardware and Software*

For further information about the available courses, visit the **Beckman Coulter Learning Center**, and enter **Biomek** in the **Search** field or contact us.

Contact Information

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.

Please have your System ID# or Serial # to enable us to better serve you.

Biomek i-Series User Manuals

This manual should be used in conjunction with the other Biomek i-Series user manuals, which are listed in the table below. These documents can be found in the following locations:

- **On your Automation Controller**:
  - ***ThisPC\OSDisk(C:)\Program Files (x86)\Common Files\Beckman Coulter\Manuals***
  - Click (**Help**) to open an interactive version of the *Biomek i-Series Software Reference Manual*.

  NOTE To update the files located on your system, download the Biomek i-Series System Help file by following instructions in *Manually Updating User Manuals on the Biomek i-Series Automation Controller*.

- **On the web**: *www.beckman.com/techdocs*

User Manual	Part Number	Objective
Biomek i-Series Preinstallation Manual	B54472	Provides specifications and instructions for the following: • Preparing the site. • Preparing the instrument for installation. • Preparing Cytomat devices for installation. • Preparing other integrated devices for installation.
Biomek i-Series Hardware Reference Manual	B54474	Provides the following: • An overview of available Biomek i-Series configurations. • Instrument specifications. • Detailed descriptions and instructions for using, troubleshooting, and maintaining both the Multichannel and Span-8 pods. • Instructions for configuring the instrument in **Hardware Setup**. • Instrument framing instructions. • Instructions for using **Manual Control**. • Enclosure system instructions.

User Manual	Part Number	Objective
Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use	B54477	Provides instructions for ALPs and accessories designed for the Biomek i-Series instruments. This document includes: • 1 x 1, 1 x 3 and 1 x 5 static ALPs • Test Tube Rack ALP • Fly-By Bar Code Reader • Trash ALP • Span-8 Active Wash ALP • Span-8 Tip Wash ALP • Multichannel Wash ALPs (96-Channel and 384-Channel) • Circulating Reservoir/Tip Box ALP • Heating and Cooling ALP • Compatible Biomek FX^P/NX^P ALP Mouting Plates
Automated Labware Positioners (ALPs) Instructions for Use	987836 & B54477 (above)	Provides instructions for the following ALPs and accessories: • Device Controller • Orbital Shaker • Positive Positioner • Drainable/Refillable Reservoir **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 **PN B54477**. Instructions for using these ALPs are located in **PN 987836**.
Biomek i-Series Software Reference Manual	B56358	All-inclusive instructions for using Biomek Software with the Biomek i-Series instruments.
Biomek i-Series Tutorials	B54475	Provides instructions specifically aimed at acquainting you with using Biomek Software to operate Biomek i-Series instruments. The instructions use methods as a baseline, which aid in familiarizing users to practical applications. This document contains tutorials for both the multichannel and Span-8 pods, including the following topics: • Getting started with Biomek Software. • Using more steps in a method. • Using individual steps to transfer liquid. • Using worklists and conditions. • Using selective tips pipetting (Multichannel only). • Using files to direct transfers (Span-8 only). The manual is formatted to allow you to complete only the chapters that include the topics you need to learn.
SAMI EX Software for Biomek i-Series Automated Workstations Instructions for Use	B58997	Provides basic operating information to get a user acquainted with SAMI EX Software with the Biomek i-Series system, including an overview of the software, instructions for configuring decks and devices in the software, tutorials on creating and running a basic method, an overview on advanced features, and best practices. This manual also includes a comprehensive list of safety messages.

User Manual	Part Number	Objective
SAMI EX Software for Biomek i-Series Automated Workstations User's Manual	B59001	To help you become familiar with the software, this manual covers the basics of developing, scheduling, and running assays on the Biomek i-Series system using SAMI EX Software through step-by-step instructions and five tutorials.
Shaking Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments	A93393, Rev. AC and up	This manual provides the complete instructions for using the Shaking Peltier ALP with the Biomek FX/FX^P, NX/NX^P, and i-Series instruments.
Static Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments	A93392, Rev. AC and up	This manual provides the complete instructions for using the Static Peltier ALP with the Biomek FX/FX^P, NX/NX^P, and i-Series instruments.
Biomek i-Series Cytomat ALP and Devices User's Manual	B91265	Provides complete instructions for using the Cytomat ALP and related devices with Biomek i-Series instruments.

Manually Updating User Manuals on the Biomek i-Series Automation Controller

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. If a restart is not performed manually, the system will schedule an automatic restart during a time that the system is usually idle. To avoid loss of data and/or samples, check for pending Windows Updates and install them prior to starting an overnight or off-shift run.

IMPORTANT Beckman Coulter is not responsible for viruses introduced into your system through third party devices. Ensure the flash drive used for this operation does not contain malware.

NOTE If you do not have access to the internet, contact us.

1 Go to *www.beckman.com/techdocs* on a computer connected to the internet.

2 Search for part number **B96939**, which is the **Biomek i-Series System Help** file, and select the link for this file.

3 In the pop-up, select the **Save** down arrow, and then select **Save As**.

4 Browse to the location where you wish to save the file, and then select **Save**. If installing the files on the current system, go to step 6.

5 If installing on another system that is not connected to the internet:

a. Save the files on a portable memory device, such as a flash drive.

⚠ 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.

b. Insert the memory device into the Biomek i-Series Automation Controller.

c. Browse to the downloaded file on the portable memory device and copy the files to the Biomek i-Series Automation Controller.

6 Double click on the file to initiate the installer, and follow the instructions on the installer window to complete the process.

NOTE If you have any questions, contact us.

CHAPTER 1

Biomek i-Series Instruments

Overview

Biomek i-Series Automated Workstations

Biomek i-Series Automated Workstations feature the following:

- Modular design, allowing expansion of the instrument capabilities through interchangeable specific-use components, such as the 384-channel and two 96-channel heads for the Multichannel pod and a variety of ALPs.
- System architecture that is designed to simplify the integration of plate readers, washers, labware storage devices, and robotic transport systems.
- A 360° rotating gripper, which moves labware and plates in different orientations, comes standard on both the Multichannel and Span-8 pod types.
- Intuitive Biomek Software, which provides an extensible user interface, allowing the ability to define new deck layouts and labware to make changing configurations fast and easy, import and export methods, use icon-driven steps to create and configure methods, and much more.

Biomek i-Series Instrument Configurations

There are two types of Biomek i-Series instruments, which are differentiated by the size of the workstation. Table 1.1 provides an overview of pod configuration options for each instrument type, along with the maximum number of positions that are available on each deck.

Table 1.1 Configuration Options Per Instrument Type

Instrument	Configuration	Available Pod(s)	Deck Positions[a] (Maximum)
Biomek i5	• **Single Arm**	**Multichannel**	25
		Span-8	25
Biomek i7	• **Single Arm**	**Multichannel**	45
		Span-8	45
	• **Dual Arm**	**Multichannel + Span-8** (hybrid)	45
		Multichannel (2)	45

a. Equivalent to ANSI/SLAS footprint labware.

What You'll Learn in This Chapter

This chapter provides an overview of the Biomek i-Series instrument hardware, ALPs, accessories, and software. Topics include the following:

- *Hardware*
- *ALPs and Accessories*
- *Tips*
- *Biomek Software*

Hardware

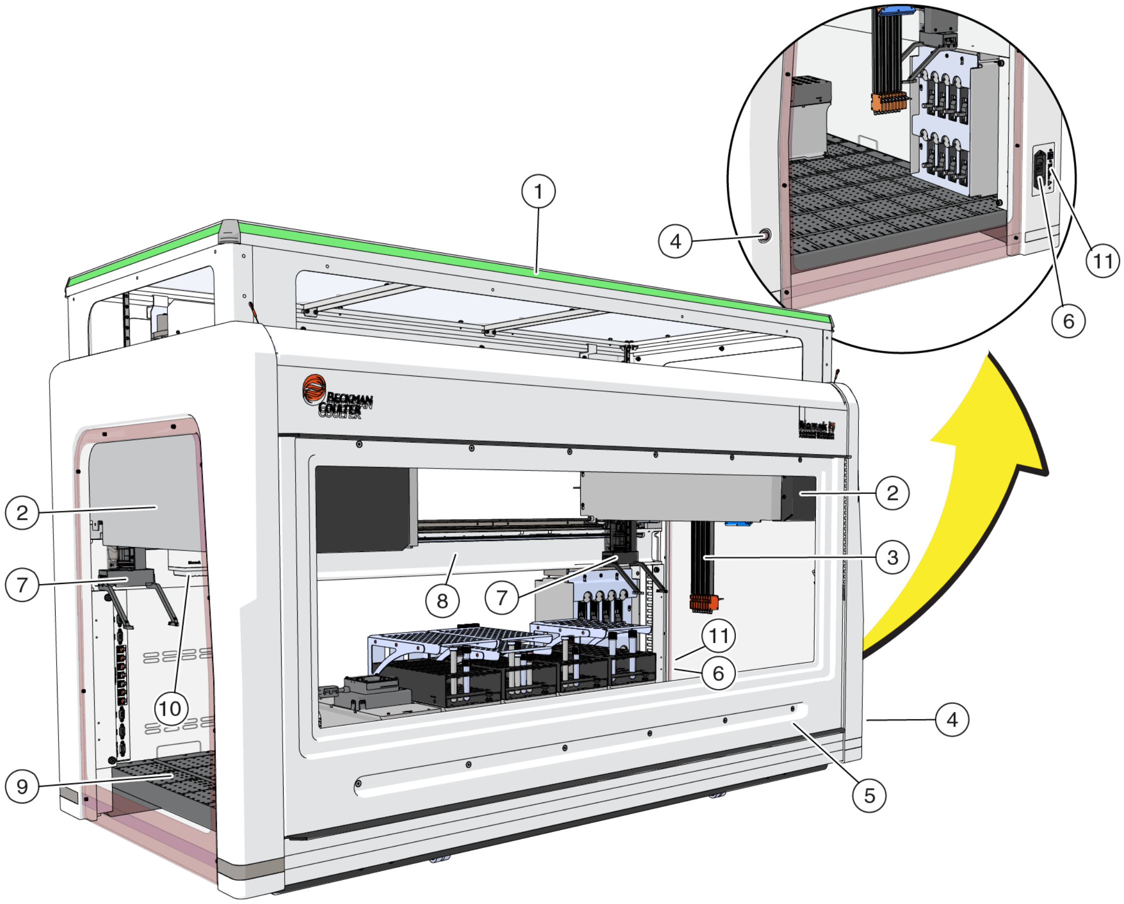
This section provides basic information regarding the instrument, including:

- *Main Components*
- *X-, Y-, Z, & D-Axes*
- *Multichannel Pod*
- *Span-8 Pod*
- *Biomek i-Series Connections*
- *Protective Barriers*

NOTE For additional information, refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

Main Components

Figure 1.1 Main Components of the Biomek i-Series Instruments (Biomek i7 Hybrid Instrument Shown)



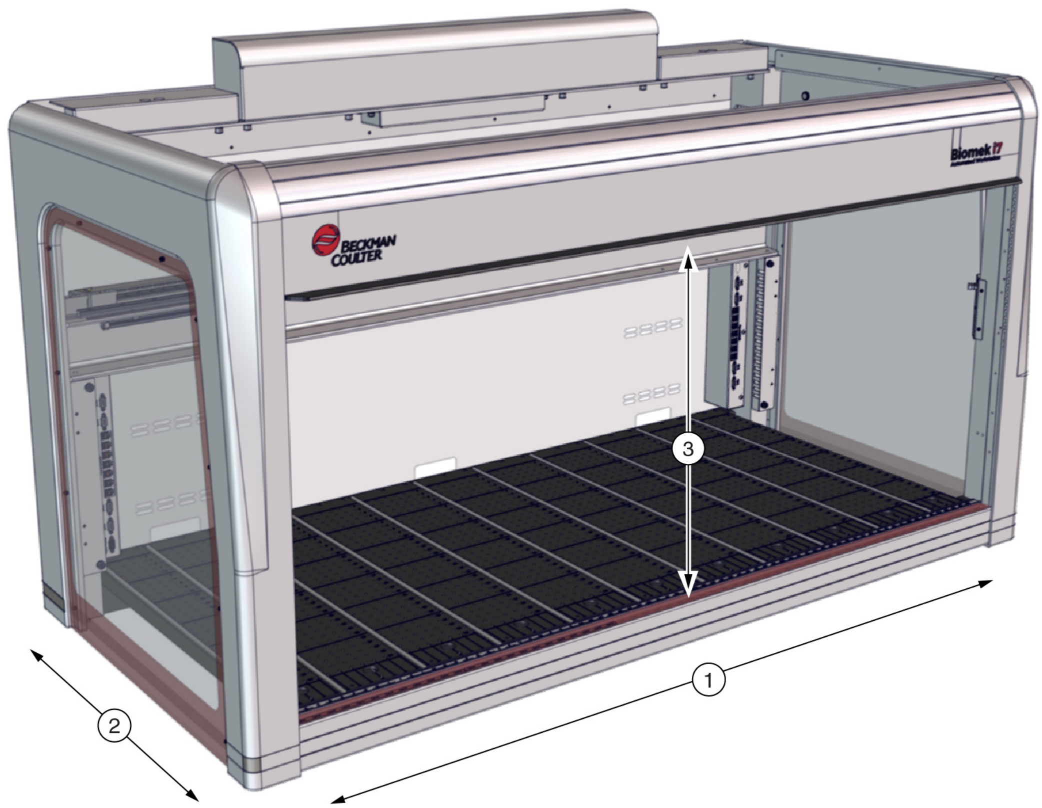
1. Status Indicator Light
2. Pod
3. Span-8 Probes
4. Deck Light Switch
5. Door
6. Power Switch
7. Grippers
8. Chassis
9. Deck
10. Multichannel Head
11. Automation Controller Connection

Instrument dimensions are provided in *System Specifications*.

X-, Y-, Z, & D-Axes

Figure 1.2 provides the orientation of the four axis types on Biomek i-Series automated workstations.

Figure 1.2 X-, Y-, and Z-Axes



1. **X-Axis**: Pod horizontal axis oriented from left to right.
   - Movement from left to right is in a *positive* direction.
   - Movement from right to left is in a *negative* direction.
2. **Y-Axis**: Pod horizontal axis oriented front to back.
   - Movement from back to front is in a *positive* direction.
   - Movement from front to back is in a *negative* direction.
3. **Z-Axis**: Pod vertical axis that runs along the instrument, closer and farther from the deck.
   - Movement upwards is in a *positive* direction.
   - Movement downwards is in a *negative* direction.

- **D-Axis** (not shown): Vertical axis that allows for aspirate, dispense, tip shucking, and gripping operations. *On Multichannel systems, the D-axis controls the syringes and is internal to the pod; on Span-8 systems, the D-axis is the pump for each probe.*
  — Aspirate (upward movement) is in a *positive* direction.
  — Dispense (downward movement) is in a *negative* direction.

Multichannel Pod

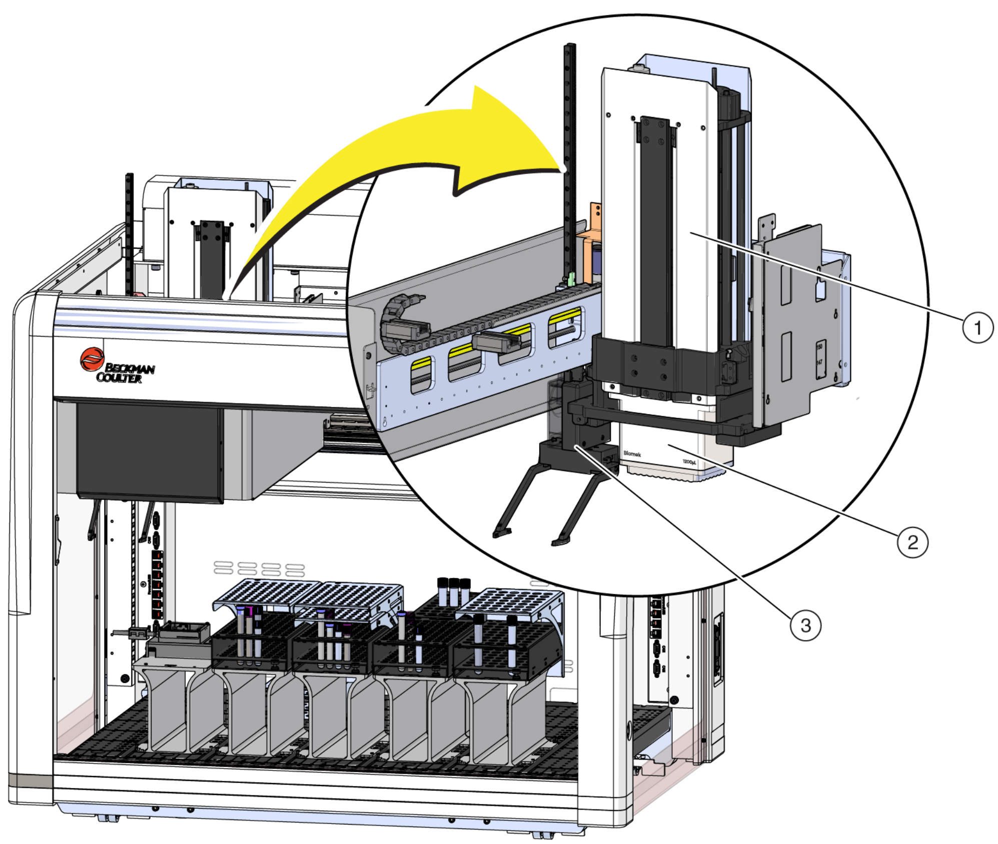
The Multichannel pod (Figure 1.3) is a self-contained working unit installed as the following:

- **Biomek i5 Automated Workstation**:
  - **Single pod** only
- **Biomek i7 Automated Workstation**:
  - **Single pod**
  - **Left Side** of a hybrid instrument
  - **Both Sides** of dual Multichannel pod instrument

The Multichannel pod is a full microplate pipetting tool with interchangeable heads to accommodate a variety of functions. The Multichannel pod can also transfer liquid to specified wells on a microplate or test tubes using the Selective Tips option.

NOTE When installed on a dual-pod system, Automated Labware Positioners (ALPs) located on the far right or far left sides of the instrument cannot be reached by the pod installed on the opposite side of the instrument. ALPs located toward the center of the instrument can typically be accessed by both pods.

Figure 1.3 Multichannel Pod Installed on a Multichannel Biomek i5 Instrument



1. Multichannel Pod
2. Head
3. Gripper

Interchangeable Heads

An interchangeable, Multichannel head is attached to the bottom of the pod to perform a specific liquid-handling procedure. Depending on the head and the desired liquid-handling procedure, different tip types may be used.

There are three head types available for the Biomek i-Series Multichannel pod:

- 300 µL MC-96 Head
- 1200 µL MC-96 Head
- 60 µL MC-384 Head

Interchangeable heads installed on the Multichannel pod aspirate and dispense liquid using disposable tips. A list of the compatible tips, as well as the features and capacity of each tip, is provided in *Tips*.

Changing Heads

Each Multichannel head can be removed and replaced to accommodate the needs of a particular method. Refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474, *Changing Heads*, for complete instructions.

NOTE When a head is changed, the **Hardware Setup** must be changed appropriately. If the hardware configuration is not updated using **Hardware Setup**, damage to the system may occur (refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474), *Configuring a Multichannel Pod*).

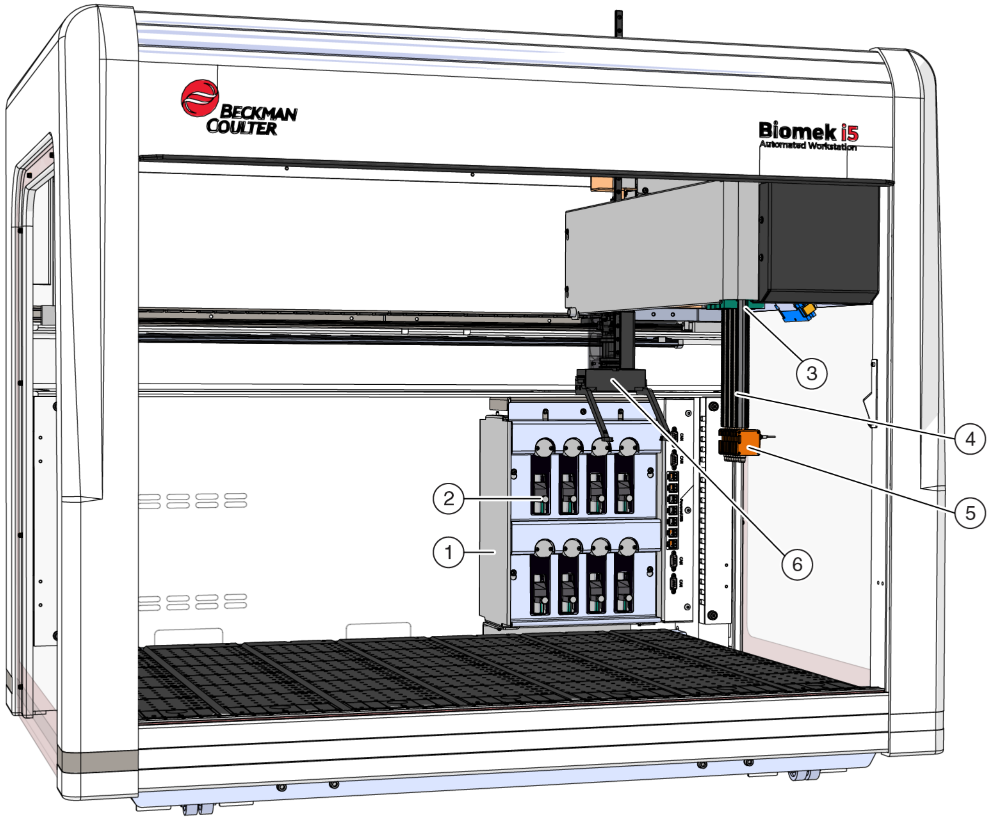
Span-8 Pod

The Span-8 pod is a self-contained working unit installed on the instrument (Figure 1.4). The Span-8 pod is a liquid-handling pod capable of performing liquid transfers from test tubes and large pieces of labware to smaller pieces of labware, or vice versa. The Span-8 pod can also perform liquid level sensing (LLS) with conductive tips and clot detection (CD) with fixed probes during liquid transfers.

The Span-8 pod (Figure 1.4) is a self-contained working unit installed as the following:

- **Biomek i5 Automated Workstation**:
  - **Single pod** only
- **Biomek i7 Automated Workstation**:
  - **Single pod**
  - **Right Side** of a hybrid instrument

Figure 1.4 Span-8 Pod Installed on a Span8 Biomek i5 Instrument



1. Pump Assembly
2. Pumps and Syringes
3. Span-8 Pod
4. Probes
5. Mandrels
6. Gripper

- System Fluid Tubing (not shown)

Probes

Probes are capable of moving independently in the Z-axis and pipetting independently in the D-axis with the assistance of the pump assembly. They hold the tip interface for fixed or disposable tips, and are capable of performing both Liquid Level Sensing (LLS) and non-LLS operations (refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474, *Main Components of the Span-8 Pod*).

Interchangeable Tips

The Span-8 pod uses fixed and/or disposable tips, which allow microplate-to-microplate, test tube-to-microplate, and test tube-to-test tube liquid transfers. A list of the compatible tips, as well as the features and capacity of each tip, is provided in *Tips*.

Pump Assembly

The Pump Assembly houses the individual pumps and syringes that control the flow of system fluid to and from each of the eight probes by controlling the D-axis. The Pump Assembly is located near the right towers of the instrument (refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474, *Pump Assembly*).

Liquid System

The Liquid System stores and transports system fluid used to provide a vacuum for pipetting, washing tips, and performing bulk dispense operations (refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474, *Liquid System*).

Biomek i-Series Connections

The towers provide the hubs for connecting all external devices, ALPs, the automation controller, and power to the instrument. Specifically, the following connections are located on the towers (refer to Figure 1.5, Figure 1.6, and Figure 1.7 for details):

- Main power switch and the automation controller (host computer) connects to the instrument with a USB-B connector on the right rear tower.
- Two internal device connection panels, each consisting of the following:
  - 4 CAN ports
  - 7 USB + Power ports
  - AccuFrame port (left rear tower)
- Two external connector panels:
  - The panel on the right rear tower includes USB-A, USB-B, CAN, and the AC inlet circuit breaker.
  - The panel on the left rear tower includes USB-A and CAN connectors.

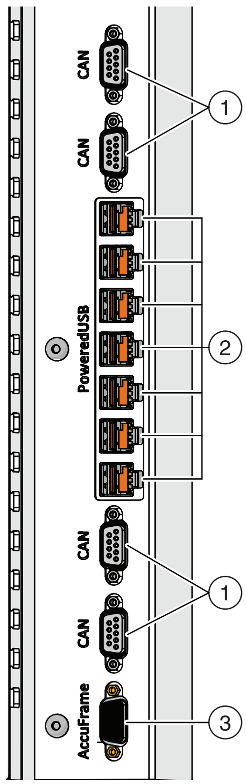
⚠ CAUTION

Risk of equipment damage. Make sure to connect the correct devices to the communication ports. Failure to make the correct port connections can cause equipment damage.

Inside and Outside Rear Tower Connections (Detail View)

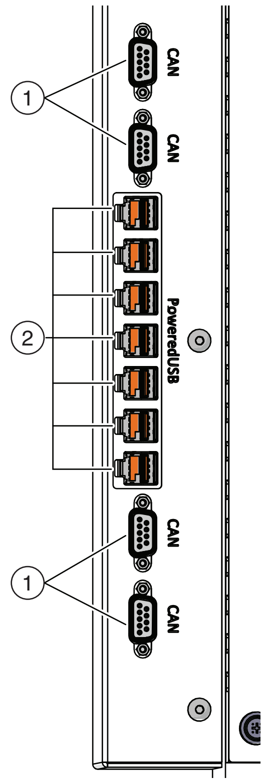
Inside Tower Connections

Figure 1.5 Left Rear Tower Inside Connections



1. CAN Ports
2. USB + Power Ports
3. AccuFrame Port

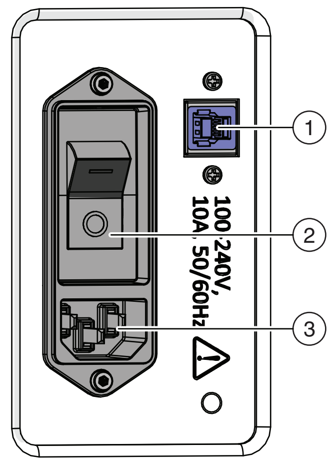
Figure 1.6 Right Rear Tower Inside Connections



1. CAN Ports
2. USB+Power ports

Outside Tower Connections

Figure 1.7 Right Rear Tower Outside Connections

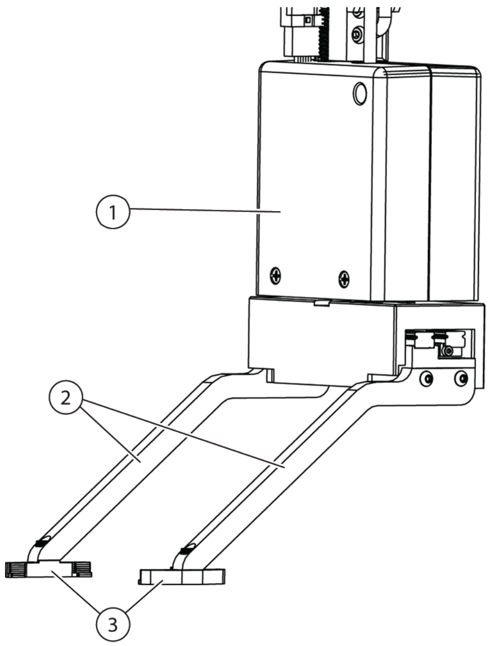


1. USB Port
2. Main Power Switch
3. AC Inlet

Gripper

A 360 degree rotating gripper that has two offset fingers (Figure 1.8) that grasp and move labware onto, off of, and within the Biomek i-Series instrument. The gripper can travel in the Y and Z axes independently of the pod.

Figure 1.8 Gripper



1. **Gripper Body**
2. **Gripper Fingers**
3. **Gripper Pads**

The gripper can:

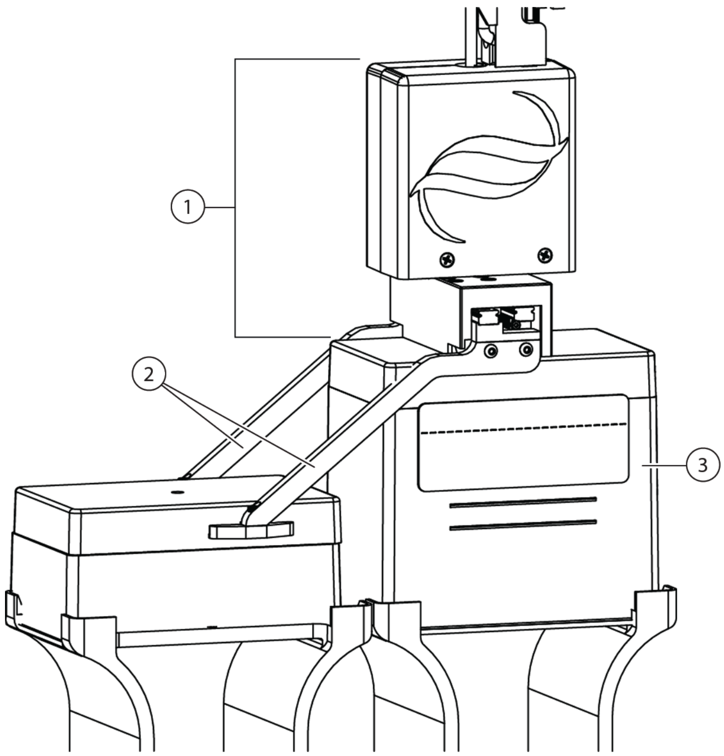
- Move labware up to 12.8 cm (5.04 in.) in height.
- Move labware up to 725 grams
- Stack labware.
- Move stacks of standard height labware up to four plates high (maximum 5.6 cm (2.2 in.)).
- Place lids on and remove lids from labware.
- On a Biomek i7 dual arm instrument, the left gripper can move labware to and from locations off of the left side of the deck.
- On a single arm instrument, and on the left arm of a dual-arm instrument, the gripper can move labware to and from locations off of the left side of the deck.
- Rotate the fingers up to 360 degrees to match the orientation of the labware holder before picking up or placing the labware.
- Detect the presence of gripped labware.
- Grip labware along the two long sides.

IMPORTANT The gripper may not be able to access low labware, such as a standard microtiter plate, adjacent to or surrounded by high labware, such as BC1070 tip boxes.

The Gripper fingers are offset. When gripping or placing labware on a desired position, the gripper mechanism will be positioned over an adjacent position. If the labware on the adjacent position is above 56 mm (2.2 in.) in height, the grippers may not be able to grip or place the labware in the desired position (Figure 1.9).

Certain columns on the deck can only be accessed from one direction. However, In some cases the gripper can be configured to approach the position from the opposite direction. Refer to *Biomek i-Series Instructions for Use* (PN B56358), *Understanding Labware Adjacency Rules*.

Figure 1.9 Offset Gripper with Adjacent Labware



1. **Gripper Body**
2. **Gripper Fingers**
3. **Approach Position**: Labware located in this position cannot exceed the height of a stack of four standard microplates (56 mm or 2.2 in. total). Standard sized tip boxes in this position will allow the gripper to access the adjacent position

Deck Observation System

The Biomek i-Series instrument includes a Deck Observation System, consisting of two wide-angle cameras with overlapping view areas that allow the user to view the entire instrument deck from a remote device. The cameras record 30 seconds of video prior to and 30 seconds after the instrument is stopped, or when any unexpected error event occurs during a method run. This event information is stored for a limited time for subsequent error analysis by trained operators, and overwritten by new data.

The cameras are mounted on each front tower. Each camera points towards the deck and is equipped with a wide-angle lens with overlapping viewing areas, allowing the user to view the entire deck.

The following web browsers are recommended to provide the best user experience for remote viewing:

- Chrome, version 29 or higher
- Firefox
- Edge, version 25 or higher
- Internet Explorer on Windows 10 only
- Internet Explorer, version 11 or higher

  NOTE Internet Explorer is not supported under Windows 7 and is not recommended.

To view recorded video logs:
Choose **Windows > All Apps > Beckman Coulter > Biomek Files** to open the Biomek directory and access ***Logs\Video***.
OR
Browse to: ***ThisPC\OSDisk(C:)\Users\Public\Public Documents\Biomek5\Logs\Video***

To view the deck in real time:
Open a web browser and navigate to http://(controller name or IP address):53402/remote-view.

Resolution settings for the cameras are:

- 640 x 480
- 1280 x 720
- 1920 x 1080

Camera Feature - Privacy and Data Collection

IMPORTANT The cameras may capture images of individuals in the lab if they are in range. The instrument owner is responsible for compliance with any applicable laws, rules, or regulations, including privacy and data protection laws, regarding the use of these features.

To turn off the error event recording feature, go to **Utilities > Hardware Setup > Vision System**, and uncheck **Record video on errors during runs**. This option is stored in the instrument file and will need to be reconfigured if a different instrument file is used.

PROService

PROService is a remote troubleshooting and diagnostics package, included with every Biomek i-Series instrument installation. PROService allows our world-class technical support team to use screen-sharing and file transfer tools to assist customers remotely. To protect the privacy of our end users, access to the screen sharing-portion of PROService is restricted by the end user; he or she must accept an access request at the physical workstation each time technical support wants to begin a screen-sharing session.

Protective Barriers

A perimeter protective safety system is standard for the Biomek i-Series instrument. This safety system helps protect against operator injury, damage to the equipment, and interruptions during the liquid-handling process.

⚠ WARNING

Risk of personal injury. Do not override or remove the safety shields. The instrument operates with a force that could cause injury. Always ensure the safety shields are in place before operating.

⚠ WARNING

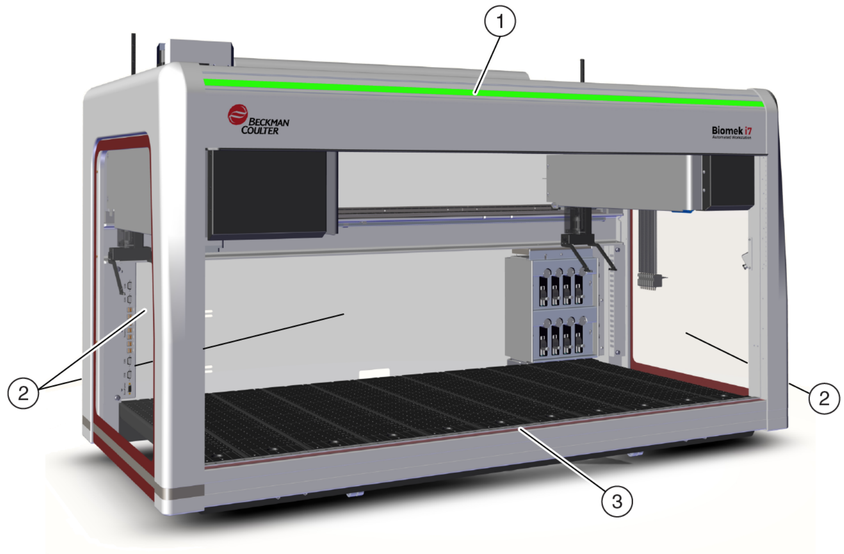
Risk of injury. Do not attempt to enter the workspace while the Biomek i-Series instrument is operating. The instrument operates with a force that could cause injury if a hand is in the way during the loading of tips or other movement of the pipetting head. Furthermore, injury to a hand or arm is possible if caught between the pod/arm and the tower. Always ensure the instrument is at a full stop before entering the work area.

Configuration With Open Enclosure

The Biomek i-Series with an open enclosure perimeter protective system includes a diffuse-reflective light curtain along the front of the instrument (see *Light Curtain Protection System*) and transparent safety shields along the left, right, and back sides of the instrument (Figure 1.10). An optional Conveyor Integration Side Panel is available to allow connection to an external device such as a conveyor, shuttle, and device transfer stations.

A status indicator light bar is installed on the top front X-axis support (see *Configuration With Open Enclosure*).

Figure 1.10 Protective Barriers for the Biomek i-Series Instrument Without Enclosure



1. Status Indicator Light Bar
2. Protective Side Safety Shield (both sides and back)
3. Front Light Curtain

Configuration With Closed Enclosure

The enclosed perimeter protective system provides additional environmental shielding around the instrument. It includes:

- A diffuse-reflective light curtain along the front of the instrument (see *Light Curtain Protection System*).
- Transparent safety shields along the left, right, and back sides of the instrument. An optional Conveyor Integration Side Panel is available to allow an external storage device to be connected to the Biomek i-Series instrument via a conveyor.
- A vertically-sliding front door that allows access to the instrument. Opening or closing the door does not affect the light curtain operation (see *Light Curtain Protection System*) and will not stop the movement of the instrument.
- A halo that encloses the top of the instrument and protects the instrument from particulates (see Figure 1.11). A status indicator light bar is installed on the halo and is visible on all sides of the instrument (see *Configuration With Closed Enclosure*). The system is compatible with an optional HEPA filtration unit(s). Contact us for additional information

Figure 1.11 Protective Barriers for an Enclosed Biomek i-Series Instrument

1. Halo with status indicator light bar
2. Protective side safety shields (both sides and back)
3. Door

Light Curtain Protection System

⚠ WARNING

Dark non-reflective material affects the sensitivity of the light curtain and adversely impacts its effectiveness. Typical light colored lab dress, such as lab coats and latex gloves, do not degrade light curtain operation; however, it is advisable to test the impact of all lab dress on light curtain sensitivity before operating the instrument. Verify lab dress impact on light curtain sensitivity as follows:

Use Manual Control in the software and insert the material no more than 2.54 cm (1 in.) past and approximately 66 cm (26 in.) above the light curtain panel. Make sure the scrolling green status indicator light bar changes to flashing red.

The light curtain along the front of the instrument projects a diffused array of infrared light (Figure 1.10 and Figure 1.11). When a part of the human body or an object larger than approximately 3.8 cm (1.5 in.) in diameter (such as labware and large cables) penetrates this protective zone, the instrument immediately stops operating, stopping all arm, pod, and head operations. The instrument will also stop if an object greater than 1.6 cm (0.625 in.) in diameter penetrates the top left or top right corners of the instrument opening. Some ALP operations, such as shaking, may continue.

ALPs respond to a violation according to safety and operational requirements specific to each ALP. For example, a refilling reservoir may continue to operate if user safety is not compromised. ALPs that operate with a motion that could present a danger to the operator go to a safe state when the light curtain is violated.

NOTE When active ALPs or optional devices are operating and the light curtain is violated, an error message may not appear until after the ALP or optional device operation is complete.

NOTE It is important to become familiar with this protected zone. This reduces the possibility of causing the instrument to shut down accidentally by unintentionally violating the light curtain zone.

When the instrument is sitting idle or in certain pause modes, no violations are registered when the protective zone is penetrated. This allows full access to instrument components, ALPs, and labware on the i-Series deck during a pause or system idle time.

Door

Opening or closing the door does not affect the light curtain operation and will not stop the movement of the instrument. The light curtain is operational regardless of whether the door is open or closed. However, if the light curtain is violated, the instrument will shut down immediately, stopping all arm, pod and head operations. Some ALP operations, such as shaking, may continue.

Status Indicator Light Bar

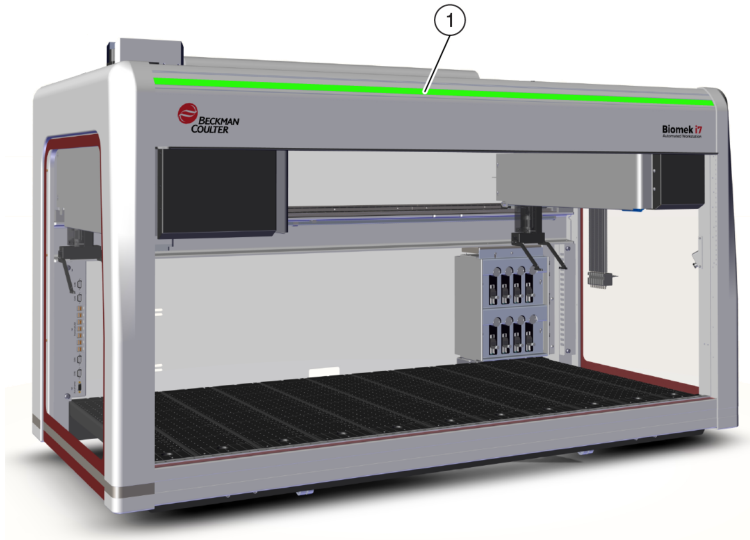
The location of the Status Indicator Light Bar depends on the configuration of your instrument. Choose the link below that pertains to your instrument to learn more.

- *Configuration With Open Enclosure*
- *Configuration With Closed Enclosure*

Configuration With Open Enclosure

A status indicator bar (Figure 1.12) with green, blue, amber, and red indicator lights is built into the top front X-axis support and indicates the current operational status of the instrument and light curtain (see *Light Curtain Protection System*). Table 1.2 describes the indicator lights and the operational status each represent.

Figure 1.12 Status Indicator Light Bar, Without Enclosure

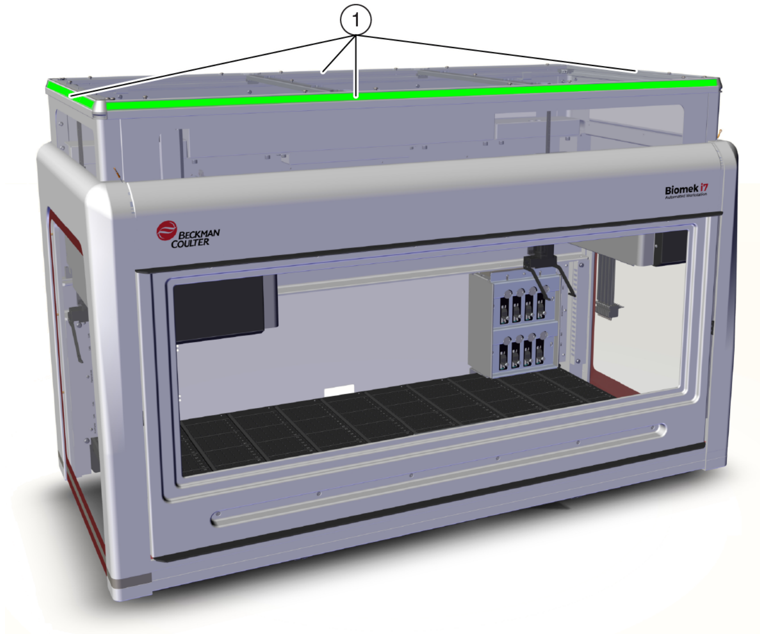


1. The Status Indicator Light Bar is visible on the front of the instrument.

Configuration With Closed Enclosure

A status indicator bar (Figure 1.13) with green, blue, amber, and red indicator lights is built into the halo of the enclosure, and is visible on all four sides of the instrument. It indicates the current operational status of the instrument and light curtain (see *Light Curtain Protection System*). Table 1.2 defines the indicator lights and the operational status each represents.

Figure 1.13 Status Indicator Light Bar, With Enclosure



1. The Status Indicator Light Bar on the halo is visible on all four sides of the enclosed instrument.

Table 1.2 Status Light Bar Colors and Instrument States

Color	Instrument State	Operational Status
None	Off	Off
Blue Solid	Power On, Ready	System has been homed. System is functional and in a ready state. It is safe to access the instrument and deck without violating the light curtain protective zone.
Green Scrolling	Power On, Running	A method is running, including pod recovery, framing, and **Manual Control**. A violation of the light curtain will halt operation.
Amber Solid	Power On, Not Ready	The instrument has not been homed, and is not in a ready state. It is safe to access the instrument and deck without violating the light curtain protective zone.
Amber Light and Dark Alternating	Paused; Awaiting User Interaction	When a **Pause** is written into a method, periodic access to the deck is allowed. When the **Pause** is terminated, the light curtain is reactivated and the method continues.
Red Solid Flashing[a]	Power On, Error	Caused by a system error. The software communicates the cause. **NOTE** Components may still be in motion when an error other than a light curtain violation has occurred (for example, on a two-arm system when only one arm has encountered an error). If the arm, pod, head, and/or gripper are moving, violating the light curtain will cause them to halt immediately.

a. Red is the only color that flashes to ensure correct distinguishability for the visually impaired.

ALPs and Accessories

Automated Labware Positioners (ALPs) are removable and interchangeable platform structures that are installed on the instrument deck.

Most ALPs are installed by a Beckman Coulter Representative when the Biomek i-Series system is first installed. Some ALPs can be added later, and may not require a Beckman Coulter Representative for installation.

ALP and Accessory Types

- **Passive ALPs** — Some passive ALPs store labware or hold labware in place on the deck, while others act as receptacles for by-products from methods, such as system fluid and disposed tips, and tip boxes.
- **Active ALPs** — Active ALPs and accessories contain a mechanism connecting to power sources for operation, such as tip washing, mixing/stirring, shaking, and precisely positioning labware.
- **Mounting Plates** — ALPs used with Biomek FX^P/NX^P instruments require a mounting plate when used on Biomek i-Series instruments due to the different mounting method of the

Biomek i-Series ALPs; mounting plate types include the standard mounting plates for passive ALPs and the vibration isolation mounting plates for active ALPs.

NOTE The *Biomek i-Series Automated Labware Positioners, Accessories, & Devices Instructions for Use* (PN B54477) provides detailed information on using Biomek i-Series ALPs, attaching mounting plates to ALPs that were designed for Biomek FX^P/NX^P instruments, and locating instructions for using compatible Biomek FX^P/NX^P ALPs with your Biomek i-Series instrument. A listing of the Biomek FX^P/NX^P ALPs that are compatible with Biomek i-Series instruments can be found in APPENDIX A, *Notice for Biomek FXP/NXP Users*.

Tips

The tips available to Biomek i-Series instruments are listed in the following tables:

- Table 1.3, Non-Filtered Disposable Tips — For 96-Channel Heads and Span-8 Pods
- Table 1.4, Filtered Disposable Tips — For 96-Channel Heads and Span-8 Pods
- Table 1.5, Disposable Tips — For 384-Channel Heads
- Table 1.6, Fixed Tips (Span-8 only)

Table 1.3 Non-Filtered Disposable Tips — For 96-Channel Heads and Span-8 Pods

Tip Capacity[a] (Max)	Features				Head/Pod			Biomek Software Representation		Part Number
	Non-Sterile	Sterile[b]	Wide-Bore	Conductive	MC-96, 300 µL	MC-96, 1200 µL	Span-8	Tip Type Editor	Labware Type Editor	
1070 µL	•				•	•	•	T1070	BC1070	B85940
1070 µL		•			•	•	•	T1070	BC1070	B85945
1070 µL	•			•			•	T1070_LLS	BC1070_LLS	B85959
1070 µL		•		•			•	T1070_LLS	BC1070_LLS	B85961
1070 µL	•		•		•	•	•	T1070_WB	BC1070_WB	B85971
1070 µL		•	•		•	•	•	T1070_WB	BC1070_WB	B85975
230 µL	•				•	•	•	T230	BC230	B85903
230 µL		•			•	•	•	T230	BC230	B85906
230 µL	•			•			•	T230_LLS	BC230_LLS	B85915
230 µL		•		•			•	T230_LLS	BC230_LLS	B85917
230 µL	•		•		•	•	•	T230_WB	BC230_WB	B85926
230 µL		•	•		•	•	•	T230_WB	BC230_WB	B85929
90 µL	•				•	•	•	T90	BC90	B85881
90 µL		•			•	•	•	T90	BC90	B85884
90 µL	•			•			•	T90_LLS	BC90_LLS	B85892

Table 1.3 Non-Filtered Disposable Tips — For 96-Channel Heads and Span-8 Pods

Tip Capacity[a] (Max)	Features				Head/Pod			Biomek Software Representation		Part Number
	Non-Sterile	Sterile[b]	Wide-Bore	Conductive	MC-96, 300 µL	MC-96, 1200 µL	Span-8	Tip Type Editor	Labware Type Editor	
90 µL		•		•			•	T90_LLS	BC90_LLS	B85894
80 µL	•				•	•	•	T80	BC80	B85764
80 µL		•			•	•	•	T80	BC80	B85767
80 µL	•			•			•	T80_LLS	BC80_LLS	B85775
80 µL		•		•			•	T80_LLS	BC80_LLS	B85872

a. Tip Capacity = Liquid + Trailing Air Gap.

b. Beckman Coulter offers sterilized product, which is controlled under validated ethylene oxide or irradiation processes, for those applications requiring sterile liquid handling. Products designated as "sterile" are sterilized in accordance with ANSI/AAMI/ISO 11135 or 11137 guidelines, as appropriate. The sterilization processes certify a sterility assurance level (SAL) of 10-6.

Table 1.4 Filtered Disposable Tips — For 96-Channel Heads and Span-8 Pods

Capacity	Features			Head/Pod			Biomek Software Representation		Part Number
Tip Capacity[a] (Max)	Sterile[b]	Wide-Bore	Conductive	MC-96, 300 µL	MC-96, 1200 µL	Span-8	Tip Type Editor	LabwareType Editor	
1025 µL	•			•	•	•	T1025F	BC1025F	B85955
1025 µL	•	•		•	•	•	T1025F_WB	BC1025F_WB	B85981
1025 µL	•		•			•	T1025F_LLS	BC1025F_LLS	B85965
190 µL	•			•	•	•	T190F	BC190F	B85911
190 µL	•	•		•	•	•	T190F_WB	BC190F_WB	B85936
190 µL	•		•			•	T190F_LLS	BC190F_LLS	B85922
50 µL	•			•	•	•	T50F	BC50F	B85888
50 µL	•		•			•	T50F_LLS	BC50F_LLS	B85899
40 µL	•			•	•	•	T40F	BC40F	B85771
40 µL	•		•			•	T40F_LLS	BC40F_LLS	B85877

a. Tip Capacity = Liquid + Trailing Air Gap.

b. Beckman Coulter offers sterilized product, which is controlled under validated ethylene oxide or irradiation processes, for those applications requiring sterile liquid handling. Products designated as "sterile" are sterilized in accordance with ANSI/AAMI/ISO 11135 or 11137 guidelines, as appropriate. The sterilization processes certify a sterility assurance level (SAL) of 10-6.

Table 1.5 Disposable Tips — For 384-Channel Heads

Type	Tip Capacity[a] (Max)	Features		Biomek Software Representation		Part Number
		Non-Sterile	Sterile[b]	Tip Type Editor	Labware Type Editor	
Non-Filtered	50 µL	•		T50_384	BC50_384	B85753
	50 µL		•	T50_384	BC50_384	B85756
	30 µL	•		T30_384	BC30_384	B85739
	30 µL		•	T30_384	BC30_384	B85745
Filtered	40 µL		•	T40F_384	BC40F_384	B85760
	25 µL		•	T25F_384	BC25F_384	B85749

a. Tip Capacity = Liquid + Trailing Air Gap.

b. Beckman Coulter offers sterilized product, which is controlled under validated ethylene oxide or irradiation processes, for those applications requiring sterile liquid handling. Products designated as "sterile" are sterilized in accordance with ANSI/AAMI/ISO 11135 or 11137 guidelines, as appropriate. The sterilization processes certify a sterility assurance level (SAL) of 10-6.

Table 1.6 Fixed Tips (Span-8 only)

Fixed Tip Type	Fixed Tip Volume [a] (Max)	Tubing Capacity		LLS/CD[b] Capable	Biomek Software Representation		Part Number
		Small Volume (Max)	Large Volume (Max)		Tip Type Editor	Labware Type Editor	
Fixed100 *for large volume tubing*	93 µL	n/a	5.0 mL	Yes	Fixed100	n/a[c]	A39377
Septa Piercing Tips, fluted *for large volume tubing*	37 µL	n/a	5.0 mL	LLS only	SeptaFluted	n/a[c]	987870
Fixed100 Tips *for small volume tubing*	14 µL	1.2 mL	n/a	Yes	Fixed100	n/a[c]	719810 (uncoated) 719809 (Teflon coated)

a. Tip Capacity = Liquid + Trailing Air Gap.

b. CD = Clot Detection

c. Fixed Tips are selected through **Hardware Setup**; see the *Biomek i-Series Hardware Manual* (PN B54474) for details.

Biomek Software

Biomek Software controls the Multichannel pod and/or Span-8 pod on your Biomek i-Series instrument and is designed to allow you to take as much direct and precise control over the method-building process as you want. The flexibility that results from this combination gives the instrument its power.

NOTE A method is a series of steps controlling the operations of your instrument.

Included in this section are the following topics:

- *Launching Biomek Software*
- *Biomek Software Components*
- *Biomek Software Workspace*
- *Configuring Components of the Main Workspace*
- *Display Options*

Automation Controller Security

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. If a restart is not performed manually, the system will schedule an automatic restart during a time that the system is usually idle. To avoid loss of data and/or samples, check for pending Windows Updates and install them prior to starting an overnight or off-shift run.

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.

Your Biomek i-Series Automation Controller is equipped with Windows® 10 Enterprise LTSB x64, which is configured with the following features to ensure it is secure from cyber threats and malware:

- Windows Defender virus scanning
- Windows Firewall enabled
- Automatic updates for Windows OS and Windows Defender

  IMPORTANT Automatic updates are scheduled to run at 2 a.m., and, therefore, normal operations may be interrupted during this time. If you must run the instrument during this time, search for ***Change Automatic Maintenance Settings*** via Windows **Search** and modify the **Automatic Maintenance** time to a time that works best for you.

  NOTE Automatic updates include a weekly drive optimization, which entails performing a complete defragmentation on the automation controller hard disk drives.

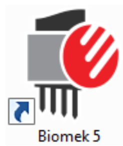
- System Restore enabled
- Auto-play disabled for all devices

Launching Biomek Software

To launch Biomek Software:

1 Double click on the Biomek Software icon (Figure 1.14), which was created on your desktop during the installation process.

Figure 1.14 Biomek Software Icon



OR

From the **Start** menu, select **All Apps** > **Beckman Coulter** > **Biomek Software**.

If Beckman Coulter Accounts & Permissions is enabled on your system, you must have an account established and log in using that account name and password. For more information, contact your system administrator.

NOTE Beckman Coulter Accounts & Permissions is an integrated set of features built into Biomek Software that assists users in complying with 21 CFR Part 11 requirements for closed systems. Permissions provides the ability to control user access to specific program operations. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Using Accounts and Permissions*, for additional details.

Biomek Software Components

Biomek Software contains the following components: instrument files, projects, and method files. An overview of each of these components is included in the sections below.

Instrument Files

An instrument file contains all pertinent information relating to the physical hardware. This includes:

- instrument type and configuration
- devices and ALPs installed on the instrument deck
- external devices integrated with the instrument
- deck layout and framing information

The instrument configuration must accurately represent the instrument hardware to prevent collisions between the instrument and any on-deck components. All instrument configurations are done using **Hardware Setup**, the **Device Editor**, and the **Deck Editor**.

IMPORTANT When adding an ALP or device to the **Deck Editor**, ensure that the selected position allows sufficient room between the adjacent ALPs or devices. To verify the positioning of the ALPs or devices, place them on the physical deck in the selected positions, making sure to include mounting plates, if required. If necessary, adjust the position coordinates in the **Deck Editor** to reflect the selected position.

NOTE ALPs are removable and interchangeable platform structures installed on the deck to allow automated assays to be performed.

Hardware Setup is used to configure the heads, certain devices, and accessories available to the instrument. The **Device Editor** is used to configure devices, such as the Static Peltier ALP and the Shaking Peltier ALP. The **Deck Editor** is used to configure the precise location of all labware positions on the deck and associate any devices or accessories to those positions. The pod must then be precisely aligned to each deck position by framing the deck.

Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Using Instrument Files and Settings*, for more information on instrument files.

Projects

A project stores information about liquid types, labware types, and tip types, well patterns, and pipetting techniques and templates that are used to configure the actions of the instrument. Projects store a history of all changes, additions, and deletions from the project.

Project items are configured using the following editors:

- **Labware Type Editor**
- **Tip Type Editor**
- **Liquid Type Editor**
- **Technique Browser**
- **Pipetting Template Editor**
- **Well Pattern Editor**

Project items may be saved, which creates a revision of the project item. Saved revisions can always be recovered and reused, ensuring that saved or validated methods are reproducible even if project items are subsequently modified or deleted. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Using Projects*, for more information on projects.

Methods

Methods contain the precise information for performing a specific sequence of actions to complete a task, and use information from the projects and instrument files to configure and customize those actions. Each method is stored in a project, alongside other project items that can be used in the method.

The method editor is used to create methods that control the liquid-handling system. Methods comprise a series of steps that together perform various operations, such as liquid transfers or labware moves using the gripper. Additional operations can be performed in a method through active or passive ALPs, accessories, or integrated devices. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Setting Up Methods*, for more information on building and working with methods.

Opening Multiple Instances of Biomek Software

IMPORTANT Simultaneously running multiple Biomek instruments on a single automation controller requires special configuration; contact us for assistance.

When opening multiple instances of Biomek Software on a single automation controller, consider the following:

- Although only one instrument file can be open in Biomek Software at a time, multiple copies of Biomek Software can be open at the same time on an automation controller, each using a different instrument file (see *Opening Subsequent Instances of Biomek Software* for additional information). If you need to create a new instrument file so that you can open multiple instances of Biomek Software, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating a New Instrument File.*
- Project items can be shared across instances of Biomek Software.
- Only one instance of Biomek Software can communicate with a physical instrument at any given time.

Typical scenarios for using multiple instances of Biomek Software include:

- Multiple Biomek instruments are connected through SAMI EX Software.
- Copying and pasting between two methods, each having a unique instrument file.
- Working on multiple methods simultaneously.

Opening Subsequent Instances of Biomek Software

If you already have Biomek Software open, and you wish to open another instance, do the following:

1 Locate the instrument file you wish to open, which must be a different instrument file than the version currently open in Biomek Software.

TIP If you will be using multiple instances of Biomek Software on a regular basis, create shortcuts to regularly-used instrument files and place the shortcuts in an easily accessed location on your controller.

2 Double click on the instrument file.

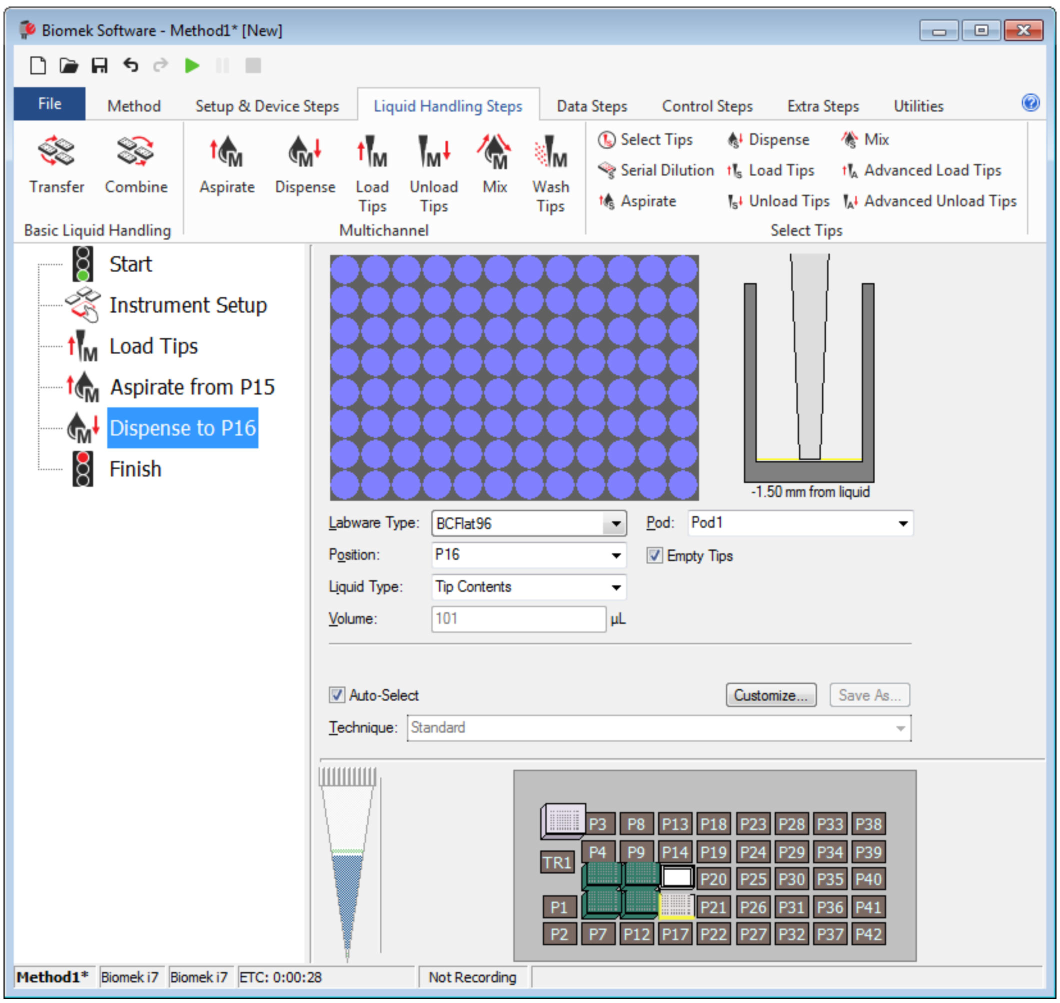
NOTE You can also open the subsequent instance of Biomek Software by clicking on the software shortcut. This method for opening the additional instance of the software is less direct, as it prompts for responses to several errors, the second asking if you would like to search for a different instrument file; if you select **Yes**, you must locate and select a different instrument file, and then select **Open** to open the software.

Biomek Software Workspace

The components that make up the Biomek Software workspace are described in detail in the sections listed below. An example Biomek Software workspace window is in Figure 1.15.

- *File Tab*
- *Quick Access Toolbar*
- *Title Bar*
- *Status Bar*
- *Error Bar*
- *Ribbon*
- *Method Editor*

Figure 1.15 Biomek Software Workspace Example



File Tab

The **File** tab (Figure 1.16) allows you to carry out basic Biomek Software functions, which are described in Table 1.7. For additional information, refer to the *Biomek i-Series Software Reference Manual*, PN B36358.

Figure 1.16 File Tab

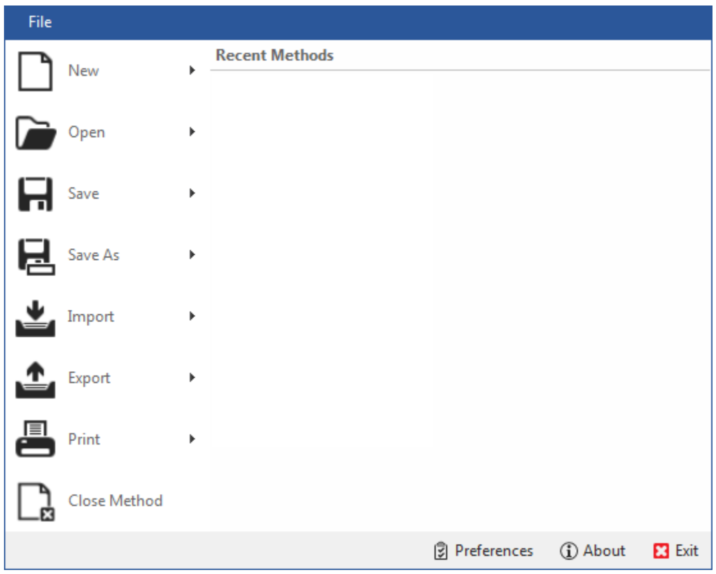


Table 1.7 File Menu Options

File Menu Option	Sub-Option	Description
New	**Method**	Creates a new method in Biomek Software. New methods are automatically assigned a generic name by the system, each containing the default name **Method** plus the next available integer in the sequence within the open project. The default method name is followed by an asterisk (after a change has been made) and **[New]** indicating that the method has not been saved; for example, **Method1*** **[New]**.
	Project	Opens a new project in Biomek Software. The name of the current project is shown in the lower left-hand corner of the Biomek Software window.
Open	**Method**	Opens a saved method.
	Project	Opens a saved project.
	Instrument	Opens a saved instrument file.
Save	**Method**	Saves the current method. If the method has not been saved before, you will enter a name and can select the project location for the method to reside.
	Instrument	Saves changes to the instrument file.

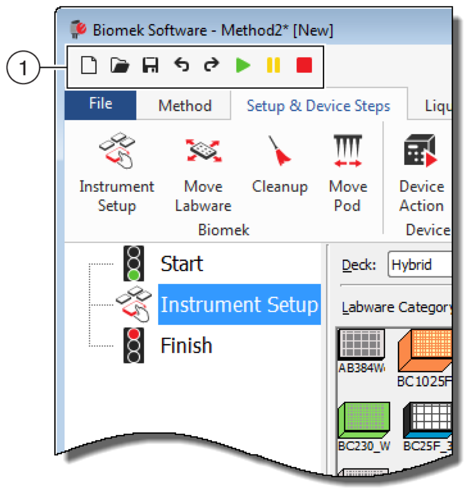
Table 1.7 File Menu Options

File Menu Option	Sub-Option	Description
Save as	**Method**	Allows you to save the current method to a new location and/or as a new name.
	Project	Allows you to save the current project as a new name.
	Instrument	Allows you to save the current instrument as a *.bif file to a new location and/or as a new name.
Import	**Method**	Imports method files previously exported from a project into the active project.
	Project	Imports a previously exported project into the current active project.
	Instrument Settings	Imports previously exported instrument settings into the current instrument file.
Export	**Method**	Exports the current method to a *.bmf file.
	All Methods	Exports all methods in the current project to the location of your choice.
	Project	Exports selected project items (other than methods) from a project to an *.imp file, which can then be imported into a different project.
	Instrument Settings	Exports selected instrument settings as a *.imp file to the name and location of your choice.
Print	**Print**	Allows you to print a Biomek method in sequential text form.
	Print Setup	Allows you to configure printer settings to fit your specific needs.
	Print Preview	Allows you to preview how the method appears when printed.
Close Method	Closes the current method, prompting you to save if there are unsaved modifications.	
Recent Methods	Provides access to the most recently used files. The files are listed in chronological order, with the most recently used file at the top of the list. To open a file on the list, click on the file name.	
Preferences	Allows you to adjust application settings, including general settings, how steps appear in the Method View, and how errors are handled.	
About	Provides information about Biomek Software, including the copyright and trademark information, version, Instrument File version, license information, and serial number.	
Exit	Closes Biomek Software.	

Quick Access Toolbar

The Quick Access Toolbar (Figure 1.17) provides convenient access to basic Biomek Software functions, which are detailed in Table 1.8.

Figure 1.17 Quick Access Toolbar



1. Quick Access Toolbar

Table 1.8 Quick Access Toolbar Functions

Icon	Description	Function
	**New Method**	Opens a new method in Biomek Software. New methods are automatically assigned a generic name by the system, each containing the default name **Method** plus the next available integer in the sequence for the open project. The default method name is followed by an asterisk and **[NEW]** indicating that the method file has not been saved; for example, **Method1* [NEW]**. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating a New Method*.
	**Open Method**	Opens a saved method. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Opening a Saved Method*
	**Save Method**	Saves the current method. If the method has not been saved before, you will enter a name and location for the method to reside. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Saving a Method*.

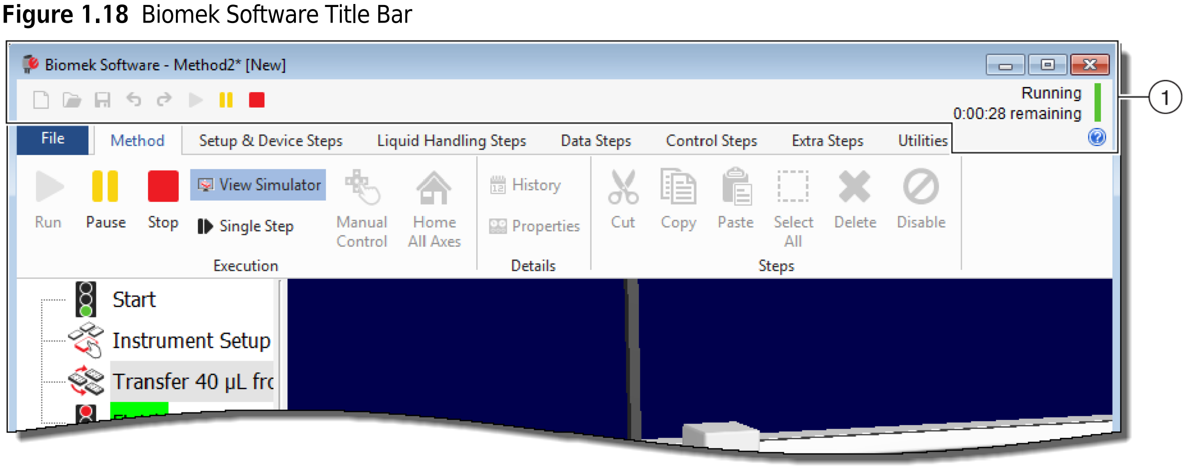
Table 1.8 Quick Access Toolbar Functions

Icon	Description	Function
	Undo **Redo**	• **Undo**: Steps the software back *an entire method step* per click of this icon. **NOTE** (Ctrl) + (Z) is an additional way to undo previous actions. • **Redo**: Steps the software forward *an entire method step* per click of this icon (only available after using the undo function). **NOTE** (Ctrl) + (Y) is an additional way to redo actions. **IMPORTANT** Hovering the mouse over the **Undo** or **Redo** button displays a tool tip indicating what action will be undone or redone. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Using Undo and Redo in Method Building*.
	Run Method	Prompts the current method to run. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Running a Method*.
	Pause Method	Pauses the currently running method. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Pausing a Method in Progress*.
	Stop Method	Stops the currently running method. • For additional information, see the *Biomek i-Series Software Reference Manual* (PN B56358), *Stopping a Method in Progress*.

Title Bar

The Title Bar, which is located at the top of the main workspace (Figure 1.18), displays the software name, current method file name, the At-a-Glance Status when a method is executing, and contains the *Quick Access Toolbar*, *Ribbon*, and title bar options buttons. Table 1.9 provides an overview of the Title Bar options.

Figure 1.18 Biomek Software Title Bar



1. Title Bar

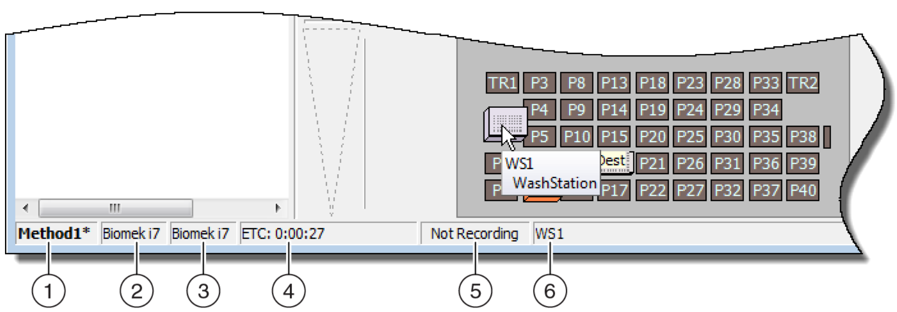
Table 1.9 Title Bar Functions

Icon	Description	Function
	Minimize	Minimizes the Biomek Software screen.
	Maximize	Maximizes the Biomek Software screen to fit the full dimensions of the monitor.
	Restore	After maximizing the screen, restores the Biomek Software screen to the previous size.
	Close	Closes Biomek Software. If there are unsaved changes in the method, a prompt appears asking if you wish to save.
	Help	Clicking the **Help** button opens an interactive version of the *Biomek i-Series Software Reference Manual*. **NOTE** For help on other Biomek i-Series topics, related manuals are available on the website or in the following location: ***ThisPC\OSDisk(C:)\Program Files (x86)\Common Files\Beckman Coulter\Manuals***

Status Bar

The Status Bar (Figure 1.19), which is located at the bottom of the Biomek Software workspace, contains the file name of the method, current project name, instrument name, estimated time to completion, any current errors, camera status, and other information pertinent to the location of your mouse on the user interface.

Figure 1.19 Status Bar - Example



1. Method Name
2. Current Project
3. Instrument
4. Estimated Time to Completion

   Or

   Time Elapsed, if a method is currently running.
5. Camera Status
6. Information related to the part of the software display where mouse is currently located.

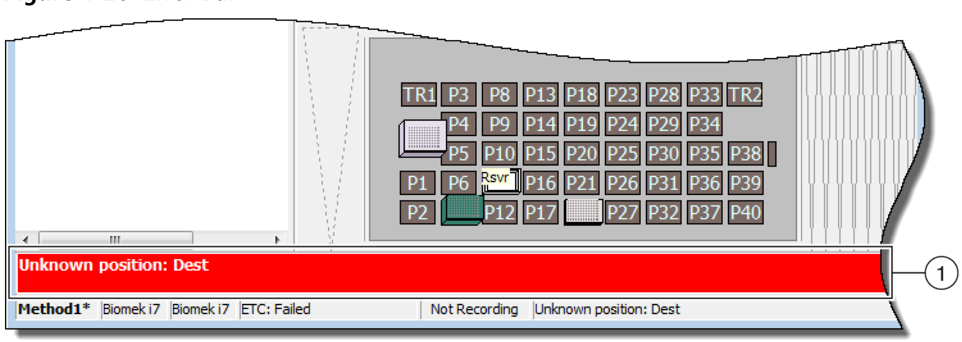
Table 1.10 Status Bar Functions

Example Image	Description	Function
Method3*	**Method Name**	Displays the name of the current method.
BiomekFXP	**Current Project**	Displays the name of the current project.
BiomekFXP	**Active Instrument File**	Displays the name of the current instrument file.
ETC: 0:00:00	**Estimated Time to Completion**	Shows the estimated time to completion in the following manner: • When the **Finish** step is highlighted in the Method View, the software estimates the real time required to complete the entire method (except for the time required for human intervention, if applicable). • When any other step is highlighted in the Method View, the length of time displayed in the ETC field represents the time required to complete the method (except for the time required for human intervention, if applicable) up to the selected step. If an error is found in validation, ETC displays as Failed. **IMPORTANT** ETC is an estimate only, and, therefore the time displayed might not be accurate. For some methods, the ETC cannot be calculated.
Not Recording	**Camera Status**	Provides the current status of the **Vision System**.
Source not specified.	**Information**	Shows information pertinent to the current mouse location.

Error Bar

Located above the Status Bar, the Error Bar (Figure 1.20), is only visible when an error is found during method validation. The Error Bar shows the first error for the currently selected step.

Figure 1.20 Error Bar



1. Error Bar

Ribbon

Located directly above the Step Configuration Area, the Ribbon provides convenient access to the most-used items within Biomek Software. The number of tabs on the ribbon can vary slightly, given the options that are enabled in the software. Refer to the following sections for details on each available ribbon tab:

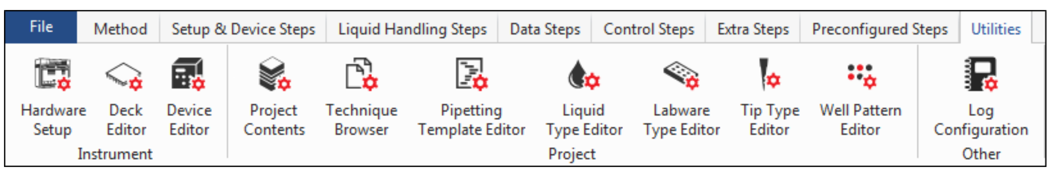
- *Method Tab*
- *Setup & Device Steps Tab*
- *Liquid Handling Steps Tab*
- *Data Steps Tab*
- *Control Steps Tab*
- *Preconfigured Steps Tab*
- *Utilities Tab*

NOTE Integrated devices can add steps and/or utilities to the tabs mentioned above, or they might add new tabs.

Switching Active Ribbon Tabs

To switch between active tabs, select the title of a different tab on the ribbon. In Figure 1.21, the **Utilities** tab is selected.

Figure 1.21 Ribbon Tabs



Method Tab

The **Method** tab (Figure 1.22), which is divided into the **Execution**, **Details**, and **Steps** groups, provides the means to make changes to or view details pertaining to the current method. The options available on this tab are presented in Table 1.11.

Figure 1.22 Method Tab

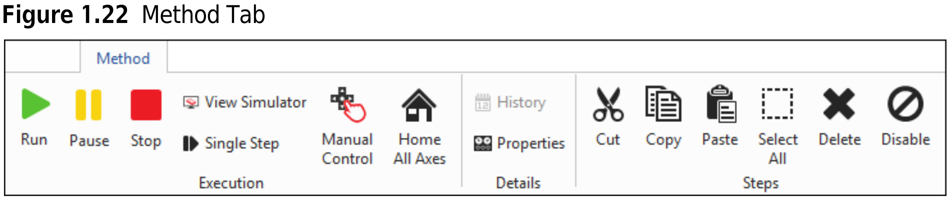


Table 1.11 Method Tab Options

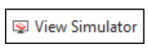
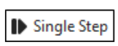
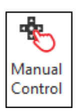
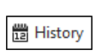
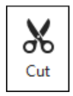
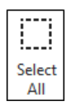
Menu Item	Icon	Description
Run		Initiates a method run. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Running a Method*.
Pause		Halts a method after the instrument has completed the move in progress. A run can be resumed by selecting **Pause** again or selecting the **Run** icon. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Pausing a Method in Progress*.
Stop		Halts a method during its run when there is no intent to resume method execution. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Stopping a Method in Progress.*
View Simulator		Opens the Biomek Simulator, which is an animated 3-D model of the instrument performing the method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Using the Simulator Controls*.
Single Step		Allows the unit to move one operation at a time by clicking the launch button for each move. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Performing Single Operations Within Steps*.
Manual Control		Moves or provides the following independent of a method: • Home All Axes • Active ALP and CAN device control • Pod Control • Get version number for firmware on instrument and CAN devices • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Manual Control*.
Home All Axes		Moves the pod(s) to the point of reference. You will need to **Home All Axes** at the following times: • Daily maintenance. • After cycling the power. • System error recovery. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Running a Method*.
History		Provides the complete revision history that tracks each time the current method has been saved or validated; can be viewed when the method is open. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Viewing Method History*.

Table 1.11 Method Tab Options

Menu Item	Icon	Description
Properties		Allows entry of a description of the method that can be viewed or modified. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Entering and Viewing Method Properties*.
Cut		Removes a step in a method, allowing you to place it in a different location. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Copying, Cutting, and Pasting Steps in a Method*.
Copy		Places a step on the Biomek Software clipboard, allowing it to be duplicated in a selected location within a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Copying, Cutting, and Pasting Steps in a Method*.
Paste		Places a copied or cut step in the selected location. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Copying, Cutting, and Pasting Steps in a Method*.
Select All		Selects all of the steps in a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Selecting All Steps in a Method*.
Delete		Deletes the selected step from a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Deleting Steps in a Method*.
Disable		Disables a step for execution. When a method is run, the step is ignored. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Disabling Steps Within a Method*.

Setup & Device Steps Tab

The **Setup & Device Steps** tab (Figure 1.23) contains the steps for setting up the instrument and devices for use in a method. This tab is split into groups, including **Biomek** and **Device Action**; other groups may appear on this tab, depending on the types of devices installed on the instrument. The common steps (in the **Biomek** and **Device Action** groups) available on this tab are described in Table 1.12.

Figure 1.23 Setup & Device Steps Tab — Example

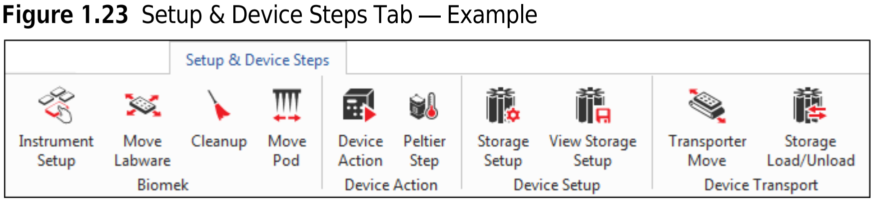
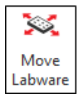
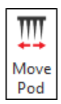


Table 1.12 Setup & Device Steps Tab Options[a]

Menu Item	Icon	Description
Instrument Setup		Allows you to specify the labware, devices, and ALPs that are on the deck and the deck position each occupies. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Instrument Setup Step*.
Move Labware		Moves labware from one position on the Biomek i-Series instrument to another position. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Move Labware Step*.
Cleanup		Directs the instrument to dispose of tips and tip boxes. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Cleanup Step*.
Move Pod		Moves the pod to a deck position that does not hamper access to the labware, ALPs, and devices on the deck. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Move Pod Step*.
Hold Labware		Software version 5.1 only. Picks up labware and holds it in the gripper while executing a series of additional steps, then replaces the labware in its original position. For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Hold Labware Step*.
Device Action		Configures the actions of active ALPs and devices, such as the Orbital Shaker, Wash Station, and Positive Positioner ALP. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Device Action Step*.
Peltier Step		Configures the actions of Peltier devices. For details, refer to the following applicable manual(s): • *Static Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments* (PN A93392, Rev. AC and up) And/Or • *Shaking Peltier ALP Integration Manual for Biomek FX/FX^P, NX/NX^P, and i-Series Instruments* (PN A93393, Rev. AC and up)

a. Depending on the devices installed on your instrument, the Setup & Device Steps tab could include additional icons. Additional information can be found in the user manual for the device.

Liquid Handling Steps Tab

The **Liquid Handling Steps** tab (Figure 1.24) contains the steps to configure liquid handling operations. The steps available on this tab are provided in Table 1.13.

Figure 1.24 Liquid Handling Steps Tab

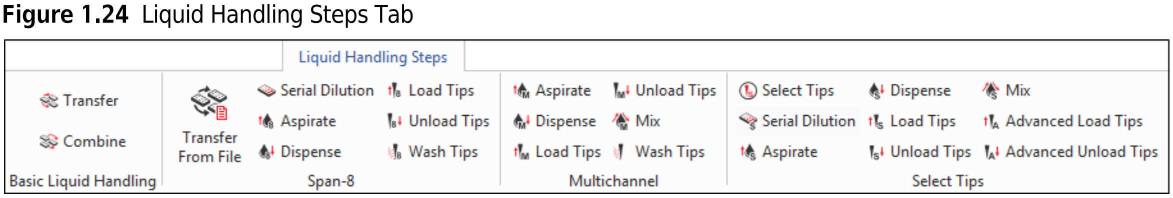


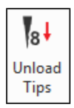
Table 1.13 Liquid Handling Steps Tab

Step	Icon	Description
Transfer		Merges tip load, aspirate, dispense, and unload tip functions in one step to transfer liquid from a single source to one or more destinations. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Transfer or Combine Step*.
Combine		Similar to a **Transfer** step, except **Combine** transfers liquids from one or more sources to a single destination. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Transfer or Combine Step*.
Multichannel Aspirate		Aspirates a specified amount of liquid from a single source in preparation for the **Multichannel Dispense** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Aspirate Step*.
Multichannel Dispense		Dispenses a specified amount of liquid into a single destination, following the **Multichannel Aspirate** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Dispense Step*.
Multichannel Load Tips		Loads new tips onto the pod. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Load Tips Step*.
Multichannel Unload Tips		Unloads tips from the pod. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Load Tips Step*.
Multichannel Mix		Mixes the contents within a piece of labware using repeated aspirate and dispense. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Mix Step*.
Multichannel Wash Tips		Washes Multichannel tips by aspirating and dispensing repeatedly at a Tip Wash ALP. **NOTE** The **Multichannel Wash Tips** step applies to Multichannel and Select Tips operations. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Multichannel Wash Tips Step*.
Select Tips		Groups together all Select Tips steps. When using any Select Tips steps listed below, they must be contained within the **Select Tips** step container. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Select Tips Step*.

Table 1.13 Liquid Handling Steps Tab

Step	Icon	Description
Select Tips Serial Dilution	Serial Dilution	Provides the ability to perform serial dilution with one or more rows or columns of select tips. When multiple rows/columns are used, they must be evenly spaced. Allows for use of an optional diluent and an optional source compound. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Select Tips Serial Dilution Step*.
Select Tips Aspirate	Aspirate	Provides the aspirate capability for the loaded select tips. This is very similar to the standard **Aspirate** step. However, it allows accessing labware with the selected pattern of tips, rather than a full head of tips. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Select Tips Aspirate Step*.
Select Tips Dispense	Dispense	Provides the dispense capability for the loaded select tips. This is very similar to the standard **Dispense** Step. However, it allows accessing labware with the selected pattern of tips, rather than a full head of tips. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Select Tips Dispense Step*.
Load Select Tips	Load Tips	Loads the selected tips (single tip, one or more columns, or one or more rows). • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Load Select Tips Step*.
Unload Select Tips	Unload Tips	Unloads the loaded select tips. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Unload Select Tips Step*.
Select Tips Mix	Mix	Provides the mixing capability for the loaded select tips. This is very similar to the standard **Mix** step. However, it allows accessing labware with the selected pattern of tips, rather than a full head of tips. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Select Tips Mix Step*.
Advanced Load Select Tips	Advanced Load Tips	Loads tips from the location specified in the step, offsetting the pod as prescribed in the step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Advanced Load Select Tips Step*.
Advanced Unload Select Tips	Advanced Unload Tips	Positions the pod as indicated in the step and unloads the tips. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Advanced Unload Select Tips Step*.
Transfer From File	Transfer From File	Performs well-to-well transfers on a Span-8 pod using a comma-separated data file. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Transfer From File Step*.
Serial Dilution	Serial Dilution	Performs a series of dilutions on a single microplate using a Span-8 pod. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Serial Dilution Step*.

Table 1.13 Liquid Handling Steps Tab

Step	Icon	Description
Span-8 Aspirate		Aspirates a specified amount of liquid from a single source in preparation for the **Span-8 Dispense** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Span-8 Aspirate Step*, for instructions on using the **Span-8 Aspirate** step.
Span-8 Dispense		Dispenses a specified amount of liquid into destination labware, following the **Span-8 Aspirate** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Span-8 Dispense Step*.
Span-8 Load Tips		Loads new tips to the Span-8 probes. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), Span-8 Load Tips Step.
Span-8 Unload Tips		Unloads tips from the Span-8 probes into a discard location. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), Span-8 Unload Tips Step.
Span-8 Wash Tips		Washes tips by flushing tips with system fluid at a **WashStationSpan8** ALP or by aspirating and dispensing at a **WashStation96** ALP or a **WashStationSpan8Active** ALP. The **Span-8 Wash Tips** step is also used to purge air from system tubing and syringes during a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), Span-8 Wash Tips Step.

Data Steps Tab

The **Data Steps** tab (Figure 1.25) contains the steps that are used for handling data sets in a method. The standard steps available on the **Data Steps** tab are provided in Table 1.14; other steps, such as the steps in the **Bar Code** group are available only when specific devices are installed.

Figure 1.25 Data Steps Tab — Example

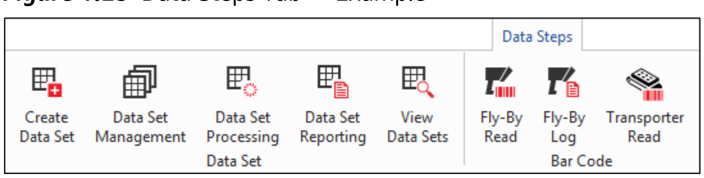


Table 1.14 Data Steps Tab[a]

Step	Icon	Description
Create Data Set		Specifies data in a data set by using a text (*.txt) or comma separated values (*.csv) file or data table. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Create Data Set Step*.
Data Set Management		Renames, removes, copies, or modifies the properties of a data set. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Data Set Management Step*.
Data Set Processing		Applies a transformation expression to an existing data set to create a new data set. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Data Set Processing Step*.
Data Set Reporting		Generates a report on data sets at any point during a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Data Set Reporting Step*.
View Data Set		A viewing tool that provides an easy means of checking data set values at any point in the Biomek method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the View Data Set Step*.
Fly-By-Read		The **Fly-By Read** step may be used to initially enter bar codes for decision making in a Biomek method using an **If** step or as a confirmatory read to ensure the correct labware has been selected. • For information on the **Fly-By-Read** step, refer to the *Biomek i-Series ALPs, Accessories, and Devices Reference Manual*, PN B54477.
Fly-By-Log		Reads from the Fly-By Bar Code Reader can be logged to a special log file that records time, plate name, initial barcode, final barcode, and recovery action.

a. Depending on the devices installed on your instrument, the **Data Steps** tab could include additional icons. Additional information can be found in the user manual for the device.

Control Steps Tab

The **Control Steps** tab (Figure 1.26), which is divided into the **Basic Control**, **Flow, Variables**, and **Labware Grouping** groups, contains steps that govern the course of the method. The steps available on the **Control Steps** tab are provided in Table 1.15.

Figure 1.26 Control Steps Tab

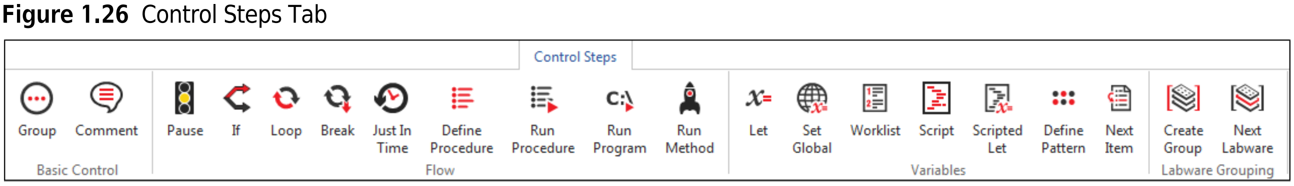


Table 1.15 Control Steps Tab

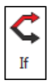
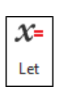
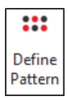
Step	Icon	Description
Group		Groups a series of steps in a nested fashion under a logical name that appears in the Method View. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Group Step*.
Comment		Documents the method or adds instructions in the Method View. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Comment Step*.
Pause		Halts instrument interaction with a position for a specified amount of time or the entire deck for an indefinite period of time. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Pause Step*.
If		Evaluates a condition within a method and runs either the "then" substeps or the "else" substeps according to the condition. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *If Step*.
Loop		Executes one or more steps a configured number of times. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Loop Step*.
Break		Breaks out of one or more loops. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Break Step*.
Just In Time		Synchronizes the execution of steps. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Just In Time Step*.
Define Procedure		Creates a series of steps that can be run at any point during a method using a **Run Procedure** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Define Procedure Step*.
Run Procedure		Runs a series of steps previously created in a **Define Procedure** step. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Run Procedure Step*.
Run Program		Runs any executable file during a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Run Program Step*.
Run Method		Accesses and runs a method within another method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Run Method Step*.
Let		Defines variables for its substeps. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Let Step*.

Table 1.15 Control Steps Tab

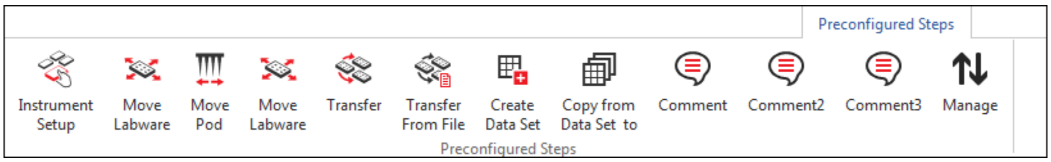
Step	Icon	Description
Set Global		Defines a global variable that can be used in subsequent steps of a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Set Global Step*.
Worklist		Uses a text (*.txt) or comma separated values (*.csv) file to supply multiple values for one or more variables. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Worklist Step*.
Script		Runs a list of commands providing customized control over the instrument. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Script Step*.
Scripted Let		Similar to **Script** step, with the exception that it allows variables to be extended outside the script and used in the method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Scripted Let Step*.
Define Pattern		Create a method-specific well pattern manually or by reading well information from a file. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Define Pattern Step*.
Next Item		Names a global variable, provides a list of VBScript and JScript expressions, and specifies behavior when a **Loop** step list is exhausted. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Next Item Step*.
Create Group		Creates and names a group of labware that can be accessed using a **Next Labware** step during a method run. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Create Group Step*.
Next Labware		Accesses the next piece of labware in a group of labware created using **Create Group**. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Next Labware Step*.

Preconfigured Steps Tab

Configured steps can be saved for reuse, and once a step is saved, it appears on the **Preconfigured Steps** tab (Figure 1.27). For instructions on using the **Preconfigured Steps** tab, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Saving Preconfigured Steps*.

NOTE The **Preconfigured Steps** tab is visible only if a configured step has been saved.

Figure 1.27 Preconfigured Steps Tab — Example



Utilities Tab

The **Utilities** tab (Figure 1.28) provides the means for making project-level and instrument-level changes. For an overview on configuring each type of utility, refer to Table 1.16.

Figure 1.28 Utilities Tab

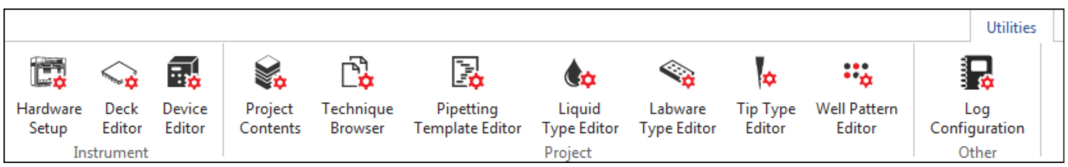


Table 1.16 Utilities Tab Options

Menu Item	Icon	Description
Hardware Setup		Allows you to configure instrument information in Biomek Software, including instrument type and which pods and devices are available for use. The simulator, which shows a 3-D animation of the instrument performing methods, is also configured in **Hardware Setup**. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring Hardware Step*.
Deck Editor		Allows you to define and change the deck configurations stored in the current instrument file. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Preparing and Managing the Deck*.
Device Editor		Allows you to configure external devices for use with the instrument. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Setting Up and Using Devices Step*.
Project Contents		Displays a complete list of all items within a Project, the status of each Project item, and, if applicable, the time at which a Project item was modified. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Using Projects*.

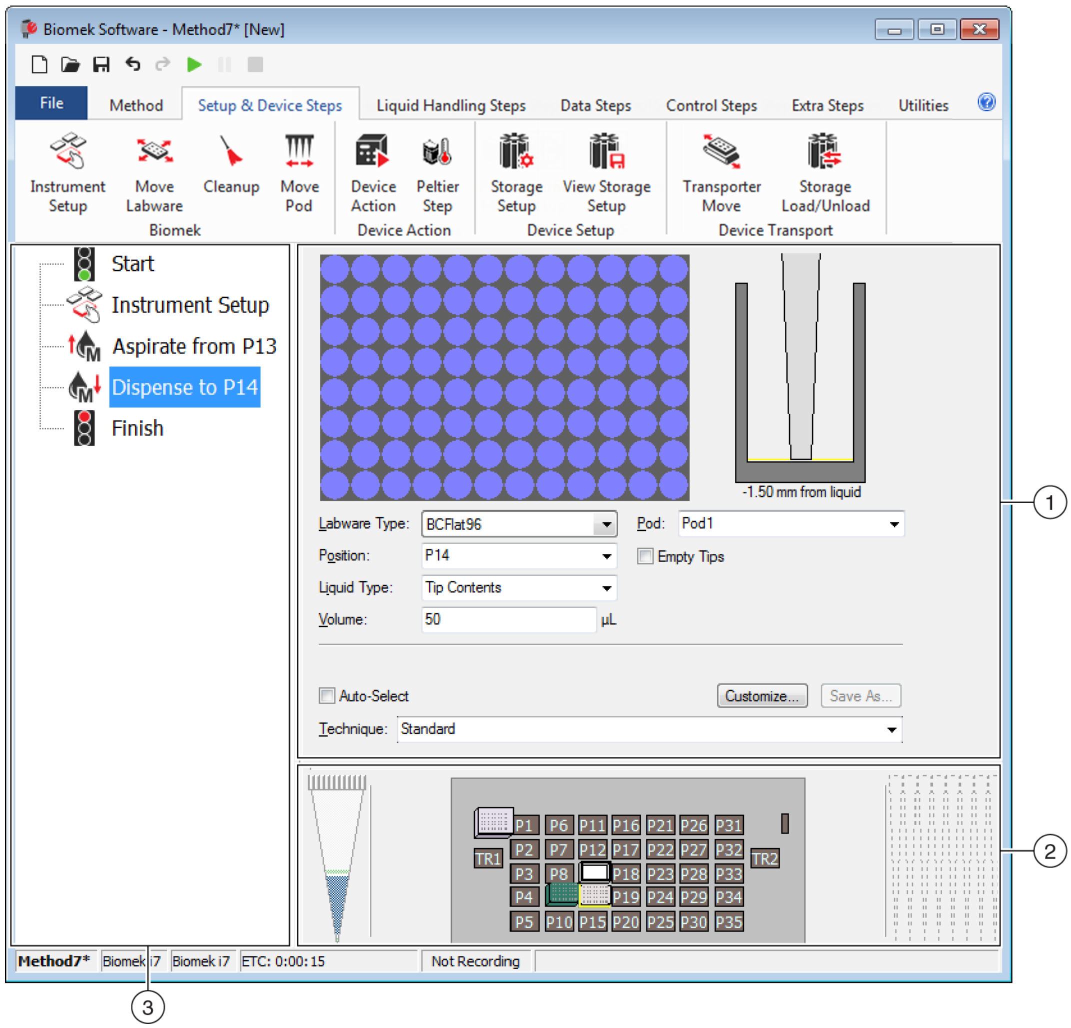
Table 1.16 Utilities Tab Options

Menu Item	Icon	Description
Technique Browser		Allows you to configure pipetting operations, such as aspirate, dispense, mix, pod height, pod speed, and tip touch. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Creating Techniques*.
Pipetting Template Editor		Enables you to configure the pipetting operations that are used within steps of a method. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Using the Pipetting Template Editor.*
Liquid Type Editor		Allows you to create new liquid types or to modify existing liquid types for methods. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Creating Liquid Types.*
Labware Type Editor		Allows you to define labware that is not predefined in the software, or update or modify labware specifications if they need to be changed. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating and Modifying Tip and Labware Types*.
Tip Type Editor		Allows you to define tips that are not predefined in the software, or update or modify tip specifications if they need to be changed. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating and Modifying Tip and Labware Types*.
Well Pattern Editor		Allows you to create and store patterns for accessing specific wells. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating Well Patterns*.
Log Configuration		Enables you to select the log files to generate with each subsequent method run. • For details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Generating Method Logs*.

Method Editor

The Method Editor consists of the Configuration View, the Current Instrument Display, and the Method View. Figure 1.29 shows where each area is located, as well as a brief description of each.

Figure 1.29 Method View



1. **Configuration View**: The configuration for each step appears in the Configuration View. The view changes to correspond to the step highlighted in the Method View.
2. **Current Instrument Display**: The Current Instrument Display reflects the status of the deck upon completion of the previous step. This display is interactive, as it can be used for selecting deck positions to use while configuring a step and selecting which pod to use in the case of a dual pod Biomek i7 instrument. This display also highlights positions chosen for use in a step.
3. **Method View:** The Method View is a pane in the main editor displaying the steps in a method. Steps placed in the Method View are executed in sequential order during a method run. See the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating a New Method*, for additional information.

Configuring Components of the Main Workspace

Depending on the task you are currently completing, you might need to resize or hide components of the main workspace to provide a better layout for entering or viewing information. The following sections provide instructions for setting up your workspace to optimize your workspace for completing the current task:

- *Hiding/Showing the Ribbon*
- *Resizing the Method View*
- *Resizing the Configuration View and Current Deck Display*

Hiding/Showing the Ribbon

You may wish to hide the ribbon to allow more space to configure your method, temporarily show the ribbon, or restore the ribbon after it has been hidden. Instructions for completing these tasks are provided in this section.

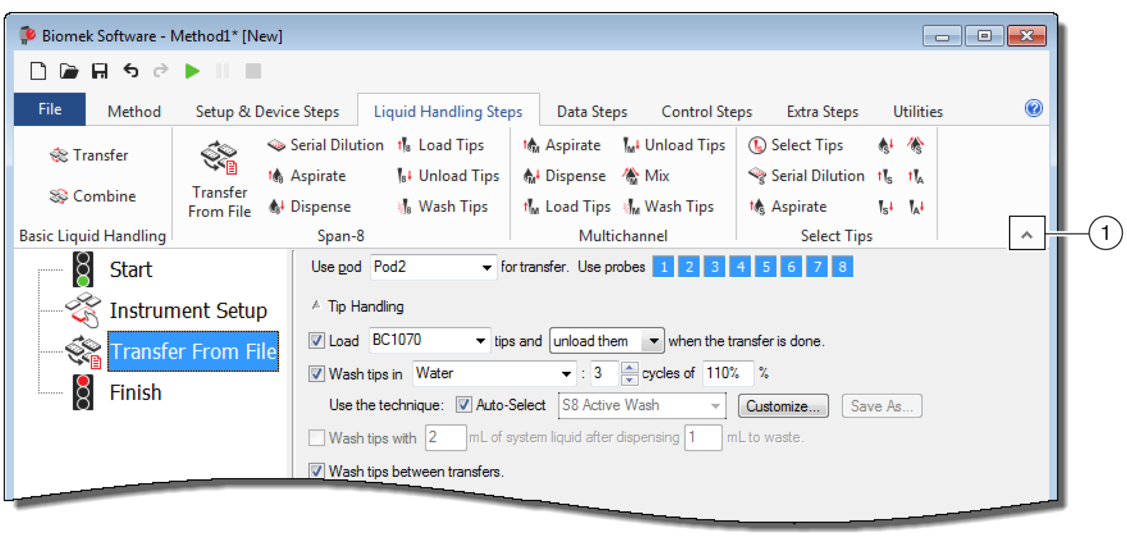
Hiding the Ribbon

To hide the ribbon:

1 Select the up arrow icon located in the lower right corner of the ribbon, as shown in Figure 1.30.

NOTE The ribbon tabs are still visible after the ribbon is collapsed, which allows you to temporarily show the ribbon to make a selection on a specific tab (see *Temporarily Showing the Ribbon* for details).

Figure 1.30 Hiding the Ribbon



1. Select this icon to collapse the contents of the ribbon.

Temporarily Showing the Ribbon

To temporarily show the ribbon:

1 Select the tab where the icon you need to select is located; this displays the contents of the tab.

2 Select the desired icon.

NOTE After selecting an icon, the ribbon returns to the collapsed state.

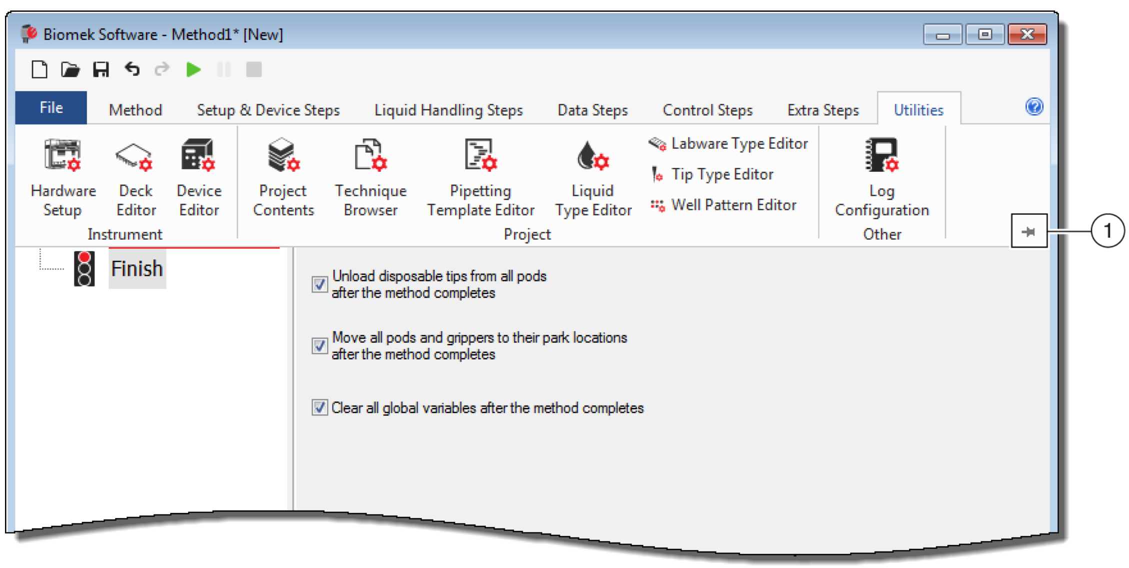
Restoring the Ribbon

To restore the ribbon:

1 Select any of the ribbon tabs.

2 Select the pin icon located on the lower right corner of the ribbon (Figure 1.31).

Figure 1.31 Restoring the Ribbon



1. Select this icon to restore the ribbon.

Resizing the Method View

To resize the Method View:

1. Hover your mouse over the right edge of the pane until the cursor changes to a double-sided arrow (⇹).

2. Click and drag the edge of the pane to the right or left, depending on whether you need to make it smaller or larger.

3. When you are satisfied with the size, release the mouse button.

Resizing the Configuration View and Current Deck Display

To resize (lengthen or shorten) the Configuration View sub-panes and the Current Deck Display:

1. Hover your mouse over the bottom edge of the pane until the cursor changes to a double-sided arrow (⇳).

2. Click and drag the edge of the pane up or down, depending on whether you need to make it smaller or larger.

3. When you are satisfied with the size, release the mouse button.

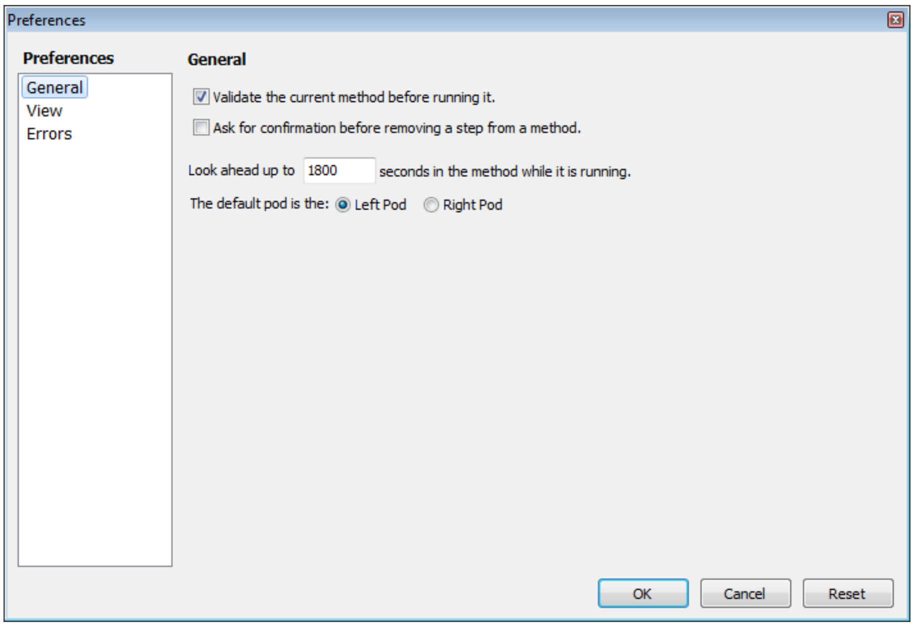
Display Options

Preferences allows the main editor appearance to be customized. **Preferences** allows the customization of the main editor using options organized under **General**, **View**, and **Errors**.

To customize the appearance of the main editor:

1 Choose **File** > **Preferences**. **Preferences** displays (Figure 1.32).

Figure 1.32 Preferences



2 Choose **General** to configure options concerning validating methods, confirmation on deleting steps and Look Ahead (refer to *Configuring General Options*).

OR

Choose **View** to configure options concerning the appearance of the Method View (refer to *Configuring View Options*).

OR

Choose **Errors** to configure options concerning the notifications of errors (refer to *Configuring Errors Options*).

Configuring General Options

To update general options concerning validating methods, confirmation on deleting steps, and Look Ahead:

1 From **Preferences**, highlight **General** (Figure 1.32).

2 Check the desired options using Table 1.17.

Table 1.17 General Options

Option	Description
Validate the current method before running it.	Simulates methods internally to test for errors before the method is run. If no errors are detected, the method is executed. If an error is detected, the process stops and an error message displays information about the error.
Ask for confirmation before removing a step from a method.	Displays a confirmation prompt when deleting a step from a method.
Look ahead up to... seconds in the method while it is running.	To prevent the system from slowing down due to unnecessary memory consumption, the software translates the steps of the method into “to do” lists of actions. This option prevents the software from slowing down by designating a length of time for suspending the translation process (refer to the *Biomek i-Series Software Reference Manual*, PN B56358).
The Default pod is the:	Allows you to choose the default pod for steps that can be executed on either pod. **NOTE** This option only appears on **Biomek i7** instruments that are equipped with two pods. The type of pod corresponding to each side of the instrument is assigned in **Hardware Setup**; see the *Biomek i-Series Hardware Reference Manual* (PN B54474) for details.

3 Choose **OK** to save the checked options.

OR

Choose **Cancel** to cancel the checked options.

OR

Choose **Reset** to reset all customizations, including options chosen in **Preferences** and the position and size of the main editor.

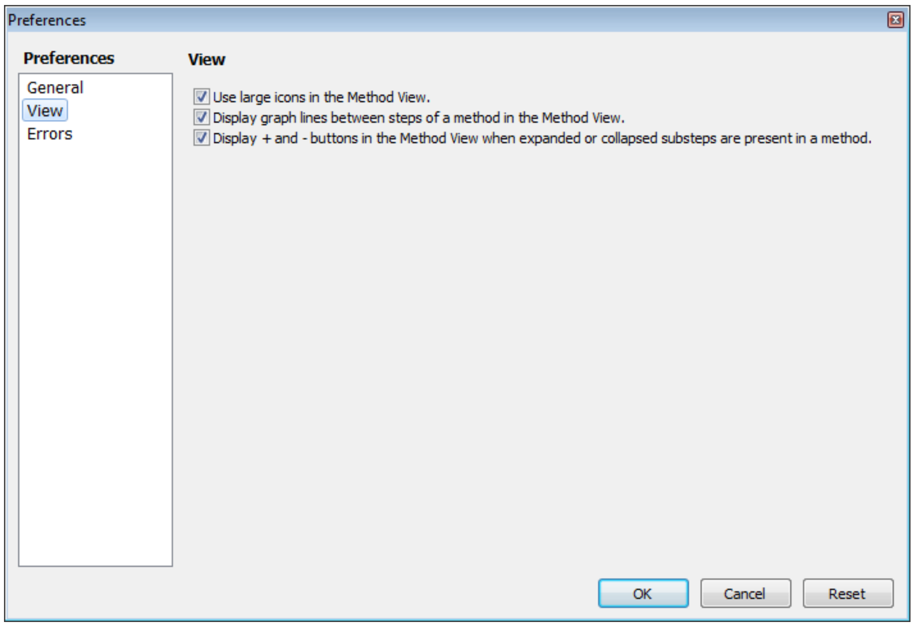
Configuring View Options

View options concern the appearance of the Method View.

To configure **View** options:

1 From **Preferences**, highlight **View** (Figure 1.33).

Figure 1.33 Preferences — View



2 Check the desired options using Table 1.18.

Table 1.18 View Options

Option	Description
Use large icons in the Method View.	Displays text and icons in the Method View in a larger size. (Enabled by default.)
Display graph lines between steps of a method in the Method View.	Displays lines which connect steps in the Method View when checked.
Display + and - buttons in the Method View when expanded or collapsed substeps are present in a method.	Displays + and - in front of steps, such as **Loop**, that contain nested steps. Click the + or - to expand or collapse the main step.

3 Choose **OK** to save the checked options.

OR

Choose **Cancel** to cancel the checked options.

OR

Choose **Reset** to reset all customizations, including options chosen in **Preferences** and the position and size of the main editor.

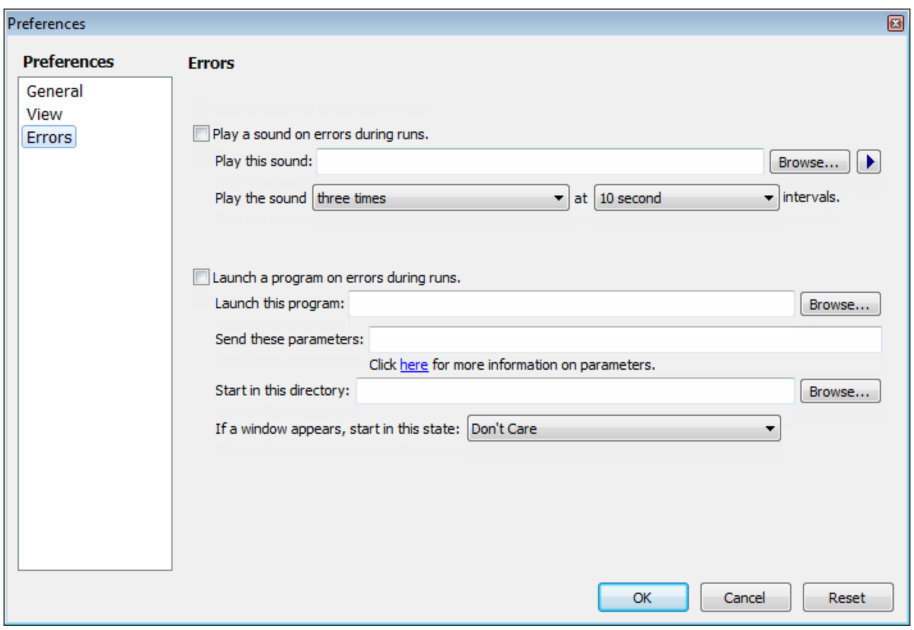
Configuring Errors Options

Error options concern the notifications of errors when an error occurs during a method run. One option is to enable black box recording, another option is to play a *.wav file, while another option allows a program, such as an *.exe file, to be run.

To configure **Errors** options:

1 From **Preferences**, highlight **Errors** (Figure 1.34).

Figure 1.34 Preferences — Errors



2 Choose **Play a sound on errors during runs** to play a *.wav file when an error message displays.

a. In **Play this sound**, use **Browse** to find the desired *.wav file.

b. Choose the desired *.wav file. The desired file appears in **Play this sound**.

c. Select ▶ to play the sound.

d. From **Play the sound**, choose one of the following options from the drop-down menu to play the sound the desired number of times when an error message appears:

- once
- twice
- three times
- repeatedly until dismissed

e. From **intervals**, choose one of the following options from the drop-down menu to play the sound at the desired intervals when an error message displays:

- 1 second
- 5 second
- 10 second
- 30 second
- 1 minute
- 5 minute

---

3 Choose **Launch a program on errors during runs** to run an *.exe file when an error message displays.

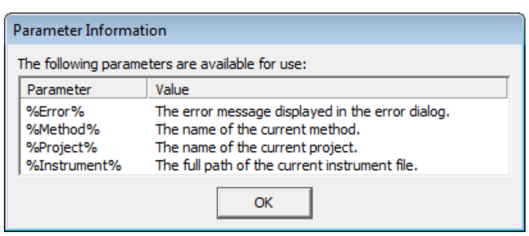
a. In **Launch this program**, use **Browse** to find the desired *.exe file.

b. Choose the desired file. The desired file displays in **Launch this program**.

c. In **Send these parameters**, enter the desired parameters using the information displayed in Figure 1.35.

NOTE Choose **click here** to display **Parameter Information** (Figure 1.35). Choose **OK** to close **Parameter Information**. Highlighting the **Parameter** and **Value** and choosing **OK** does not enter the desired parameter; the desired parameters must be manually entered in **Send these parameters**.

Figure 1.35 Parameter Information



d. In **Start in this directory**, use **Browse** to select the desired directory.

e. From **If a window appears, start in this state**, choose one of the following options from the drop-down menu to select the display style of the program:

- **Don't care** — The message appears in the default style of the program.
- **Maximize** — The message appears in the maximized state of the program.
- **Minimize** — The message appears in the minimized state of the program.

4 Choose **OK** to save the checked options.

OR

Choose **Cancel** to cancel the checked options.

OR

Choose **Reset** to reset all customization options chosen in **Preferences** and the position and size of the main editor.

CHAPTER 2

Preparing to Run

Overview

A Beckman Coulter Representative will perform the initial setup of your instrument with the ALPs, accessories, and devices that you have selected for your Biomek i-Series Automated Workstation.

What You'll Learn in This Chapter

After the workstation has been set up, Biomek Software must be updated to match the physical instrument setup. In this chapter, you will learn the basics of setting up the software in preparation for running methods. Configuring Biomek Software prior to building your method involves the following:

- *Powering On the Instrument*
- *Configuring Hardware Setup*
- *Configuring the Deck Editor*
- *Framing the Deck*
- *Populating the Deck with Labware and Tips*

Practical Applications

The instructions in this chapter are for general purposes. The procedures outlined in the chapters listed below provide instructions for setting up and creating a simple method, from start to finish. Completing these chapters is suggested to develop an understanding of the activities required to run a method.

- CHAPTER 8, *Introduction to Method-Building*
  - CHAPTER 9, *Creating a Simple Multichannel Method*
  - CHAPTER 10, *Creating a Simple Span-8 Method*

NOTE Additional tutorials are available in *Biomek i-Series Tutorials* (PN B54475).

Powering On the Instrument

To power on your instrument:

1 Power on your automation controller.

2 Power on the instrument using the power switch Figure 1.1; this initiates communication between the instrument and the automation controller, which takes a moment to complete.

3 Launch Biomek Software. The status indicator bar illuminates blue once the system is ready for use.

4 Complete the **Home All Axes** procedure; see CHAPTER 2, *Homing All Axes of the Pod(s)*.

Configuring Hardware Setup

If you change the current configuration of your instrument or add a new device, it will be necessary for you to update Biomek Software to reflect the physical changes using the **Hardware Setup** utility. This section provides the basics on using **Hardware Setup** to appropriately setup and run your instrument.

This section contains information on the following topics:

- *Homing All Axes of the Pod(s)*
- *Specifying Devices in Biomek Software*

Homing All Axes of the Pod(s)

CAUTION

In Biomek Software, before clicking OK to home all axes, make sure:

- **The pods and grippers are positioned as shown in the corresponding figure.**
- **The gripper fingers are not holding any labware.**
- **The grippers are able to rotate freely without contacting the Multichannel head, Span-8 probes, tips, or sides of the instrument.**
- **No disposable tips are loaded on either pod.**
- **The Framing Probe is NOT installed.**
- **Either disposable tip mandrels or fixed tips are installed on the Span-8 Pod.**
- **If fixed tips are installed on the Span-8 pod, no liquid is present in the tips.**

Failure to do so can cause the pod to crash into other items on the workstation, causing equipment damage and/or hazardous waste spills.

Prior to framing the Biomek i-Series deck with either a Multichannel pod or a Span-8 pod, all axes must be homed. Homing the pods gives the instrument a point of reference from which to make subsequent moves. For a single-arm system, home position is left, back. For a dual-arm system, home position for the first (left) pod is left, back and for the second (right) pod is right, back.

NOTE Home the pods each time the Biomek i-Series instrument is powered on. When attempting to use the pod, error messages result until the pod is homed.

NOTE While it is necessary to home the pods after the Biomek i-Series instrument is powered on, it is not necessary to home the pods each time the host computer is turned on or the software is accessed.

⚠ CAUTION

Risk of equipment damage. Offset gripper fingers could physically contact the instrument or pods. Always ensure the gripper fingers are away from the front, sides, and back of the instrument. Also ensure the gripper fingers are not rotated towards the pod. Use AccuFrame to properly correlate the grippers.

To home the pods:

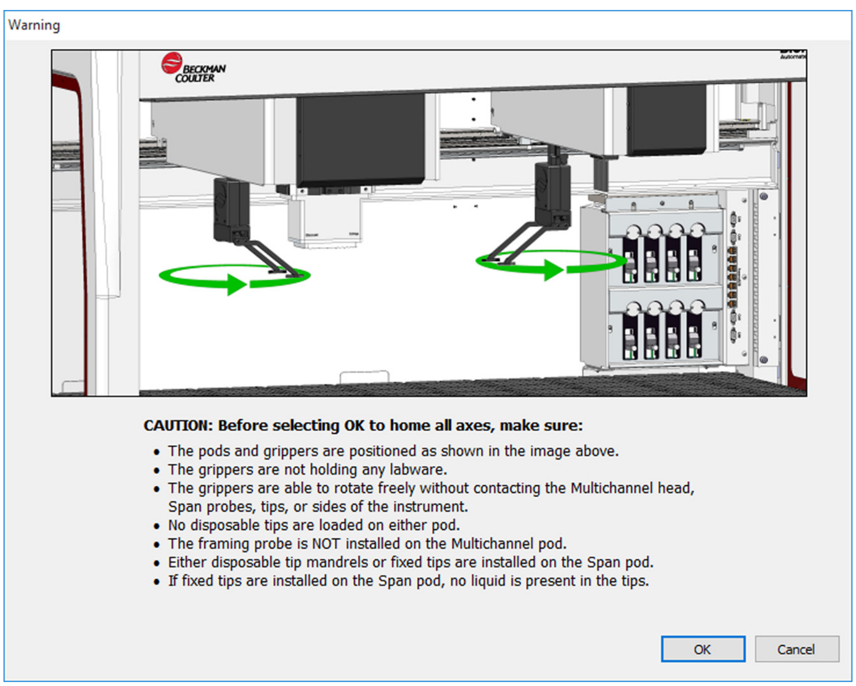
---

1 On the **Method** tab, in the **Execution** group, choose Home All Axes (**Home All Axes**).

A **Warning** appears (Figure 2.1).

NOTE Choosing **Home All Axes** homes all of the axes for all pods.

Figure 2.1 Example of Warning on a Biomek i7 Instrument to Address Before Homing Process Begins



2 Choose **OK** on each **Warning** and **Information** after confirming that the actions have been addressed appropriately.

Specifying Devices in Biomek Software

This section covers installing and removing devices in **Hardware Setup**.

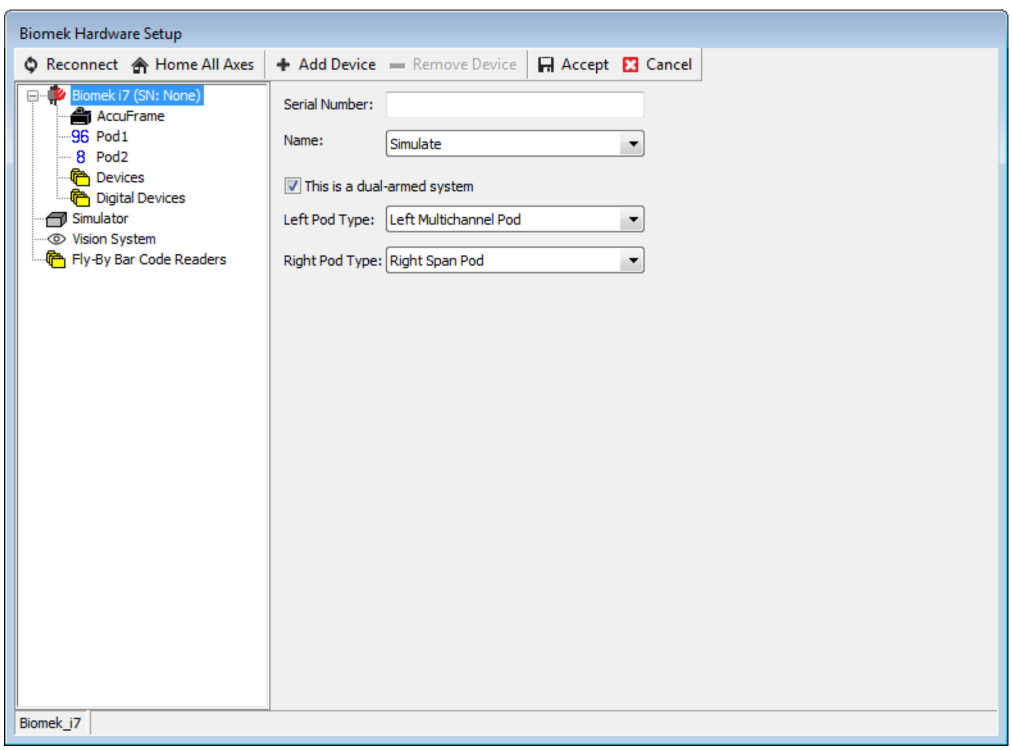
Adding Devices

To install new devices:

1 On the **Utilities** tab, in the **Instrument** group, choose 

(Hardware Setup). The **Biomek Hardware Setup** window appears (Figure 2.2).

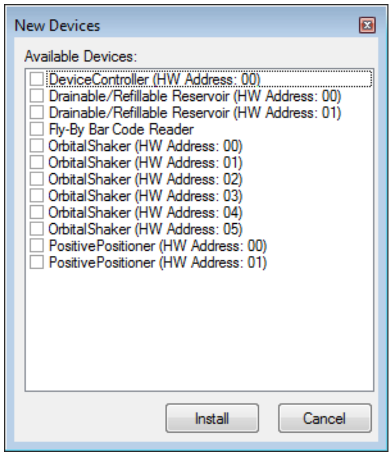
Figure 2.2 Biomek Hardware Setup Window



NOTE The devices displayed in **Hardware Setup** are dependent on instrument type and configuration.

2 Select **Add Device**. The **New Devices** window appears (Figure 2.3).

Figure 2.3 New Devices Window



3 Make the applicable selection(s), and then select **Install**.

4 Configure the device if needed. See the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use* (PN B54477) for device configuration.

5 Select **Accept** in the **Biomek Hardware Setup** window to complete the process.

Removing Devices

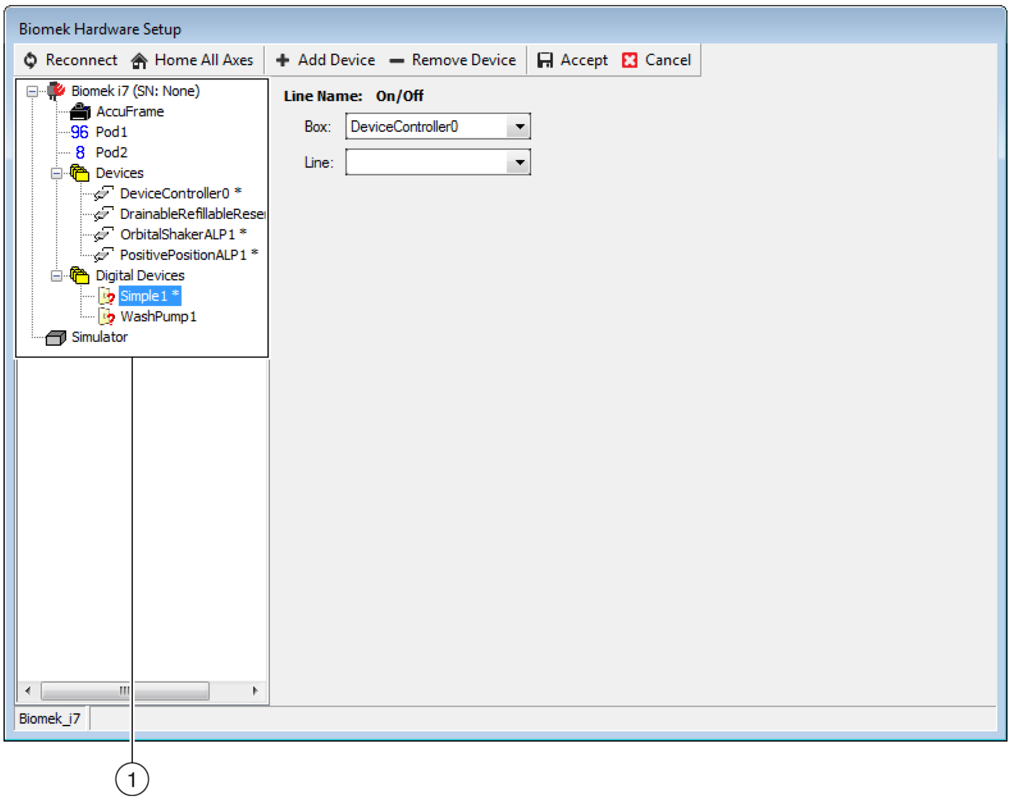
To remove a device that had previously been added to Biomek Software:

1 On the **Utilities** tab, in the **Instrument** group, choose 

(Hardware Setup). The **Biomek Hardware Setup** window appears.

2 In the pane on the left side of the **Biomek Hardware Setup** window (Figure 2.4), select the device you wish to remove from Biomek Software.

Figure 2.4 Hardware Setup Window



1. List of available devices.

3 Select **Remove Device**.

4 Select **Accept** in the **Biomek Hardware Setup** window to complete the process.

Configuring the Deck Editor

Use the **Deck Editor** utility to define and change deck configurations and frame the deck, determine the possible locations for an ALP, and notify the software of hardware changes.

This section contains information on the following topics:

- *Opening the Deck Editor*
- *Creating a Deck*
- *Deleting an ALP*
- *Adding an ALP*
- *Associating a Device With an ALP*
- *Renumbering the Deck*
- *Saving the Deck*

NOTE For additional details, refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

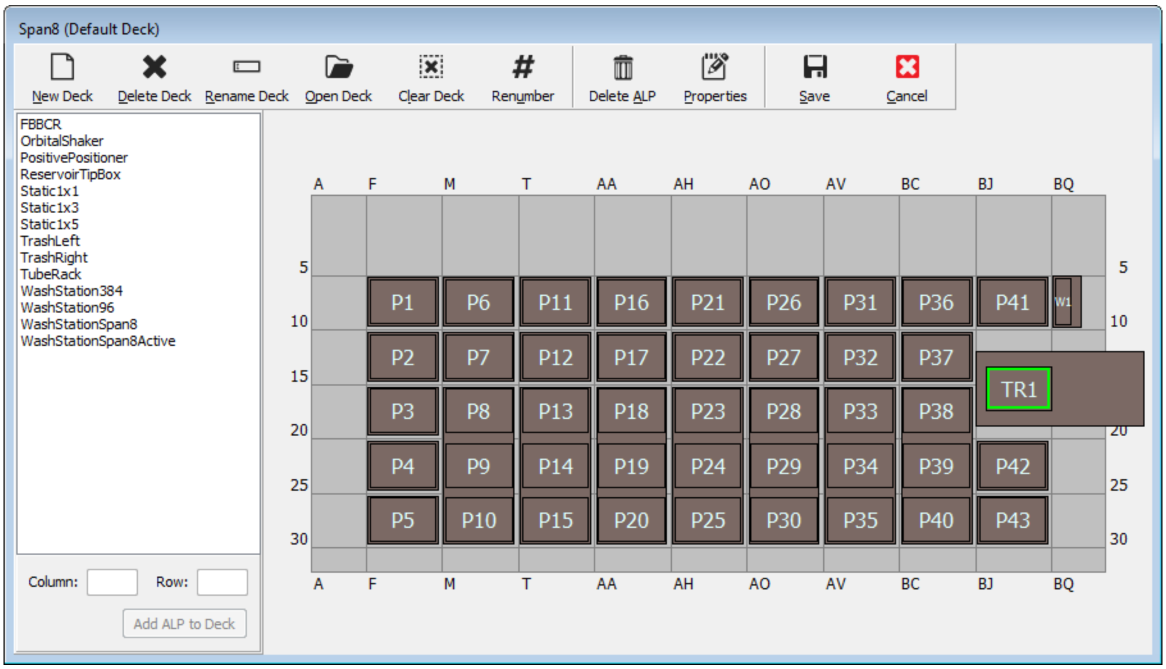
Opening the Deck Editor

To open the **Deck Editor**:

---

1 On the **Utilities** tab, in the **Instrument** group, select  (**Deck Editor**). The **Deck Editor** opens (Figure 2.5).

Figure 2.5 Example Biomek i7 Span-8 Default Deck



Creating a Deck

To create a deck:

---

1 With the **Deck Editor** open, select **Open Deck**. **Select a Deck** appears.

---

2 In **Select a Deck**, select **Standard**, which is located in the left-hand pane, and then select **OK**.

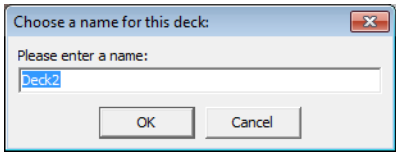
NOTE The **Standard Deck** cannot be modified. This template will be used to create a new deck.

---

3 When the **Standard Deck** opens in the **Deck Editor**, select **New Deck.**

4 Enter a name in the **Select a name for this deck** window (Figure 2.6).

Figure 2.6 Deck Name



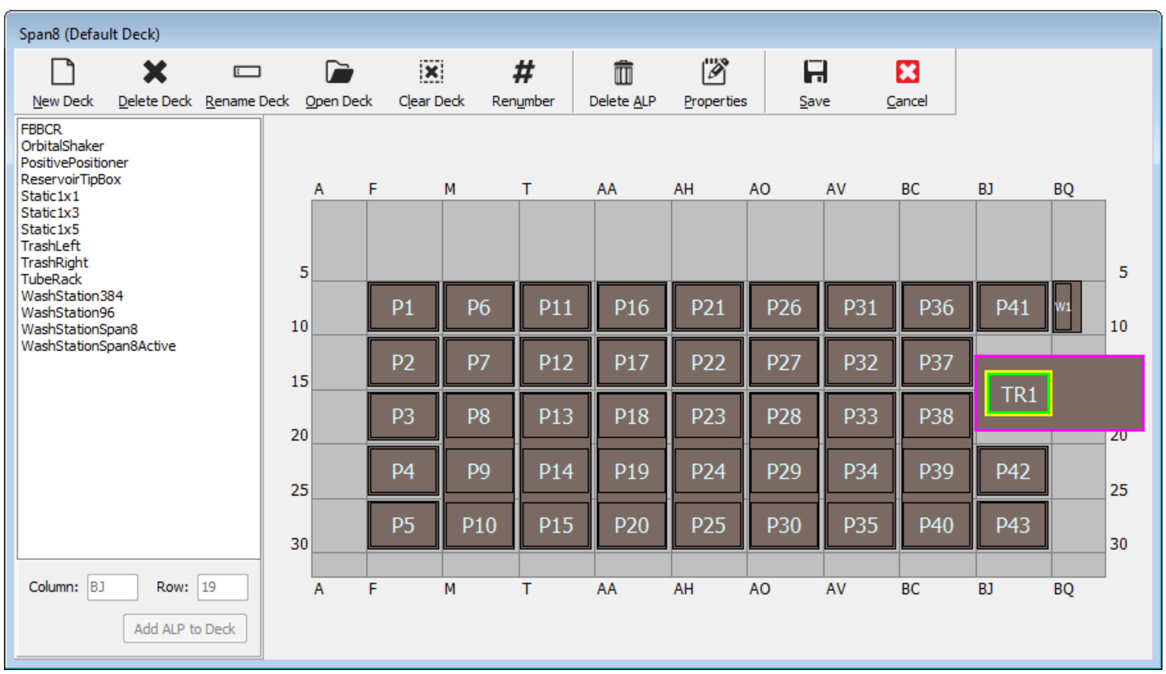
NOTE The name should not include spaces or special characters.

Deleting an ALP

To delete an ALP:

1 With the **Deck Editor** open, click on an ALP to select it. In Figure 2.7, ALP **TR1** is selected.

Figure 2.7 Selected ALP

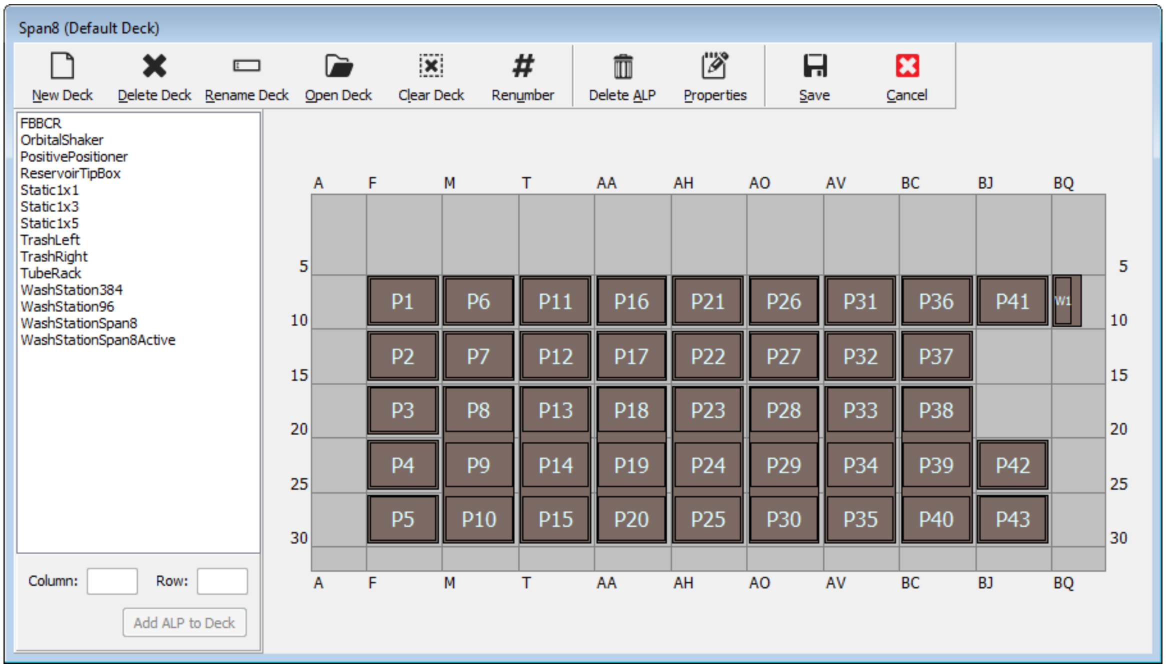


2 Select **Delete ALP** from the toolbar. A warning appears asking you to confirm you are sure you want to delete the ALP.

3 Select **Yes** to confirm. In Figure 2.8, ALP **TR1** has been deleted.

NOTE This process can only be undone by cancelling **all** changes in the **Deck Editor**.

Figure 2.8 Deleted ALP



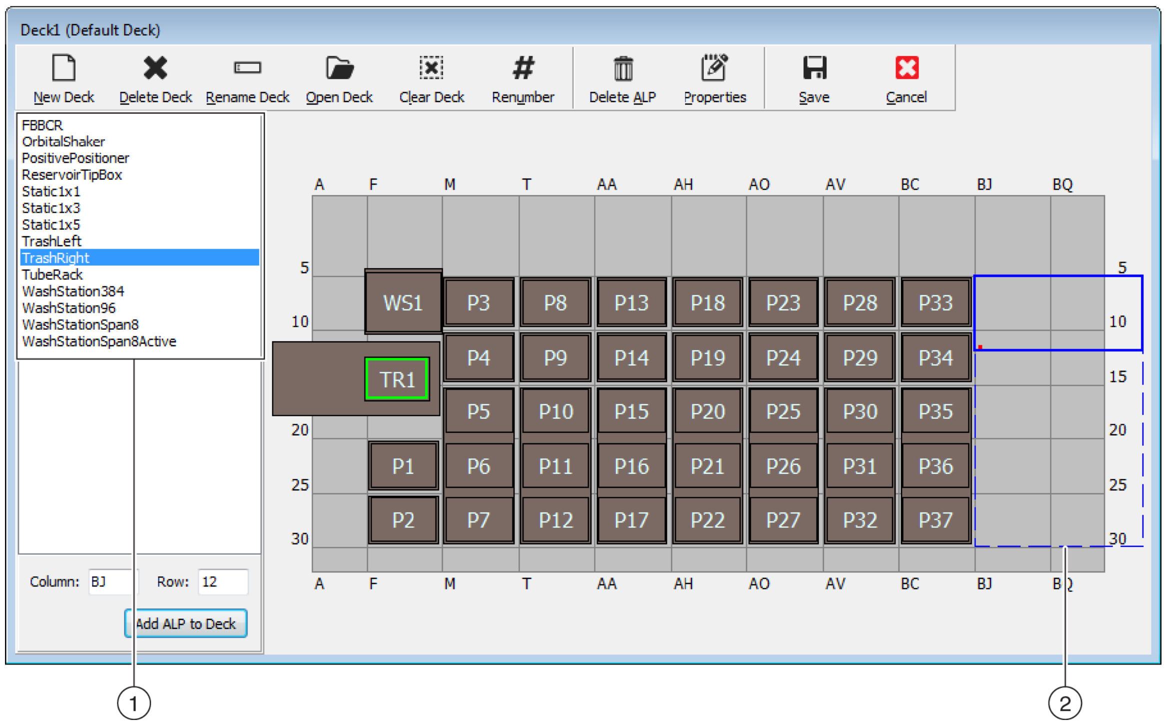
4 Continue to remove ALPs to match the physical configuration of your system.

Adding an ALP

To add ALPs to the deck:

1 With the **Deck Editor** open, click on the desired ALP in the ALP Types List (Figure 2.9). On the Biomek i-Series deck, there are multiple individual locations capable of supporting the selected ALP; available areas are shown as a blue outlined region(s). Typical locations for standard ALPs are provided in Table 2.1.

Figure 2.9 Possible TrashRight Deck Positions



1. ALP Types List
2. The highlighted regions indicate where the selected ALP can be placed on the deck.

Table 2.1 Typical Drop Locations for Standard ALPs

Instrument	Standard ALPs	
	Common Rows	Common Columns
Biomek i5	10, 15, 20, 25, 30	F, M, T, AA, AH
Biomek i7	10, 15, 20, 25, 30	F, M, T, AA, AH, AO, AV, BC, BJ

2 Compare the highlighted region to the physical instrument deck and determine the exact location where the ALP will be placed.

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).

3 Each ALP contains a pointing feature, which enables you to determine the coordinates of the ALP on the deck. These coordinates are entered into the **Deck Editor** for proper placement in the software.

There are two types of pointing features; the type of pointing feature depends on the type of ALP:

- ***For ALPs that do not require a mounting plate***, the location of the pointing feature is frontmost mounting or locking pin (Figure 2.10).
- ***For ALPs equipped with a mounting plate***, the pointing feature is the frontmost notch, located on the mounting plate (Figure 2.11).

NOTE For a list of ALPs that require a mounting plate, refer to the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use (PN B54477)*.

Figure 2.10 Pointing Feature Location on Biomek i-Series ALPs

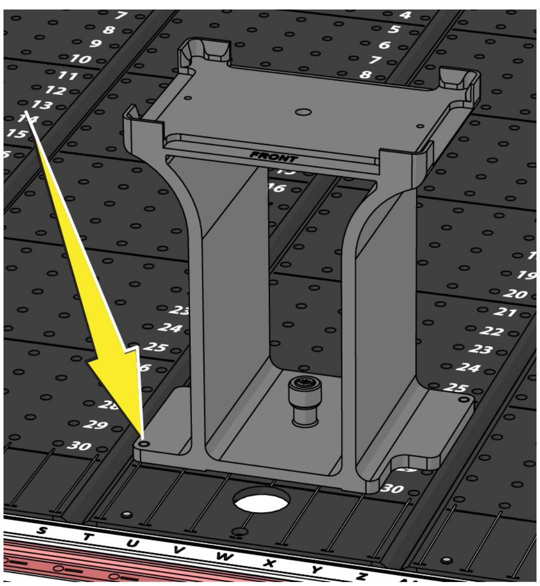
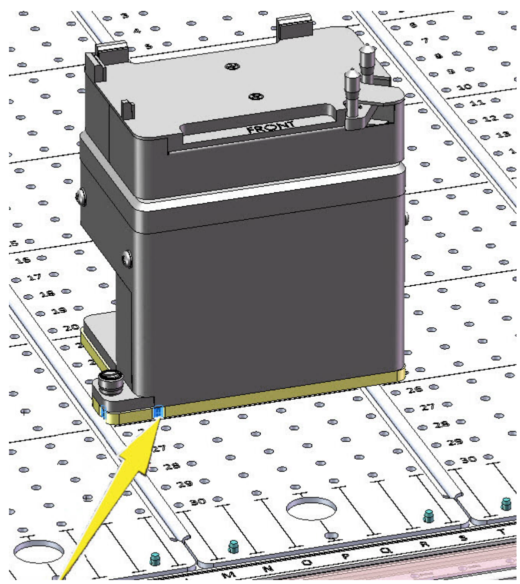


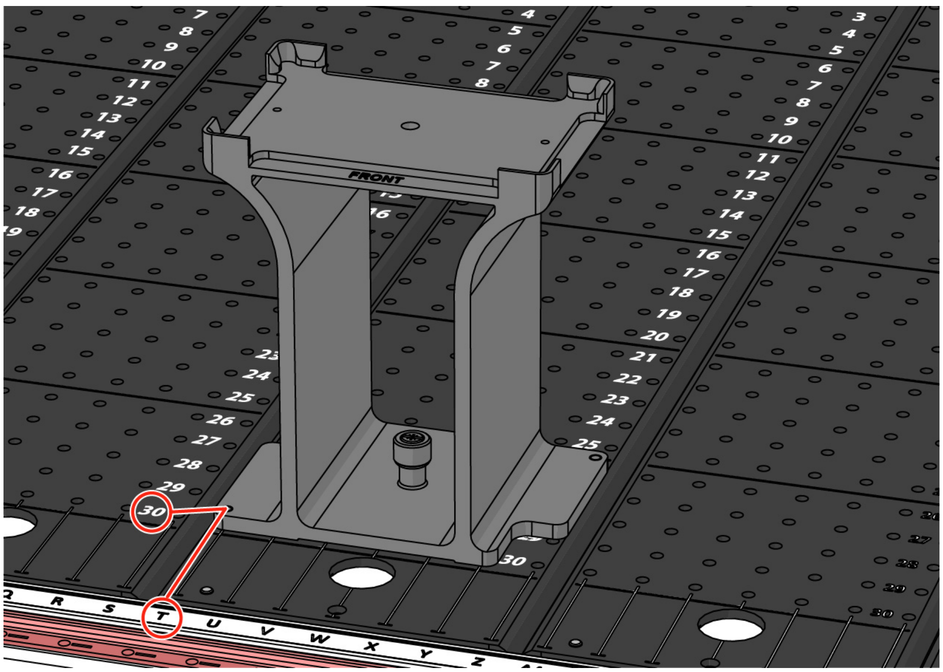
Figure 2.11 Pointing Feature (Notches) Location on Biomek FX^P/NX^P ALPs



Note the column and row coordinates of the ALP pointing feature, as demonstrated in Figure 2.12, and enter them into the **Column** and **Row** fields in the **Deck Editor**. A bounding box appears at the location of valid coordinate entries (Figure 2.13).

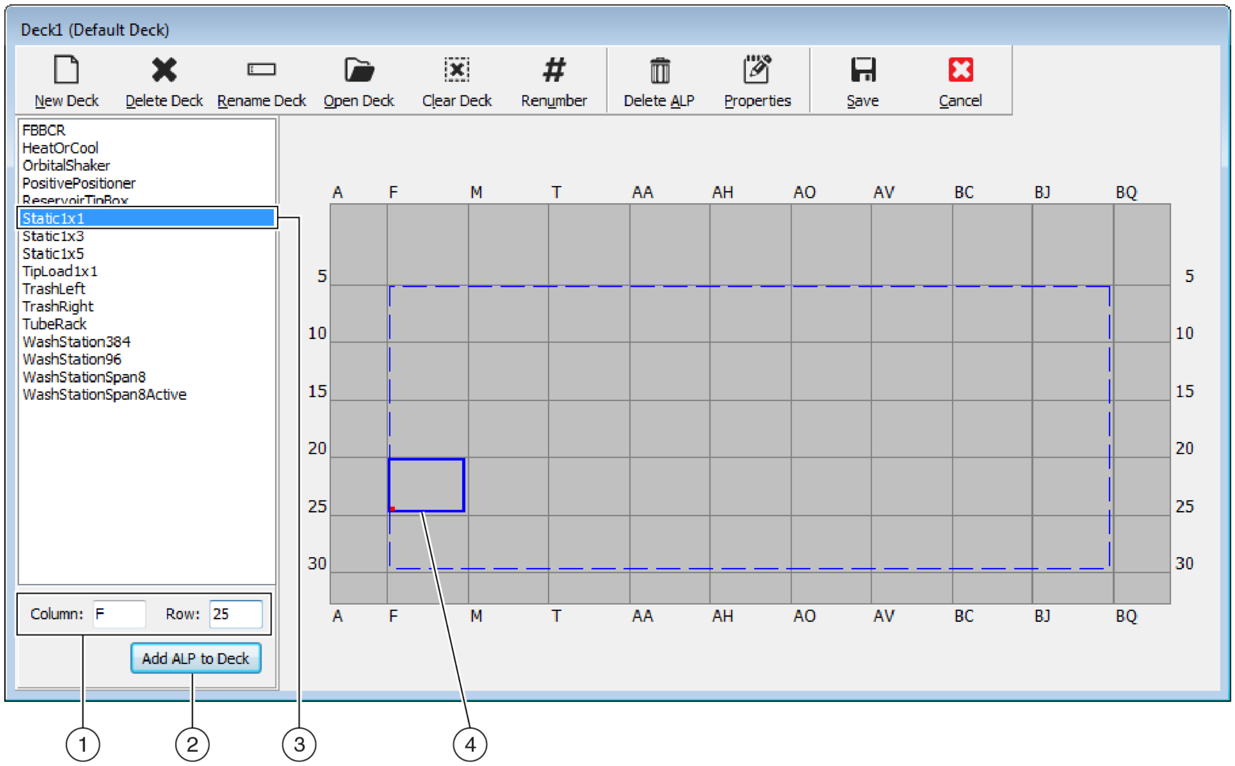
NOTE An ALP must be selected before the **Row** and **Column** fields can be edited. Invalid **Row** and **Column** entries are indicated by red font; entries must be valid before the ALP can be added to the virtual deck (step 5).

Figure 2.12 Pointing Feature Coordinates



- A **Column** coordinate is displayed as the letter corresponding to the column labels on the X-Axis, which are located on the front of the instrument.
- A **Row** coordinate is displayed as a number corresponding to the row labels on the Y-Axis and are located on each physical deck plate.
- The coordinates of the pointing feature corresponds to the column and row that intersects with it; for example, in this figure, the deck coordinates of this ALP are located at **Column T** and **Row 30**.

Figure 2.13 Adding an ALP to the Deck



1. Selected ALP
2. **Column** and **Row** Fields
3. **Add ALP to Deck** button
4. **Bounding Box**: The blue bounding box appears when a valid location is entered into the **Column** and **Row** fields. The red dot on the lower left corner of the bounding box corresponds to the column and row coordinates and is also the location of the pointing feature on the physical ALP. Verify the location is correct before selecting **Add ALP to Deck**.

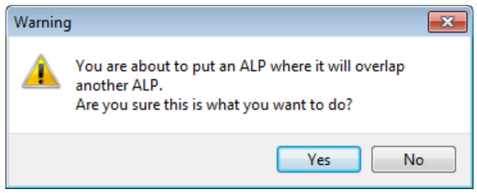
---

4 Verify in the **Deck Editor** that this is the location where you wish to place the ALP; if necessary, make an adjustment to the **Row** and **Column** fields.

5 Select the **Add ALP to Deck** button.

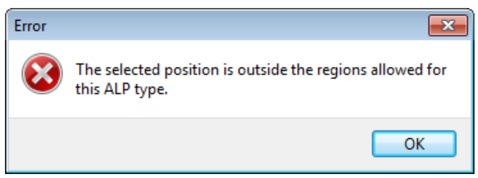
- If the desired ALP is about to be placed where another ALP is currently placed on the deck, the warning in Figure 2.14 appears. Delete the currently-placed ALP before placing the desired ALP on the deck (refer to *Deleting an ALP*).

Figure 2.14 Overlapping ALPs Warning



- If the desired ALP is about to be placed outside of the defined region, the warning in Figure 2.15 appears.

Figure 2.15 ALP Placement Warning

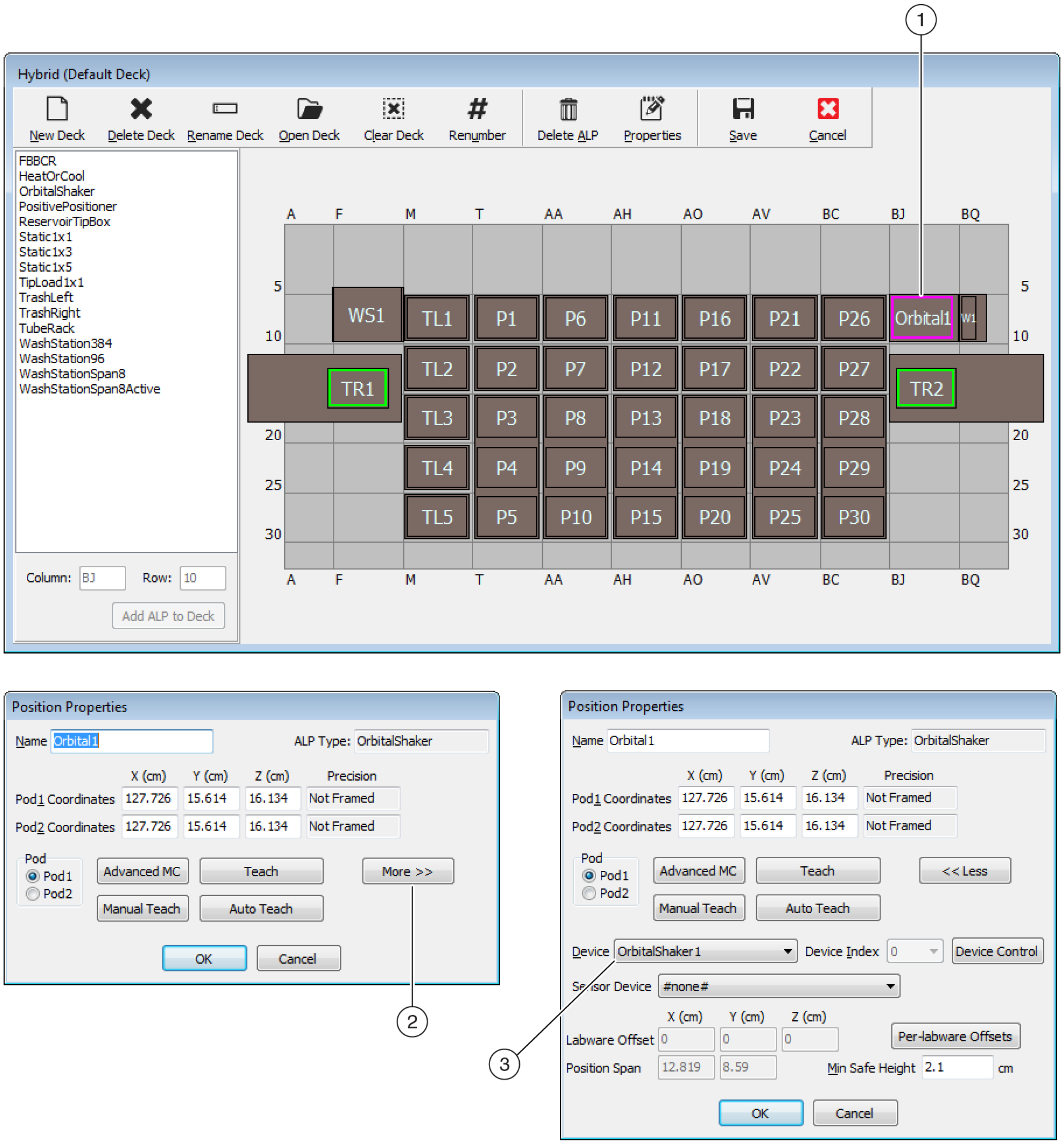


IMPORTANT Once an ALP is added to the deck, coordinates are not editable. To change the location of an ALP, delete the ALP (*Deleting an ALP*) and return to step 1 of this procedure.

Associating a Device With an ALP

Figure 2.16 is an overview of how to associate a device with an ALP.

Figure 2.16 Associating a Device with ALPs Process



1. Double click on a deck position to open **Position Properties**.
2. Select to display all position properties.
3. Use the **Device** drop-down to associate a device to the position.

To associate a device with a deck position:

---

1 With the **Deck Editor** open, double click on the deck position or ALP.

2 Select **More>>**.

3 From the **Device** drop-down, select the specific device to be associated with the position.

4 Select **OK**.

Renumbering the Deck

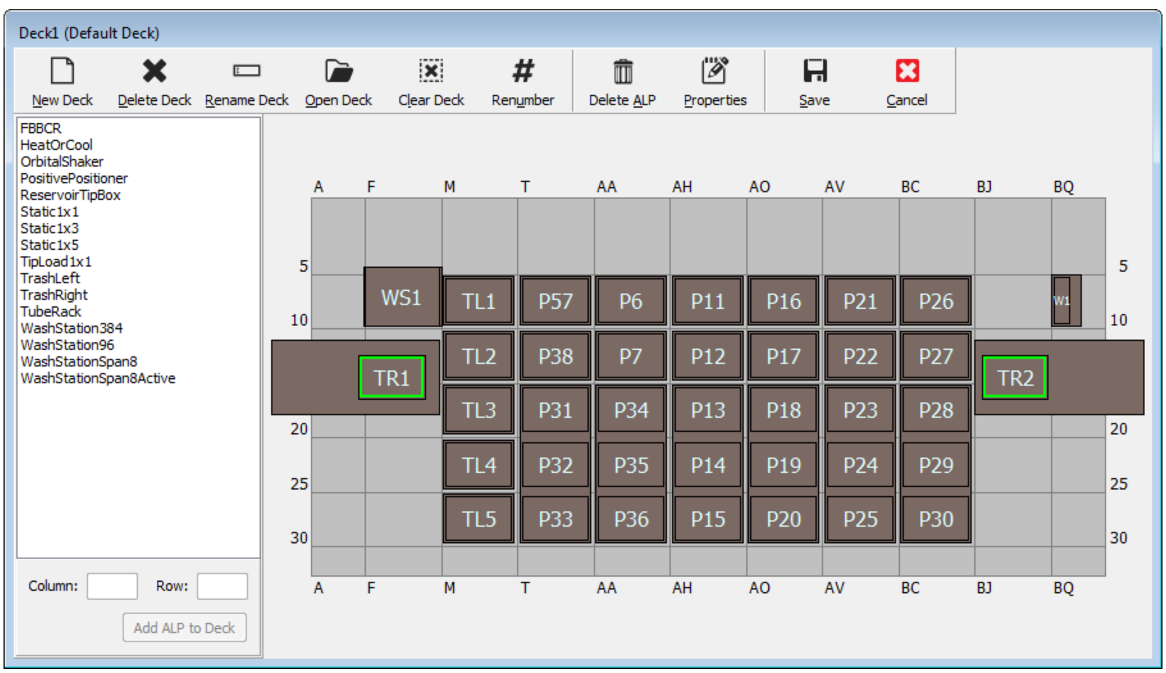
The **Renumber** feature renumbers the positions on the deck. Renumbering begins at the top left position, moves down the column, and then moves in this pattern to the right. Active ALPs will not be renumbered. This process cannot be undone.

NOTE You can manually rename each position.

To renumber the deck:

1 In **Deck Editor** with the appropriate deck open (Figure 2.17), select **Renumber**. A warning appears, asking for you to confirm the process.

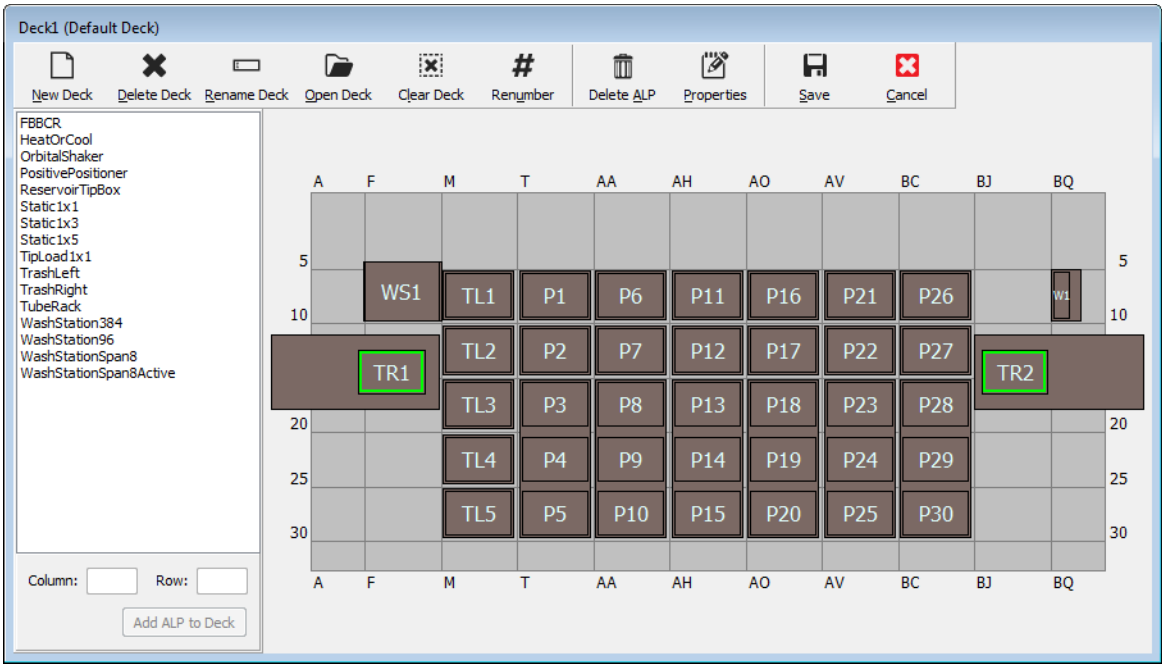
Figure 2.17 Deck Before Renumbering



2 Select **Yes** to confirm. The deck positions are renumbered (Figure 2.18).

NOTE Positions are renumbered in a top-down, left-right pattern.

Figure 2.18 Renumbered Deck



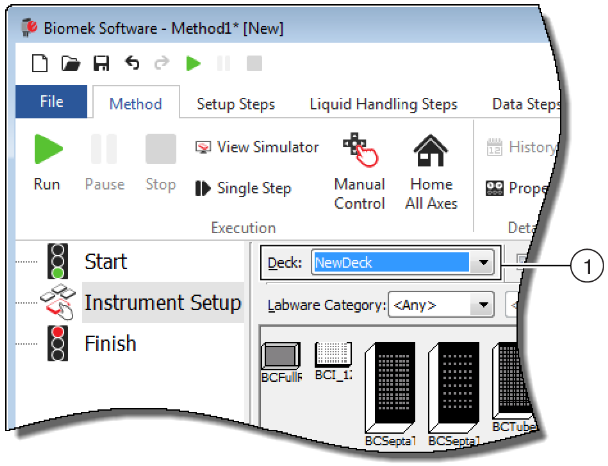
Saving the Deck

To save a deck:

1 With the **Deck Editor** open, select the **Save** button to save settings and changes to the deck.

If you saved a newly created deck, the name of the deck appears in the **Deck** drop-down located on the **Instrument Setup** step (Figure 2.19). See *Populating the Deck with Labware and Tips* for more information.

Figure 2.19 Instrument Setup Step — New Deck



1. Newly created decks are available in the **Deck** drop-down.

Framing the Deck

Framing is the process of providing Biomek Software the exact coordinates of the ALPs and devices positioned on the deck, or exact offsets for the gripper. It is also called teaching. Biomek Software uses this framing information to move the pod(s) to the appropriate positions to perform liquid-handling operations and manipulate labware.

A Beckman Coulter Representative frames the Biomek i-Series instrument during system installation. It may be necessary to repeat the framing if:

- ALPs or devices are added, moved, or removed from the deck.
- the head on the Multichannel pod is changed.
- the probes on the Span-8 pod are changed.

Deck positions can be framed automatically using the AccuFrame framing tool, or manually using a piece of labware to visually align the pod to the wells.

Framing the instrument includes:

- *Framing Deck Positions Using AccuFrame*
- *Manually Framing Deck Positions*

Precision When Framing (Teaching) Two Pods

After framing Pod 1, the Pod 2 coordinates change to match those of Pod 1. The **Precision** field for Pod 2, however, still displays **Not Framed** until Pod 2 is actually framed for that position. When precision is critical, as when using 384-well plates, each position accessed must be framed by both pods.

IMPORTANT Ensure that pod correlation has been performed by a Beckman Coulter Representative prior to framing positions.

NOTE If Pod 2 is framed before Pod 1, the coordinates of Pod 2 do not change to match those of Pod 1.

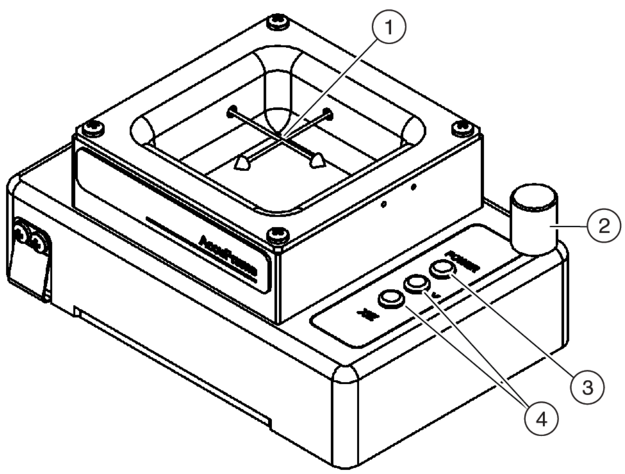
NOTE After framing both pods, the coordinates displayed for the two pods typically are slightly different.

Framing Deck Positions Using AccuFrame

The AccuFrame is a tool used for framing ALP and labware positions on the Biomek i-Series deck (Figure 2.20). Framing using the AccuFrame tool requires no human judgment of alignment and is reproducible.

NOTE AccuFrame framing tools used for framing ALPs and devices on Biomek FX/NX instruments are not compatible with Biomek i-Series instruments. Make sure to use the appropriate AccuFrame framing tool for the Biomek i-Series instrument.

Figure 2.20 AccuFrame Framing Tool



1. AccuFrame Light Beams
2. Hard Stop
3. Power Light
4. AccuFrame Light Beam Indicators

The AccuFrame fits snugly on an ALP, and the framing process is performed through Biomek Software to obtain the coordinates for each deck position. The framing is completed by breaking two light sensors on the AccuFrame at their intersection point with the framing probe or disposable tip mandrel (version 5.1 only).

The coordinates for each ALP are generated automatically through the software based upon framing one position; however, when precision is critical, as when using 384-well plates, each pod must be used to frame each position before using the instrument. This ensures that the pods and gripper locate each position reliably.

There are three indicator lights on the AccuFrame:

- First light indicates that the AccuFrame is powered on.
- Middle light indicates the framing status of the Y-axis.

- Third light indicates the framing status of the X- and Z-axes.

NOTE The AccuFrame is calibrated in the factory. The calibration values are stored on the AccuFrame and read as necessary by Biomek Software.

Framing the deck positions of the Biomek i-Series instrument using AccuFrame is performed in the same manner for either a Multichannel pod or Span-8 pod, except a framing fixture is attached to the head of a Multichannel pod, while a framing shaft is attached to a probe of a Span-8 pod when needed (see *Attaching the Framing Fixture to the Pod*).

NOTE When framing multiple position ALPs such as the Static 1 x 3 ALP, all positions on the ALP should be framed to increase precision.

To frame the deck positions of the Biomek i-Series instrument, the following operations must be completed:

- *Homing All Axes of the Pod(s)* (located on page 2-2)
- *Attaching the Framing Fixture to the Pod*
- *Installing AccuFrame*
- *Framing the Position*

NOTE Some ALPs require additional or slightly modified procedures to frame properly. Consult the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use* (PN B54477), for the specific ALP to frame for any special instructions.

NOTE Deck positions on the Biomek i-Series instrument can also be framed by choosing **Manual Teach** on **Position Properties**. **Manual Teach** involves loading tips and visually aligning them with the wells on a piece of labware (refer to *Manually Framing Deck Positions*). **Manual Teach** is useful if specialized or very high density labware is used, or when **Auto Teach** yields unsatisfactory results. Some ALPs, such as the Span-8 Tip Wash ALP, must be framed using **Manual Teach**.

Attaching the Framing Fixture to the Pod

After homing the pod(s), the appropriate framing fixture must be installed on the pod used for framing. The type of framing fixture required depends on the type of pod and head installed.

- Multichannel pod with a 96-channel or 384-channel head (refer to *Attaching the Framing Fixture to the Multichannel Pod*)
- Span-8 pod (refer to *Attaching the Framing Shaft to the Span-8 Pod*)

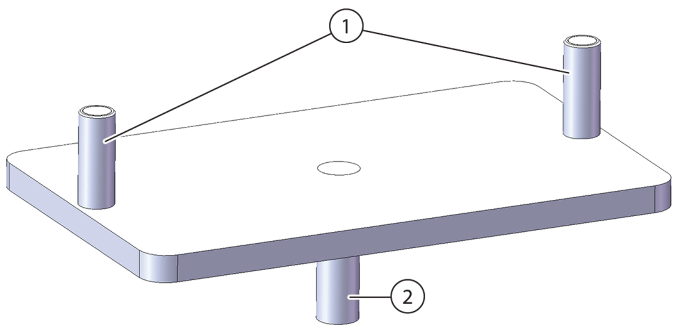
Attaching the Framing Fixture to the Multichannel Pod

When positioning the framing fixture, the framing probe must be pointed down and away from the mandrels of the head.

To install the framing fixture on the Multichannel head:

1 Align the two magnetic framing guides on the framing tool with the holes on the head (Figure 2.21).

Figure 2.21 Multichannel Framing Fixture



1. Magnetic Framing Guides
2. Framing Probe

2 Raise the framing tool up towards the head and allow the magnets to pull the framing tool against the head.

3 Ensure the framing tool is snugly seated against the shuck plate of the head.

4 Install AccuFrame in the position to frame (refer to *Installing AccuFrame*) and frame the Multichannel pod according to the procedure in *Framing the Position*.

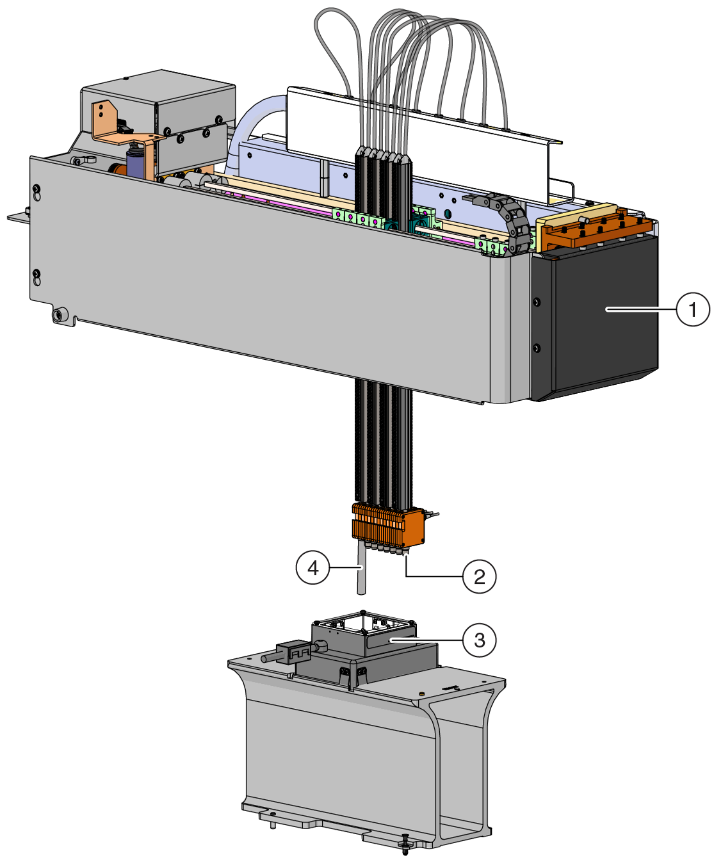
Attaching the Framing Shaft to the Span-8 Pod

After homing all axes of the pod and installing and positioning the AccuFrame, the framing shaft is attached to either probe #1 or probe #7 on the Span-8 pod. For Software Version 5.1, there is no need to attach a framing shaft when using disposable tip mandrels. The mandrels themselves will be used for framing.

The framing shaft is attached to probe #1 when all positions, except those along the front of the deck, are framed (Figure 2.22). Because probe #1 is unable to reach the AccuFrame when it is placed in the front deck positions, probe #7 must be used to frame positions along the front of the deck.

NOTE Probes on the Span-8 pod are numbered from back to front; more specifically, probe #1 is at the back of the Span-8 pod and probe #8 is at the front of the pod.

Figure 2.22 Framing a Span-8 Pod



1. Front of the Biomek i-Series instrument.
2. The framing shaft is attached to probe #7 to frame positions in the front row of the deck.
3. AccuFrame on ALP
4. The framing shaft is attached to probe #1 to frame all deck positions, except those in the front row of the Biomek i-Series deck.

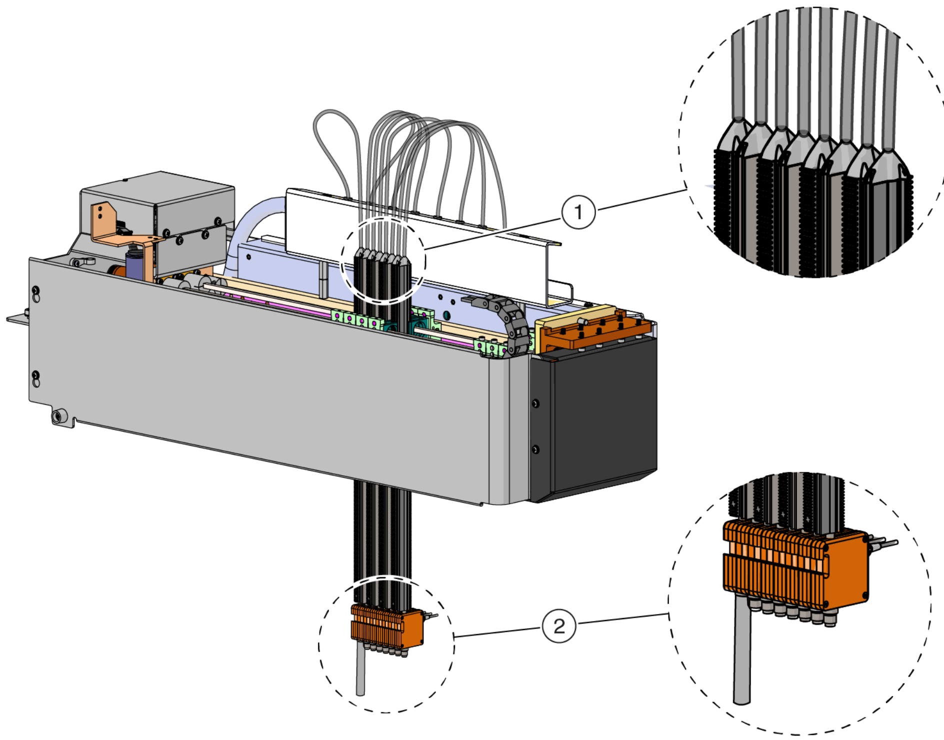
To attach the framing shaft to a probe for software version 5.0, or for fixed tips in software version 5.1:

---

1 Remove the tip mandrel from the desired Span-8 probe (probe #1 or #7).

2 Screw the framing shaft onto the appropriate probe (Figure 2.23).

Figure 2.23 Attaching a Framing Shaft (Details)



1. Probes
2. Framing Shaft

3 Install AccuFrame in the position to frame (refer to *Installing AccuFrame*) and frame the Span-8 pod according to the procedure in *Framing the Position*.

Installing AccuFrame

The AccuFrame is used during the framing process of the Multichannel pod, and the AccuFrame and framing shaft are used to frame the Span-8 pod. After these tools are attached to the ALP and pod respectively, the framing process is completed through the software.

NOTE AccuFrame framing tools used for framing ALPs and devices on Biomek FX/NX instruments are not compatible with Biomek i-Series instruments. Make sure to use the appropriate AccuFrame framing tool for the Biomek i-Series instrument.

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.

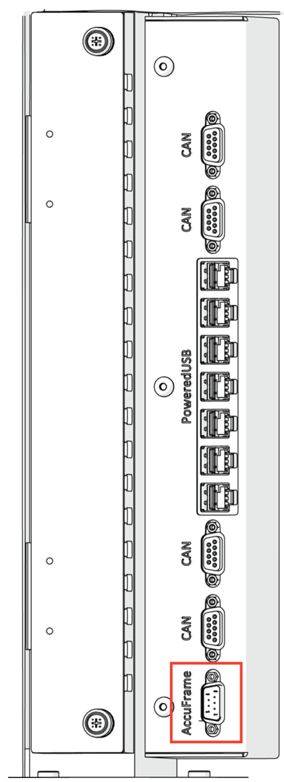
1 Turn off power to the Biomek i-Series instrument before connecting the AccuFrame.

WARNING

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.

2 Plug AccuFrame into the AccuFrame port on the instrument left rear tower (Figure 2.24).

Figure 2.24 AccuFrame Port on Left Rear Tower



IMPORTANT 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.

3 Turn on power to the instrument.

4 Manually place the AccuFrame onto the ALP position that requires framing by placing the back right corner first and pushing the AccuFrame gently down onto the ALP position.

NOTE The deck is usually framed from left to right, starting at the back, left position. However, ALPs may be framed in any order.

5 Make sure that the AccuFrame is fully seated on the ALP.

NOTE When framing a dual-arm system, frame both pods to each position where the two pods overlap.

NOTE Some ALPs require a framing adaptor to accommodate using AccuFrame to frame the position. Make sure the correct adaptor is used for each type of ALP. Framing proceeds as normal once the AccuFrame is placed on the appropriate adaptor.

Framing the Position

NOTE Some ALPs require additional or slightly modified procedures to frame properly. Consult the *Biomek i-Series ALPs, Accessories, and Devices Reference Manual* (PN B54477) for the specific ALP to frame for any special framing instructions.

IMPORTANT When framing using the Multichannel pod framing adapter, the Left Trash ALP must be removed from the physical deck prior to framing the positions directly to the right of the ALP. If it is not removed, the Multichannel pod framing adapter will collide with Left Trash ALP and dislodge the framing adapter.

For example, in Figure 2.25, the Left Trash ALP **TR1** must be removed from the physical deck prior to framing positions **P4** and **P5** using the Multichannel pod framing adapter.

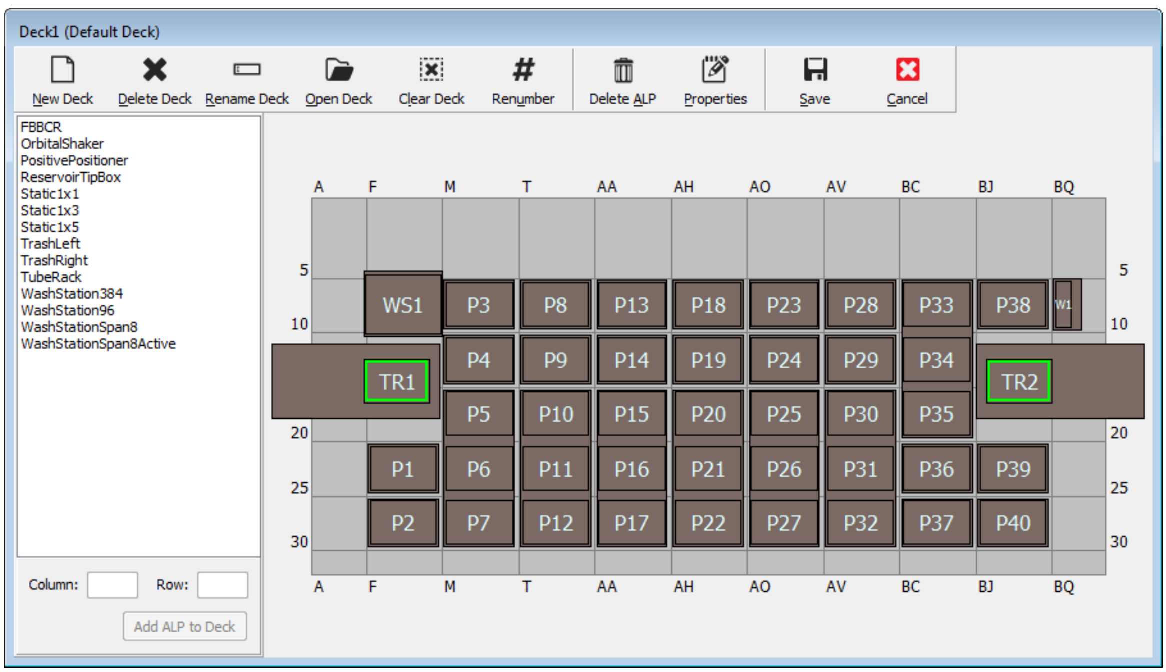
To frame a deck position:

---

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

(**Deck Editor**). The **Deck Editor** appears (Figure 2.25).

Figure 2.25 Deck Editor



⚠ WARNING

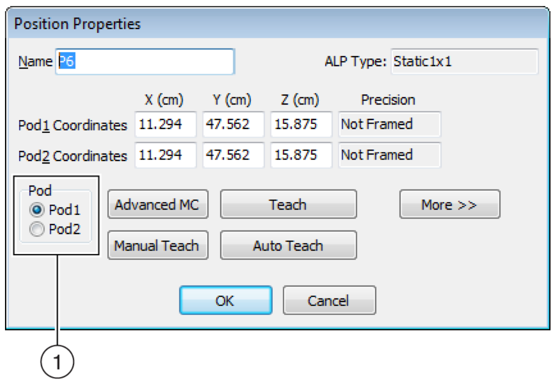
Risk of equipment damage or contamination. Always verify that the physical instrument setup matches the instrument setup in Biomek software. Inaccurate instrument setup can result in inappropriate pipetting or cause collisions, resulting in equipment damage or hazardous waste spills.

2 In Biomek Software, open the deck that requires framing in the **Deck Editor**. Verify that it reflects the current configuration of ALPs on the physical deck. If it does not reflect the current physical deck configuration, place devices on the appropriate deck locations in the **Deck Editor** by following the instructions in *Adding an ALP*. When the **Deck Editor** reflects the configuration of the current physical deck, proceed to step 3.

3 Double click on the deck position containing the AccuFrame. **Position Properties** appears ([Figure 2.26](#)).

NOTE The coordinates displayed are default values, so the software must be taught precisely where the position is located on the physical deck.

Figure 2.26 Position Properties



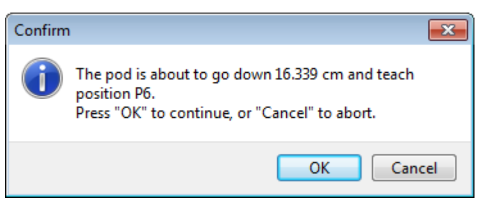
1. Choose pod being taught.

4 If using a dual-arm system, choose the pod being taught: **Pod 1** or **Pod 2** ([Figure 2.26](#)).

5 Choose **Auto Teach**. A **Confirm** message similar to [Figure 2.27](#) appears.

NOTE This moves the pod to the position being taught. The framing probe should be above the AccuFrame in that position.

Figure 2.27 Confirm



6 Visually verify that the framing probe is positioned to avoid hitting the wall of the AccuFrame and that it is positioned to lower within the AccuFrame tool.

7 Choose **OK**. The pod lowers and moves around inside the AccuFrame automatically until it breaks both light beams (Figure 2.20). The pod stops after framing is completed, and the two light beam indicators are illuminated.

CAUTION

Risk of equipment damage. Manually moving the Span-8 probes can cause the systems that move them to be damaged. Never pull or push the Span-8 probes manually. Always use Advanced Manual Control to move the probes.

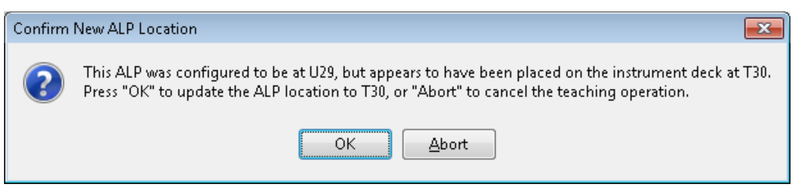
NOTE An error message appears if both light beams are not broken when the pod is lowered into the AccuFrame. If this occurs, using **Advanced Manual Control** (refer to the *Biomek i-Series Hardware Reference Manual*, PN B54474) move the pod until the probe breaks both light beams. Make sure the probes are equally spaced in the Y axis, and all the indicator lights are on. Choose **Teach**, and the pod continues the framing process.

NOTE If the framing results indicate that the ALP is placed in the wrong location on the deck (for example, the software was configured with an ALP in **U29**, but it was actually placed in **T30**. Framing a position on the ALP would indicate a large shift and trigger the error) (Figure 2.28).

The error message allows the user to update the ALP to move to the closest grid location.

8 Wait until the pod stops moving. If the framing results indicate that the ALP is placed in the wrong location on the deck (for example, the software was configured with an ALP in **U29**, but it was actually placed in **T30**), framing will indicate a large shift and trigger an error (Figure 2.28).

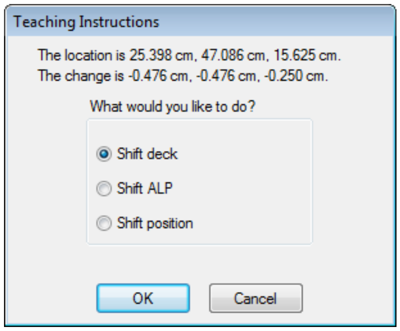
Figure 2.28 Confirm New ALP Location



The error message allows the user to update the ALP to move to the closest grid location.

9 **Teaching Instructions** appears (Figure 2.29). Choose from **Shift deck**, **Shift ALP**, or **Shift position** for appropriate framing instructions (refer to *Selecting Appropriate Framing Instructions*).

Figure 2.29 Teaching Instructions



10 If the coordinates displayed appear reasonable, choose **OK**. **Position Properties** appears again, and the position is framed for the selected pod.

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

12 For framing additional positions, move the AccuFrame to the next position to frame (refer to *Installing AccuFrame*) and repeat steps 3 through 11.

NOTE When framing positions using the Span-8 pod, the framing shaft must be moved to probe #7 to frame positions in the front row of the deck (refer to *Attaching the Framing Shaft to the Span-8 Pod*).

13 Choose **Save** to save framing information for all positions and close the **Deck Editor** (Figure 2.25).

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

14 Remove the framing fixture from the head of the Multichannel pod.

OR

Remove the framing shaft from the probe on the Span-8 pod if needed.

Selecting Appropriate Framing Instructions

In **Teaching Instructions** (Figure 2.29), the entire deck, a deck position, or an ALP can be shifted by the teaching process. Determine what should be shifted using the following information:

- **Shift deck** — Shifts all ALPs and positions associated with the deck by the change amounts shown. Choose **Shift deck** when framing the first location of a new deck. The shift amount required typically is not large, but everything on the deck may need to move 1 cm, for example.
- **Shift ALP** — Shifts the entire ALP and all deck positions associated with the ALP by the change amounts shown. **Shift ALP** typically is precise enough for using 96-well plates.
- **Shift position** — Shifts only the deck position containing the AccuFrame by the amounts shown. **Shift position** is the most precise teaching procedure, and it is useful when 384-well microplates are used (especially on larger ALPs, such as the Static 1 x 5 ALP); otherwise, **Shift ALP** is usually sufficient.

NOTE When framing a multiple-position ALP (Static 1 x 3, Static 1 x 5), **Shift ALP** on the first position, then **Shift position** on the rest.

Manually Framing Deck Positions

Manual Teach is a wizard-type interface that is used to manually frame deck positions, primarily when using high density labware. Since the wells of high density labware are relatively small, using **Manual Teach** helps to ensure that the tips can access the wells without causing any damage to the tips, probes, pod, or ALP. **Manual Teach** is also used to frame off-deck positions using the gripper.

- **Frame (on deck) using tips** — used for framing wells in labware, see *Framing Using Tips*.
- **Frame using the gripper** — used for framing integrated devices such as conveyors, plate readers, or off-deck storage. See *Framing Using Grippers*.

NOTE Some ALPs, such as the Positive Position ALP, may be framed using **Manual Teach** to improve pipetting accuracy to high-density labware.

NOTE For most labware, the standard framing procedure using the AccuFrame is acceptable. To frame using the AccuFrame, refer to *Framing Deck Positions Using AccuFrame*.

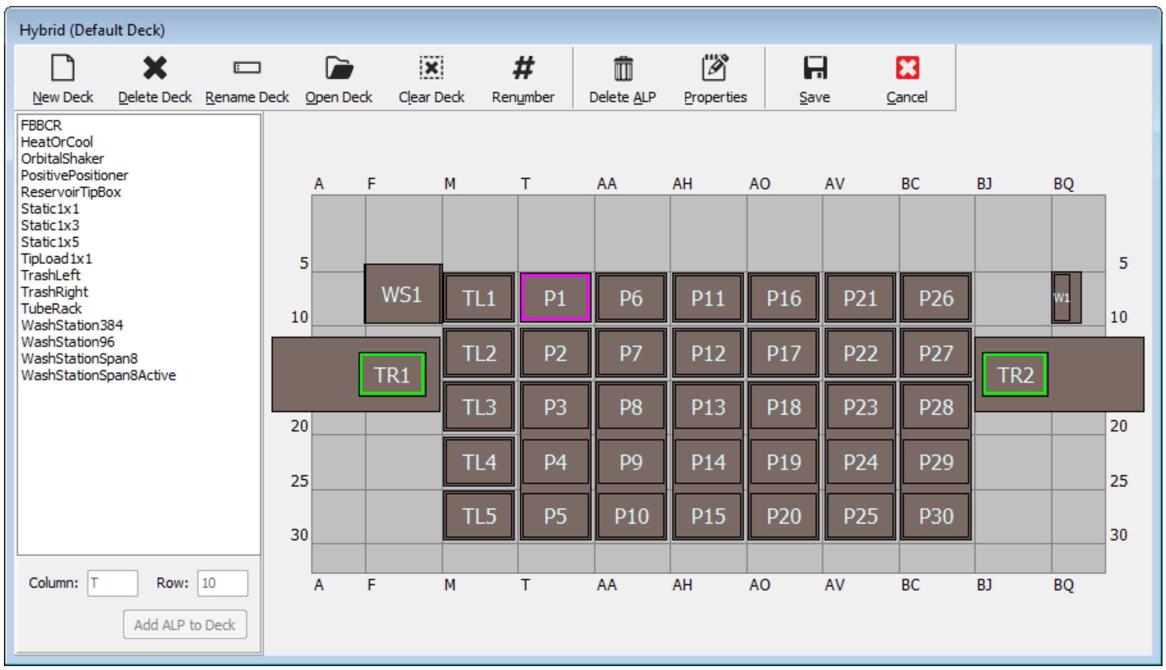
Framing Using Tips

To frame using tips:

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

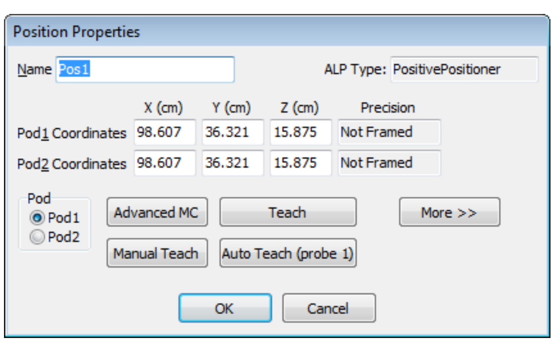
(**Deck Editor**). The **Deck Editor** opens (Figure 2.5).

Figure 2.30 Deck Editor



2 Open **Position Properties** for the desired deck position by double clicking on the deck position or by clicking the **Properties** icon on the toolbar. **Position Properties** appears (Figure 2.31).

Figure 2.31 Position Properties for a Positive Positioner ALP



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

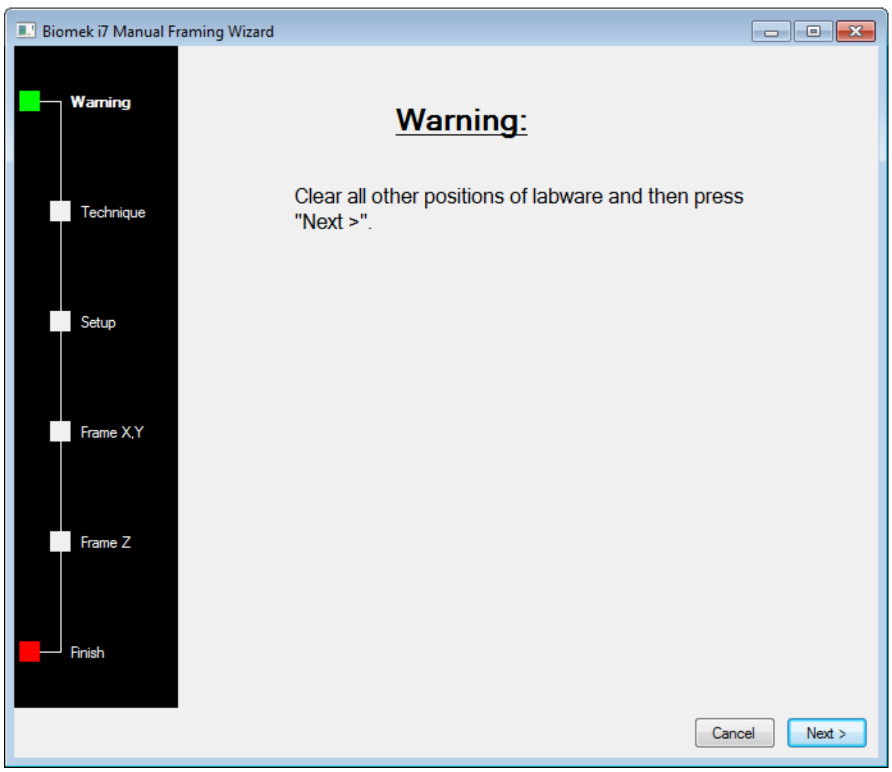
4 In **Pod**, select the pod used to frame the desired position.

IMPORTANT On a dual-pod Biomek i7 instrument, if Pod 2 is manually framed before Pod 1, the Pod 1 coordinates will not automatically be populated with the Pod 2 coordinates after framing. It will be necessary to manually edit the Pod 1 coordinates to match the Pod 2 coordinates, or to frame the position again with Pod 1.

5 Choose **Manual Teach. Manual Framing Wizard** opens with a **Warning** (Figure 2.32).

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

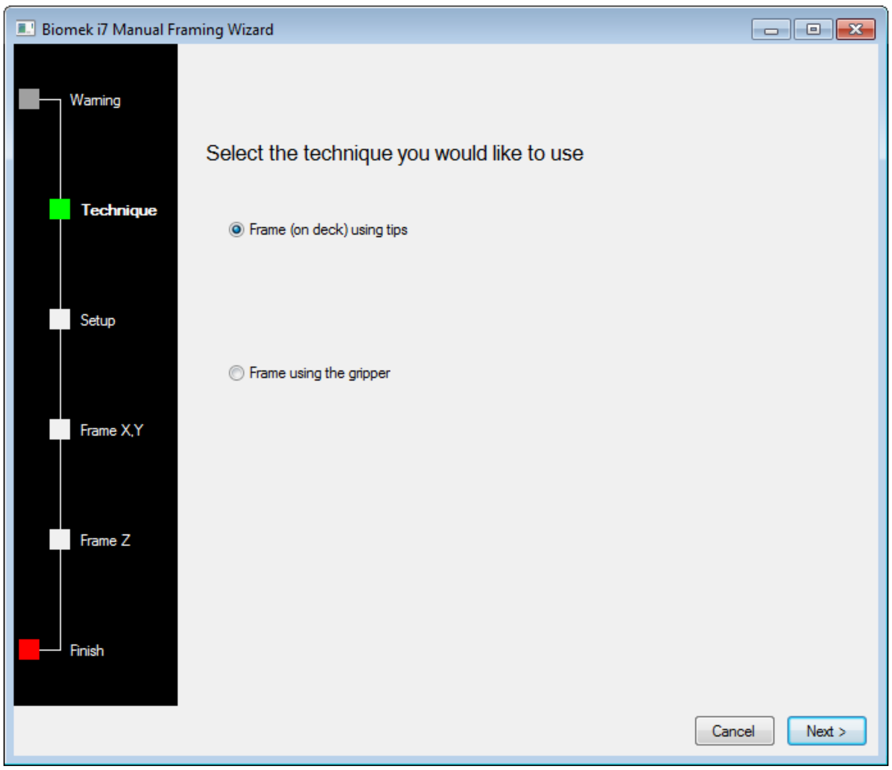
Figure 2.32 Manual Framing Wizard (Warning)



6 Once the warning has been accommodated, click **Next.** The **Manual Framing Wizard** provides two options for framing labware: **Frame (on deck) using Tips**, and **Frame using the gripper** (Figure 2.33).

NOTE To use the **Frame using the gripper** option, see *Framing Using Grippers*.

Figure 2.33 Manual Framing Wizard (Select Technique)



7 Select the **Frame (on deck) using tips** option (Figure 2.33).

8 Choose **Next** and either Figure 2.34 or Figure 2.35 appears, depending on whether or not tips are already loaded onto the pod. If tips are not already loaded, select a tip box to load from a previously framed position.

Figure 2.34 Manual Framing if Tips Are Not Already Loaded

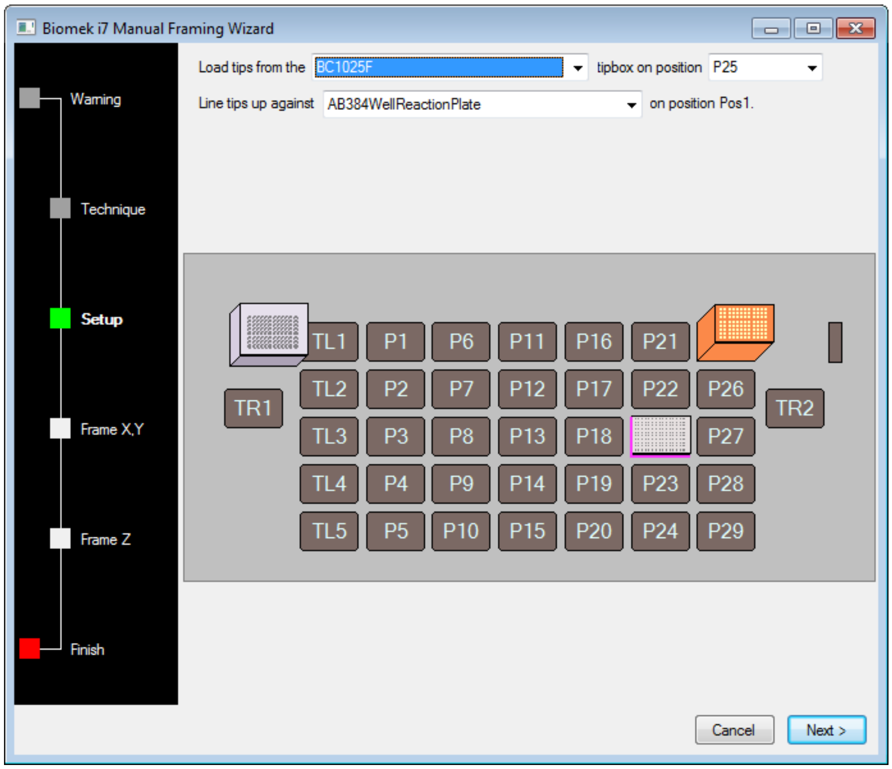
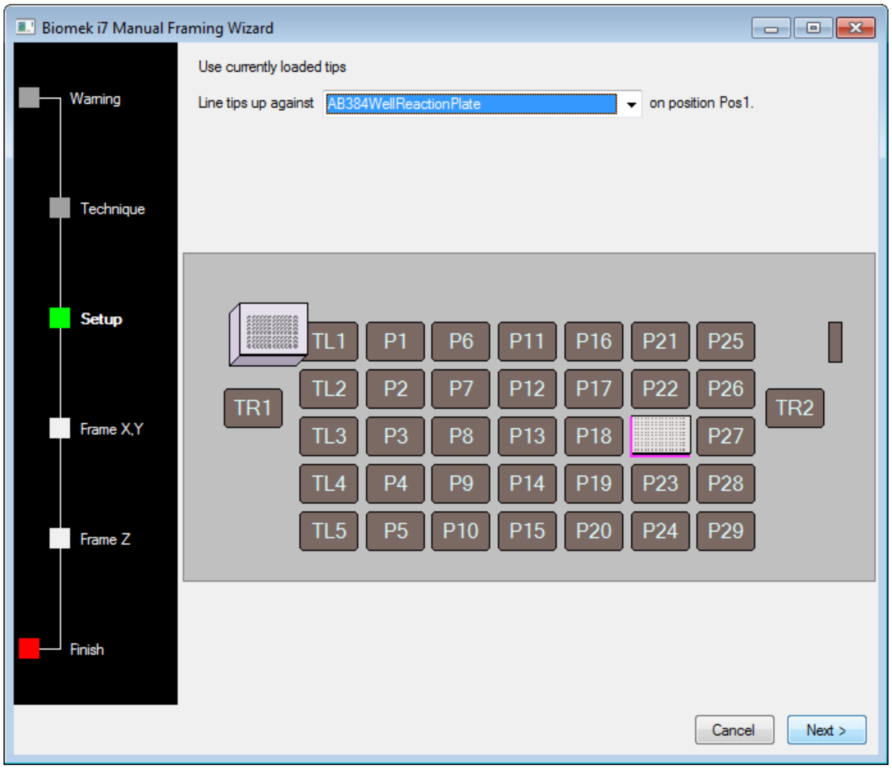


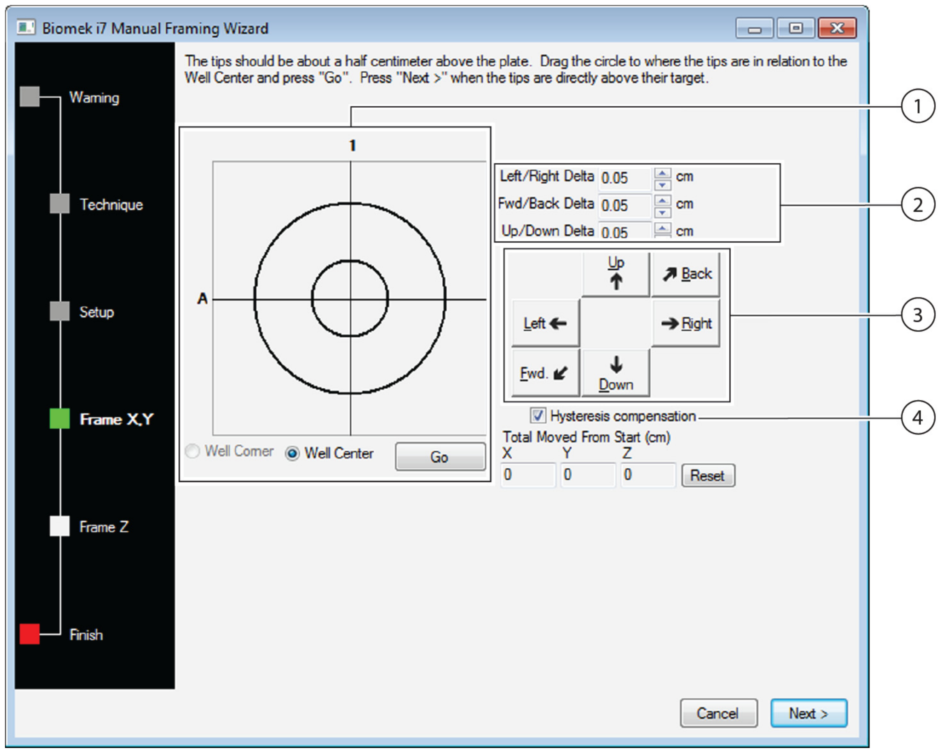
Figure 2.35 Manual Framing if Tips Are Loaded



9 In **Line tips up against**, select the appropriate labware type placed on the position being framed. Ensure that the labware on the target position is pushed to the back left corner of the position.

10 Choose **Next**. **Frame X,Y** appears (Figure 2.36).

Figure 2.36 Manual Framing (Frame X,Y)



1. **Graphic Alignment Tool**: The graphic alignment tool is a visual representation of the tip (small circle) and the wells of the microplate (the large circle). The small circle is moved until it represents the tip's current physical location in relation to the wells of the microplate on the ALP.
2. **Delta Value**: The magnitude of change applied to the tips in each axis when a directional button is clicked.
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 checked. Hysteresis is a small positional error that can be caused by the mechanical components that move the tip. When **Hysteresis Compensation** is checked, the probe will perform an additional adjustment move so the tip will approach the position from the same direction every time and correctly arrive at the desired coordinates.

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

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

12 Visually verify the physical position of the tips in relation to the physical position of the wells of the microplate on top of the ALP.

13 Select **Well Center** to align the tips to the center of the wells.

OR

Select **Well Corner** to align the tips to the corners, or junction of four wells.

NOTE **Well Corner** is available only when framing to a deck position occupied by a piece of labware with square wells.

14 In **Delta**, select the magnitude of change to be applied to the tips in each direction (Figure 2.36).

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

15 Select the directional button representing the motion required to physically move the tip into position over the wells of the microplate on top of the ALP (Figure 2.36).

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 can physically positioned over the wells of a microplate using:

- the directional buttons in **Manual Framing Wizard**
- the directional keys on the keyboard
- the directional keys on the numeric keypad

  The keys on the numeric keypad work the same as the directional buttons displayed in **Manual Framing Wizard**. Specifically, **1** correlates to **Fwd.**; **2** correlates to **Down**; **4** correlates to **Left**; **6** correlates to **Right**; **8** correlates to **Up**; and **9** correlates to **Back**.

OR

Use the mouse to click on the graphic alignment tool (Figure 2.36), then **drag the center (small) circle** until it represents the tip's physical position in relation to the wells of the microplate on top of the ALP.

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

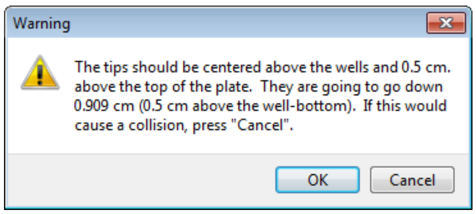
16 Select **Go**. The pod moves in accordance with the position of the small circle in relation to the large circle.

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 9 through 14 are completed. If desired, the values in **Total Moved from Start (cm)** can be reset to zero by selecting **Reset**.

17 Visually verify the position of the tips on the Biomek i-Series instrument in relation to the wells of the microplate on top of the ALP. If the tips are still not accurately positioned above the microplate, repeat steps 9 through 15 until they are accurately positioned above the microplate.

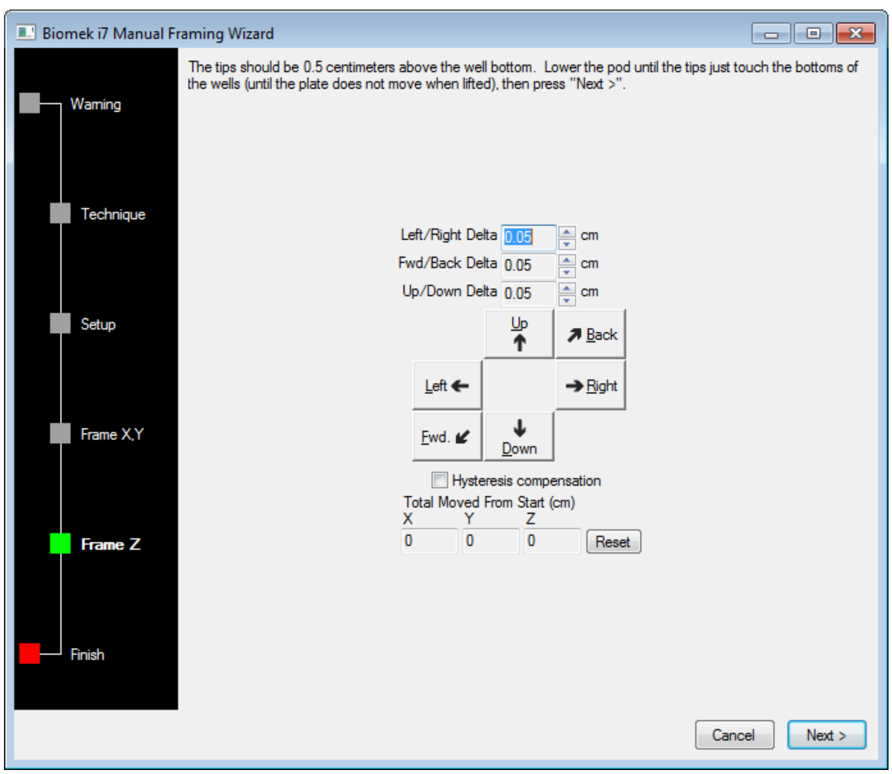
18 Choose **Next** and Figure 2.37 appears.

Figure 2.37 Manual Framing Warning on Tips Descending into a Microplate



19 Address the **Warning** and choose **OK**. **Frame Z** appears (Figure 2.38).

Figure 2.38 Manual Framing (Frame Z)



20 In **Delta**, select the magnitude of change applied to the tips in each direction each time a directional button is selected (Figure 2.38).

NOTE The default **Delta** value for each direction is 0.05 cm. If the tips are a considerable distance above the ALP, increase the distance traveled in the Z axis by increasing the Up/Down **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).

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

21 Select the **directional button** representing the motion required to physically move the tip down into the wells of the microplate until the tips touch the bottom of the wells.

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 can physically positioned over the wells of a microplate using:

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

The keys on the numeric keypad work the same as the directional buttons displayed in **Manual Framing Wizard**. Specifically, **1** correlates to **Fwd.**; **2** correlates to **Down**; **4** correlates to **Left**; **6** correlates to **Right**; **8** correlates to **Up**; and **9** correlates to **Back**.

22 Select **Finish**. The pod moves up to its maximum height in the Z-axis, **Manual Framing Wizard** closes, and **Position Properties** appears (Figure 2.31).

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

NOTE Both pods on a dual-arm Biomek i-Series instrument must frame the same deck position.

24 Repeat steps 2 to 22 to frame additional deck positions using **Manual Teach.**

25 Choose **Save** to save framing information for all positions and close the **Deck Editor** (Figure 2.34).

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

Framing Using Grippers

The grippers can be used to frame a position on deck, or positions reachable only by the gripper such as conveyors, plate readers, or off-deck storage.

NOTE Use grippers to manually frame only when it is not possible to frame using AccuFrame. Use AccuFrame to frame positions whenever possible.

NOTE Carefully observe instructions for moving the gripper. Gripper fingers can come into contact with a Multichannel head, Span-8 tips, or the side panel of the instrument.

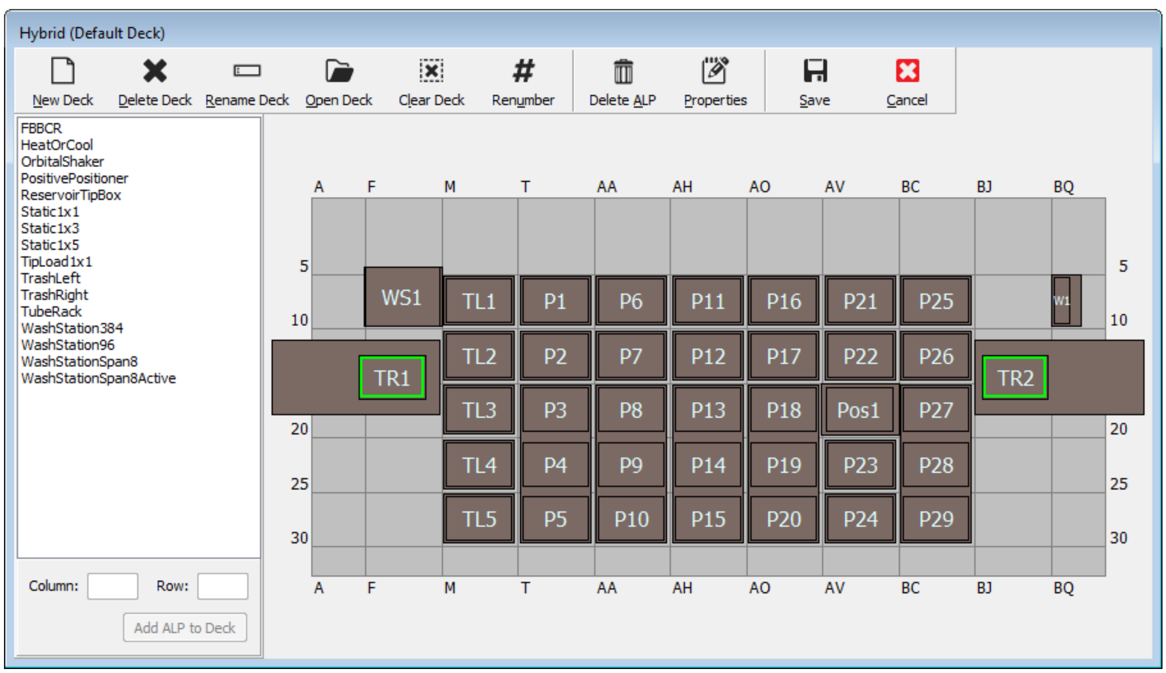
To frame using the grippers:

---

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

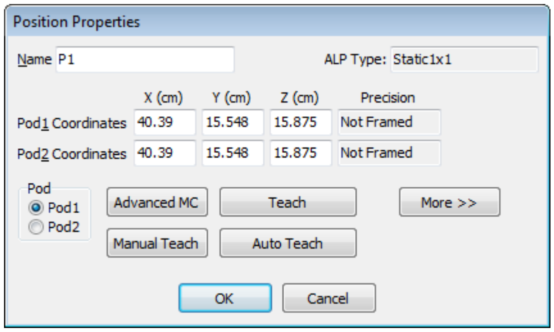
(**Deck Editor**). The **Deck Editor** opens (Figure 2.39).

Figure 2.39 Deck Editor



2 Open **Position Properties** for the desired deck position by double clicking on the deck position or by clicking the **Properties** icon on the toolbar. **Position Properties** appears (Figure 2.40).

Figure 2.40 Position Properties for a Static 1 x 1 ALP



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

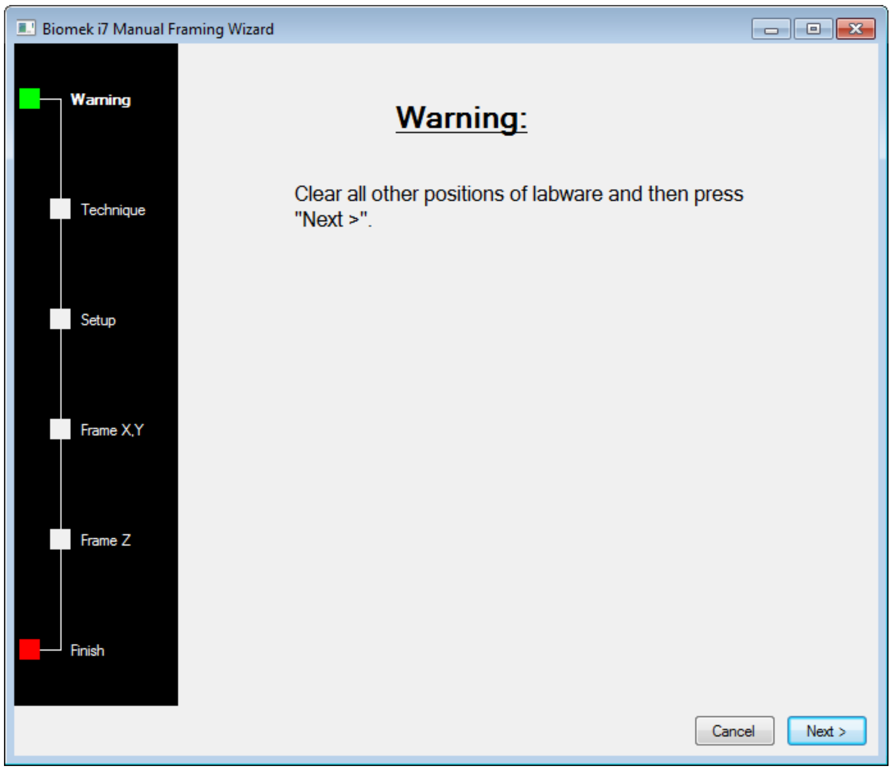
4 In **Pod**, select the pod used to frame the desired position.

IMPORTANT On a dual-pod Biomek i7 instrument, if Pod 2 is manually framed before Pod 1, the Pod 1 coordinates will not automatically be populated with the Pod 2 coordinates after framing. It will be necessary to manually edit the Pod 1 coordinates to match the Pod 2 coordinates, or to frame the position again with Pod 1.

5 Choose **Manual Teach. Manual Framing Wizard** opens with a **Warning** (Figure 2.41). Once the warning has been accommodated, click **Next.**

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

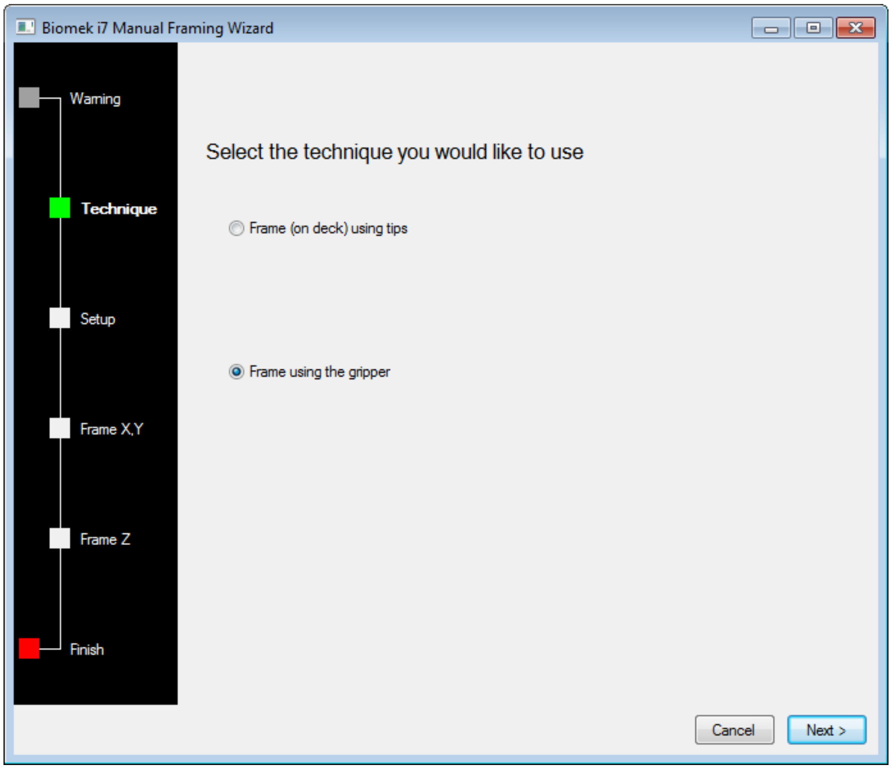
Figure 2.41 Manual Framing Wizard (Warning)



6 Select **Frame using the gripper** option (Figure 2.42).

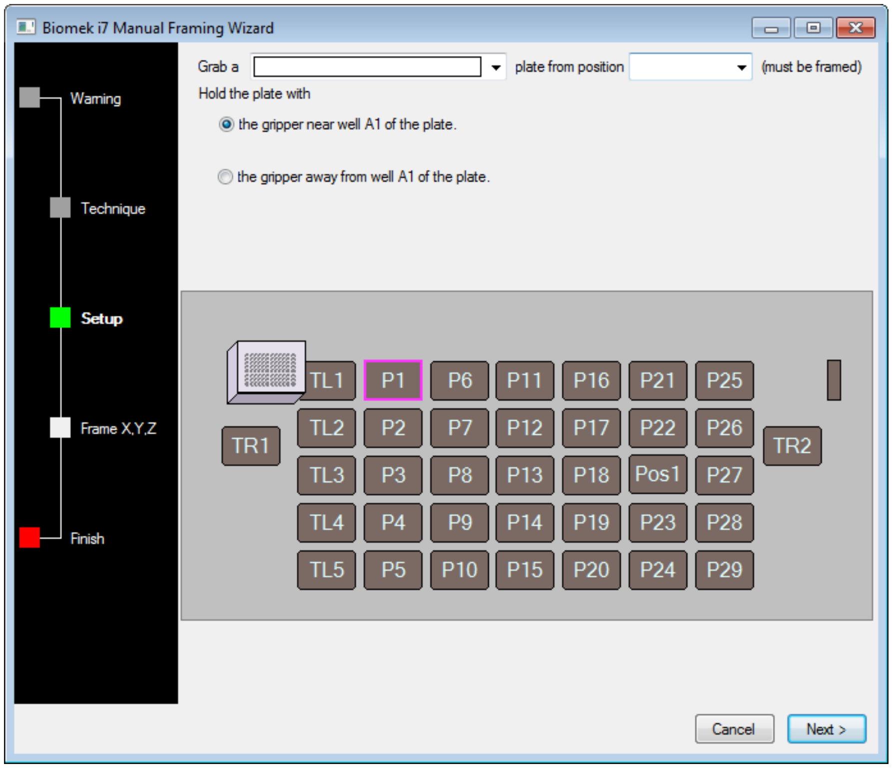
NOTE To frame on deck using tips, see *Manually Framing Deck Positions*.

Figure 2.42 Manual Framing Wizard (Select Technique)



7 Choose **Next**. **Setup** appears (Figure 2.43).

Figure 2.43 Manual Framing Wizard



8 In **Grab a [ ] plate**, select a plate from the drop-down list; and in **from position [ ]**, select a previously framed position.

NOTE The options under **Hold the plate with** can be used to specify the direction from which the gripper approaches the plate. The **A1** well on a plate is the top and leftmost well. It is advisable to leave these settings at the default. However, if a specific direction is preferred and there is no physical limitation, both options are selectable.

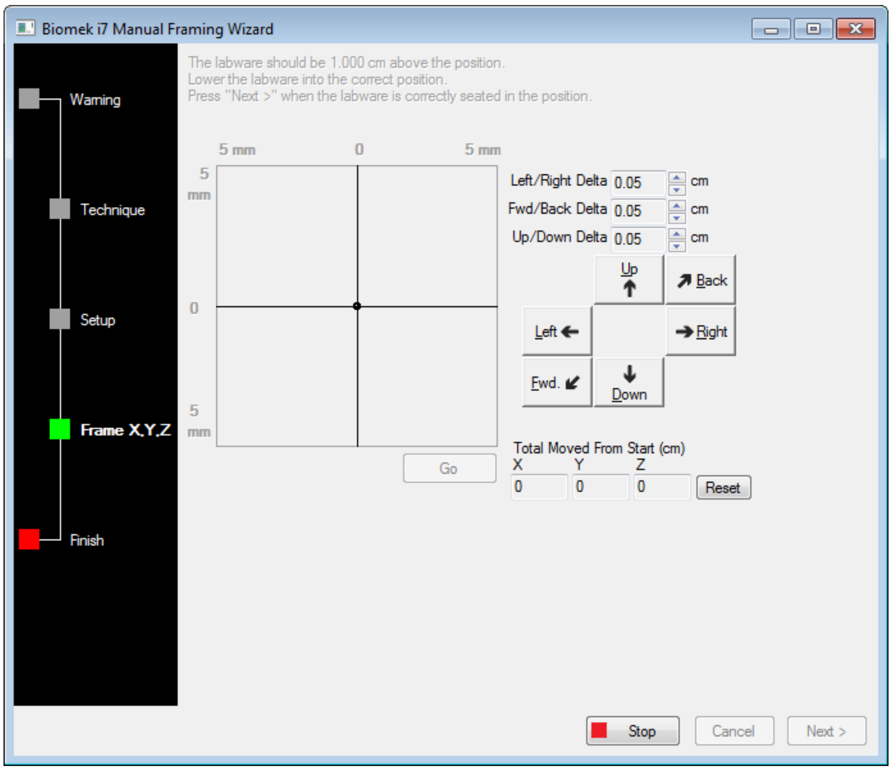
9 On the physical deck, place the specified plate onto the position configured inStep 8.

10 Choose **Next**. A warning message appears to ensure the gripper is not holding a plate.

11 Ensure the grippers are not holding a plate and select **Yes. Frame XYZ** appears (Figure 2.44).

NOTE While the gripper is moving to pick up the labware to be used to frame the position, a **Stop** button is available. To abort the framing operation, select the **Stop** button. When the gripper has stopped moving to above the position to be framed, the **Stop** button disappears, and the adjustment settings become operational.

Figure 2.44 Frame XYZ



12 Visually verify the physical position of the labware in relation to the physical ALP position to be framed.

13 In **Delta**, select the magnitude of change to be applied to the labware in each direction (Figure 2.44).

NOTE The default **Delta** value is 0.05 cm. If the labware 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 labware is 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 labware into position over the ALP (Figure 2.44).

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

NOTE The labware can be physically moved over the position using:

- the directional buttons in **Manual Framing Wizard**
- the directional keys on the keyboard
- the directional keys on the numeric keypad

  The keys on the numeric keypad work the same as the directional buttons displayed in **Manual Framing Wizard**. Specifically, **1** correlates to **Fwd.**; **2** correlates to **Down**; **4** correlates to **Left**; **6** correlates to **Right**; **8** correlates to **Up**; and **9** correlates to **Back**.

15 Select **Go**. The gripper moves to the position of the small circle in relation to the center of the graphic interface.

NOTE The small circle represents the center of the labware. An alternative method to move the labware is via the graphic interface. Click on the circle and drag it to provide the software with a representation of the labware's position in relation to the ALP. Then select **Go**. The software uses this graphical representation to move the gripper and labware approximately in the direction the indicated. The delta settings and directional buttons can then be used to fine-tune the alignment.

NOTE When the move is completed, the small circle resets itself to the center of the graphic interface. The values displayed in **Total Moved from Start (cm)** changes each time steps 10 through 15 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 labware held by the gripper on the Biomek i-Series instrument in relation to the ALP. If the labware is not accurately positioned on the ALP, repeat steps 10 through 16 until they are in the proper position to pick up labware on the ALP.

17 Choose **Next**. The position has been framed.

18 Select **OK** to close **Position Properties**.

19 Repeat steps 2 to 18 to frame additional deck positions using **Manual Teach.**

20 Choose **Save** to save framing information for all positions and close the **Deck Editor** (Figure 2.34).

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

Troubleshooting

Perform the troubleshooting techniques provided in Table 2.2 when necessary.

NOTE In the case of any other framing-related problems, contact us.

Table 2.2 Troubleshooting Framing

If...	Then...
The AccuFrame power light is not on…	Check the CAN connection to ensure the AccuFrame tool is connected to the instrument.
The Y-axis and the X/Z-axes light beams cannot be broken when moving a finger around the interior of AccuFrame…	Ensure the AccuFrame tool is receiving power.
The following error message is displayed: ***An incompatible AccuFrame is connected. Please power off the instrument and remove the AccuFrame. This instrument requires a Biomek i-Series AccuFrame.***…	Follow the instructions provided on the error message. Install a Biomek i-Series AccuFrame.
One or both beam indicator lights on AccuFrame stay on when no objects are breaking the light beams…	There is most likely an internal obstruction to sensors. Contact us. Make sure the Accuframe was not installed backwards.

Populating the Deck with Labware and Tips

Populating the deck with labware and tips is done through the **Instrument Setup** step. To insert an **Instrument Setup** step:

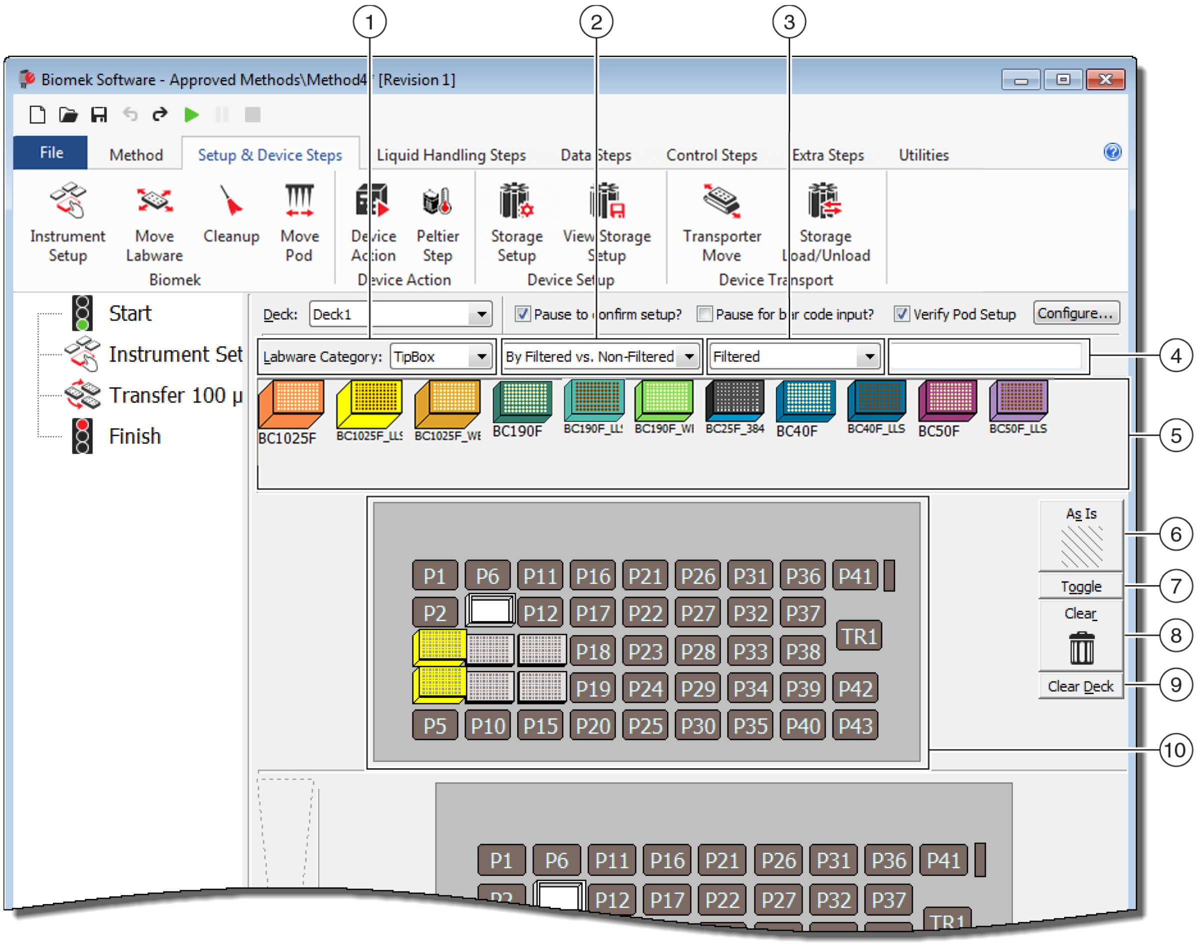
- After opening or creating a new method, from the **Setup & Device Steps** tab, in the **Biomek** group, select 

(**Instrument Setup**) to insert into the Method View (Figure 2.45).

The labware available for selection is displayed graphically below **Labware Category** (Figure 2.45). A specific type of labware can be viewed in the graphical display, or all types of labware available can be viewed simultaneously, using the **Labware Category** filter.

NOTE When populating the deck with labware, consider the tip to labware accessibility of the head as described in the *Biomek i-Series Hardware Reference Manual* (PN B54474).

Figure 2.45 Populating the Deck Layout of a Biomek i7 Instrument



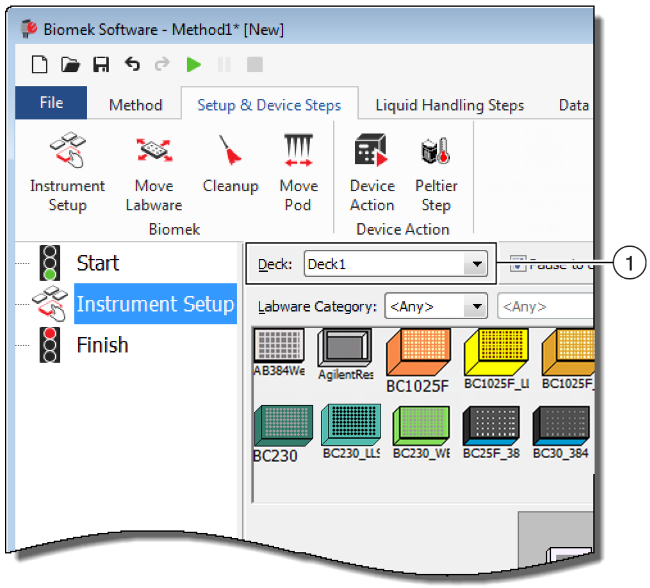
1. **Labware Category** selection: Displays labware in the **Labware Category graphical display (6)** belonging to the selected labware category.
2. **Filter 1**: If applicable, this drop down list provides subcategories for the selected **Labware Category**, displaying results matching the selected subtype.
3. **Filter 2**: If applicable, this drop down list provides further filtering for the selected subcategories in **Filter 1**, displaying results matching the selected subtypes.
4. Search field: Narrows results, displaying only the labware matching the entered keyword for the selected **Labware Category.**
5. **Labware Graphical Display**: Graphical representation of the types of labware available for populating the deck layout. The labware displayed here is based on the **Labware Category** selected above.
6. **As Is**: Individual deck positions retain their current state, whether empty or occupied by labware or a device.
7. **Toggle**: Toggles all empty deck positions to the **As Is** state and from the **As Is** state to their initial status, allowing those deck positions to retain their empty state.
8. **Clear**: Drag a piece of labware from the deck position to the trash to remove it. Another option is to select the **Clear** button and then click and drag the mouse over a group of positions to delete.
9. **Clear Deck**: Clears deck positions of labware and devices.
10. **Deck Layout**: Displays the setup of the deck. Once labware is added to the deck, it is displayed here. If names have been assigned to labware, the names are displayed. Additional information is provided on the tool tip.

Adding Labware to the Deck

To populate the deck with labware:

1 In **Deck** (Figure 2.46), verify that the correct deck is selected.

Figure 2.46 Deck Drop-Down



2 To display specific labware:

a. Enter a keyword into the **Search field**, and then select **Search** to display items matching the entered keyword (Figure 2.45).

OR

b. Select the type of labware desired by clicking the **Labware Category** and any applicable **Filter 1**/**Filter 2** drop-downs (Figure 2.45). Labware Categories/filters are provided in Table 2.3:

Table 2.3 Labware Categories and Additional Filters

Labware Category	Filter 1	Filter 2 (examples)[a]
Any *Shows all types of labware available, including lids and deck positions reserved for swapping labware.*	N/A	N/A
Custom *Shows any labware stored with defined properties (refer to the Biomek i-Series Software Reference Manual, PN B56368, Creating Custom Labware).*	N/A	N/A

Table 2.3 Labware Categories and Additional Filters

Labware Category	Filter 1	Filter 2 (examples)[a]
Lid *Shows lids associated with labware available.*	N/A	N/A
Reservation *Reserves deck positions for specific purposes; for example, to enable swapping of labware between positions or tip loading.*	N/A	N/A
Reservoir *Shows available reservoirs.*	• **By Section Volume**	• **20 mL** • **50 mL** • **100 mL** • **300 mL**
TipBox *Shows available tip types.*	• **Barrier vs. Non-barrier**	• **Barrier** • **Non-barrier**
	• **By Head Type**	• **Multichannel 96 Pod** • **Multichannel 384 Pod** • **Span Pod**
	• **By LLS Capability**	• **Yes** • **No**
Titerplate *Shows available microplates. Results can be narrowed by applying filters.*	• **By Manufacturer**	• **Beckman Coulter (BC)** • **Costar (Corning)** • **Greiner (Greiner Bio-One)**
	• **By Well Density**	• **96 well** • **384 well** • **1536 well**
	• **By Well Profile**	• **Conical-bottom (V)** • **Flat-bottom (F)** • **Round-bottom (U)**
Tuberack *Lists types of tube racks available. Tube racks can be further filtered based on the number of tubes a rack can hold.* Results can be narrowed by applying a filter.	• **24 tubes** • **48 tubes** • **96 tubes** • **128 tubes** • **160 tubes**	N/A

a. Results will vary based on your specific instrument and current project.

NOTE Labware types and their characteristics are defined in the **Labware Type Editor**. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), for information on using the **Labware Type Editor.** If the **Hide Labware** option was chosen while defining a labware type, it will not be displayed in the **Instrument Setup** step.

3 To place labware on the Deck Layout, drag and drop each desired labware graphic to the desired position on the Deck Layout display.

OR

Click on the labware graphic, and then on the desired position in Deck Layout display. The same type of labware can be added to as many deck positions as required by continuing to click on deck positions.

OR

Click on the labware graphic, and then click and drag the mouse over multiple deck positions in the Deck Layout display. This places the labware in all the highlighted positions.

NOTE To move labware to a different position, drag the desired labware to the new position in the Deck Layout.

4 To remove unwanted labware from the Deck Display during setup, drag and drop the labware to the **Clear** (trash) icon (Figure 2.45).

OR

Select **Clear** and then click on all the labware that needs to be removed.

OR

Right-click the unwanted labware and select **Delete** from the menu that displays.

CHAPTER 3

Best Practices

Overview

This chapter provides tips for optimizing your methods in order to run as efficiently and accurately as possible. Topics include the following:

- *Automating An Assay*
- *Before Running a Method*
- *Roving at Z-Max*

Automating An Assay

This section provides the information you will need prior to converting an assay on paper into a Biomek Software method.

1. **Determine Labware:**
    - Types
    - Brand
    - Quantities
    - Lids
    - Disposables

2. **Verify Deck Setup:**
    - ALPs
    - Devices
    - Disposals

3. **Build a Method:**
    - **First Pass** (Non-Optimized): Create using your best guesses at labware positions.
    - **Second Pass** (Optimized): Create by including the following:
        - Resources
        - Labware
        - Tip Usage
        - Devices

4 **Optimize the Method:**

- **Labware:** Place labware at positions that minimize flyover, reducing travel time and distance.
- **Tip Usage:** Specify tip usage options.
  - **Automated Loading (Standard):** Uses the closest available tip box.
  - **Labeled Tip Boxes:** Allows you to define which tip box to use for the defined task.
  - **Reuse Tips:** Allows tips to be reused.
- **Pipetting Techniques:** Determine liquid type, volume, pod used for pipetting, and tip type.
- **Devices:** Determine varied device run time intervals.
- **Roving at Z-Max:** Enable **Roving at Z-Max**; see *Roving at Z-Max* for details.

5 **Run Without Liquid (Dry):**

- **Without Labware:** Observe movements of the pod to determine if anything unexpected occurs.

  NOTE **Move Labware** steps would not be performed.

- **With Labware:** Observe to determine if the aspirate and dispense heights are optimal, and if the labware was moved to the correct positions.

6 **Run With Liquid (Wet):**

- Run the method using water with dye or food coloring.
- Before running samples, verify that you have completed all items listed in *Before Running a Method*.

Before Running a Method

Before running your method, complete the following list of best practices, which will increase the accuracy of your results and significantly reduce errors during a method run.

- ✓ Define your labware properly and verify that the correct labware have been placed on your virtual Biomek Software deck by comparing the labware to other similar labware types in the Labware Category Graphical Display.
- ✓ Ensure that the correct labware is placed on the physical instrument deck and are in the correct locations.
- ✓ Verify that the instrument file in which you are working is for the correct instrument configuration.
- ✓ Test and optimize your liquid transfers before running samples with a dry run, water, or liquids similar to the liquids ultimately being used.
- ✓ Choose the tip type appropriate for your transfer volume.
- ✓ Test tips that are not manufactured by Beckman Coulter for quality prior to running with samples.
- ✓ Ensure your deck is framed.
- ✓ Ensure the correct deck is selected in your method and that it matches the physical deck on the instrument.
- ✓ Ensure that the Span-8 source or system liquid fluid container is full.
- ✓ Home the instrument and ensure all Span-8 tubing lines are purged and free of bubbles.

Roving at Z-Max

When **Roving at Z-Max** is enabled, the pods move to their highest configured height while roving, which helps to avoid collisions when moving the pods around. **Roving at Z-Max** is not required for normal operation, but is useful to avoid crashes when the method contains errors.

To enable **Roving at Z-Max** for the Multichannel pod:

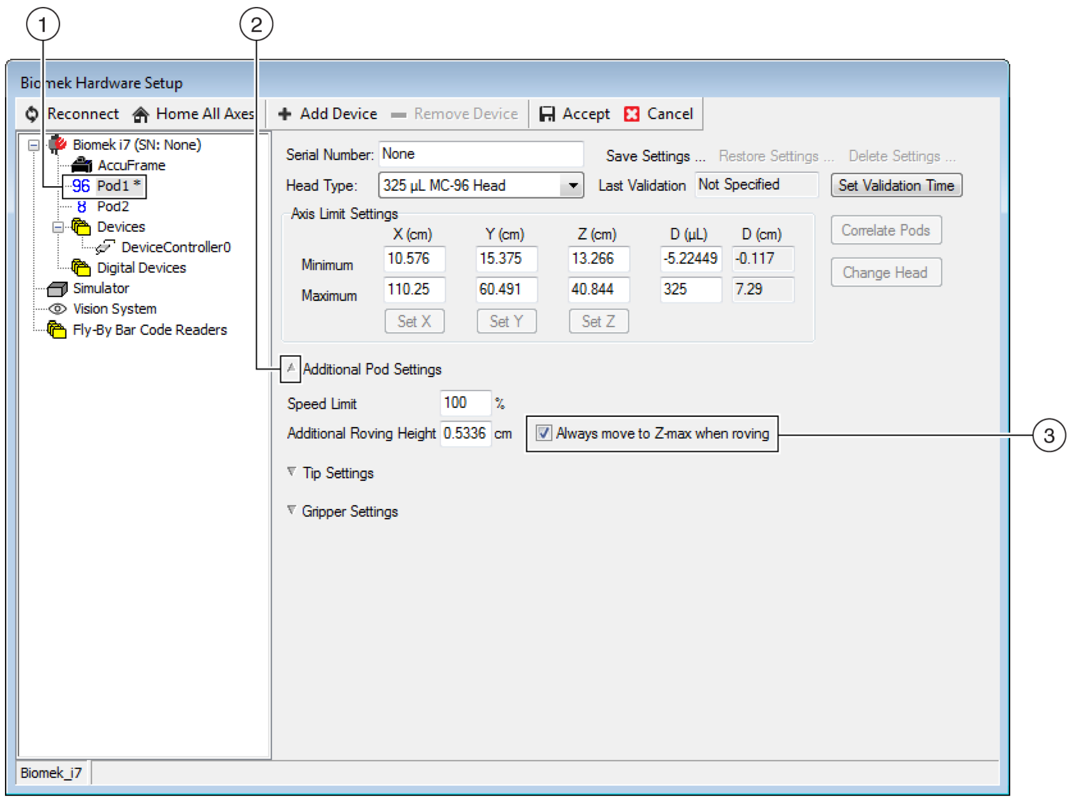
---

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

(**Hardware Setup**).

2 In left pane of the **Hardware Setup** window, select the Multichannel pod to display the pod configuration (Figure 3.1).

Figure 3.1 Hardware Setup — Pod Settings Configuration for the Multichannel Pod



1. Multichannel pod selection
2. **Additional Pod Settings**
3. **Always move to Z-Max when roving** check box

3 Select the **Additional Pod Settings** down arrow to display the additional settings.

4 Select the **Always move to Z-Max when roving** check box (Figure 3.1).

5 Select **Accept** to complete the process and close the **Hardware Setup** window.

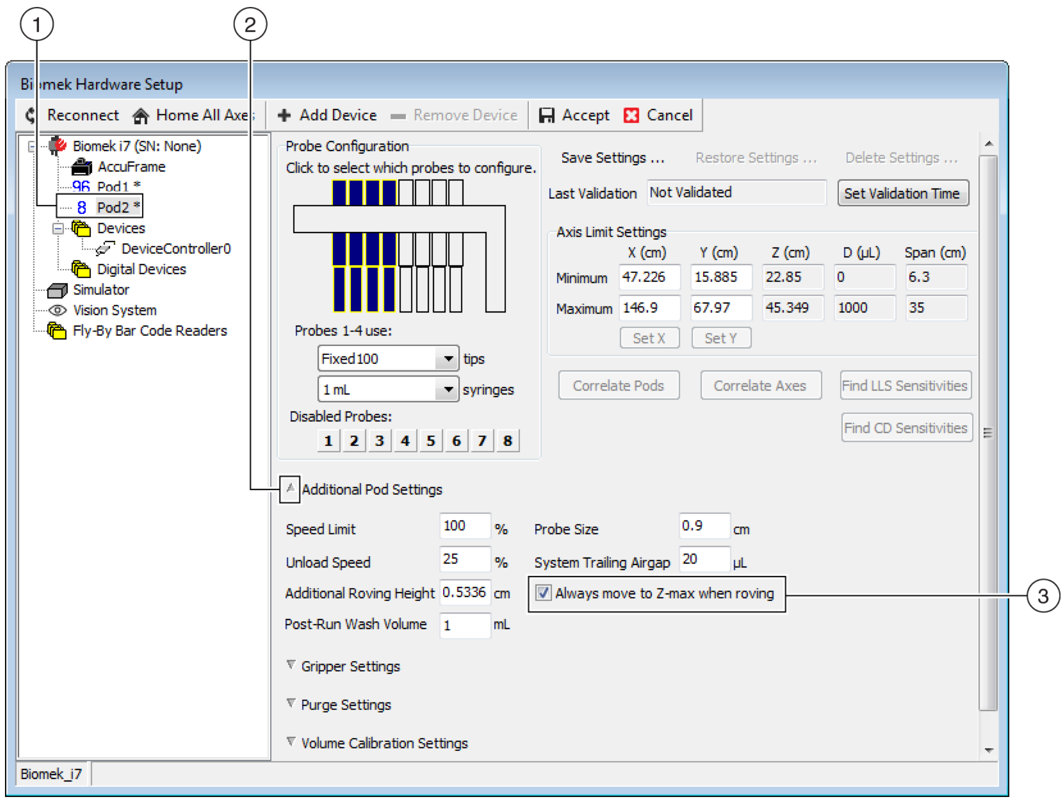
To enable **Roving at Z-Max** for the Span-8 pod:

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

(**Hardware Setup**).

2 In left pane of the **Hardware Setup** window, select **the Span-8 pod** to display the pod configuration (Figure 3.1).

Figure 3.2 Hardware Setup — Pod Settings Configuration for the Span-8 Pod



1. Span-8 pod selection
2. **Always move to Z-Max when roving** check box

3 Select the **Additional Pod Settings** down arrow to display the additional settings.

4 Select the **Always move to Z-Max when roving** check box (Figure 3.1).

5 Select **Accept** to complete the process and close the **Hardware Setup** window.

CHAPTER 4

Understanding Pipetting Techniques

Overview

Pipetting techniques are a flexible way to make the pipetting process easier. Techniques allow the pipetting settings to be saved in a project and used in multiple methods. With **Auto-Select** enabled, each time a method is created, the technique most appropriate for the pipetting operation is selected with no additional configuration required. When multiple sources and liquids are used in a method, each pipetting operation may use a different technique. This allows for appropriate pipetting throughout the entire method.

Customized techniques may also be created. Once additional techniques are created, they appear and function like predefined techniques.

What You'll Learn in this Chapter
This chapter provides the basics of pipetting techniques, including the following:

- *How Techniques Work*
- *Accessing the Technique Browser*
- *Creating New Techniques*
- *Configuring Pipetting Techniques*

NOTE Pipetting techniques can be explored in further detail in the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Creating Techniques*.

How Techniques Work

Biomek Software is pre-programmed with a variety of techniques. The properties input during method-building are matched with technique properties to select the most appropriate technique for use in the pipetting operation. Techniques can be selected automatically based upon the number of properties that match the method. For example, a technique that matches five properties in a method would be automatically selected over a technique with four matching properties.

In most instances, one technique will have the closest match with the properties of the current pipetting operation; however, if more than one technique matches the same number of properties, Biomek Software selects the technique with the highest rank. Rank is prioritized such that the lower the number, the higher the rank.

When the **Auto-Select** option is specified, Biomek Software chooses techniques automatically, and any change within a method could result in a new technique selection. When a single value or property is changed in the method, Biomek Software makes sure the technique is still the most appropriate technique to use. **Therefore, it is important to make sure the Auto-Select option is not selected when a specific technique is desired.**

Accessing the Technique Browser

The **Technique Browser** provides access to techniques for viewing, editing, or updating properties, as well as creating new techniques or groups of techniques. To access the **Technique Browser**:

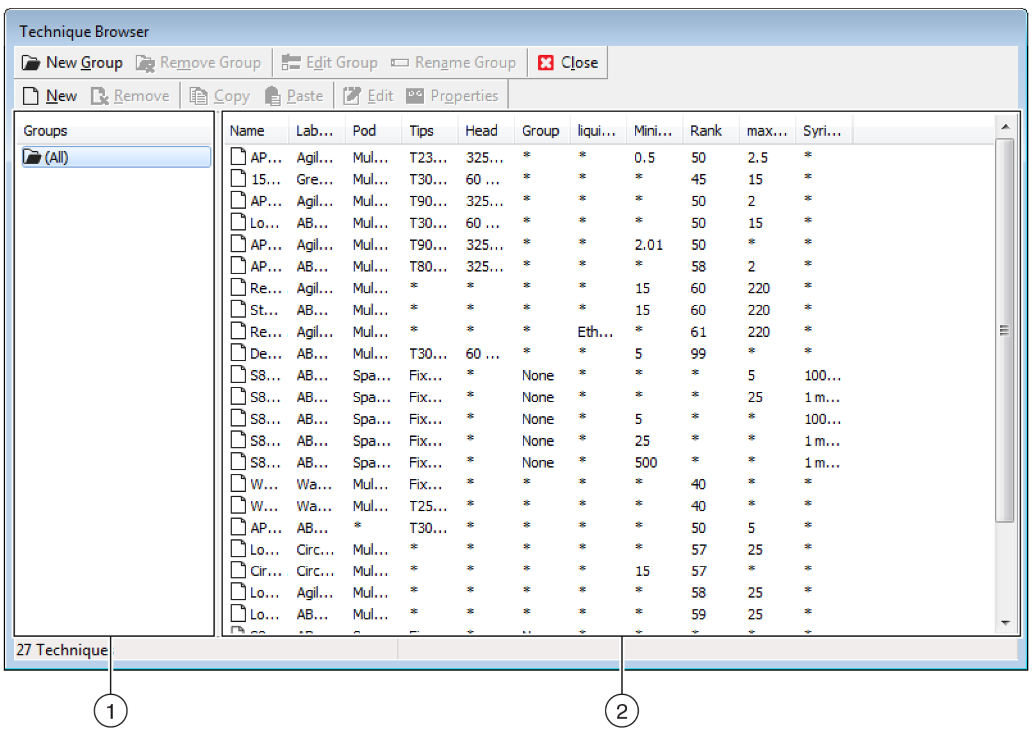
1 On the **Utilities** tab, in the **Project** group, select 

(**Technique Browser**). From the **Project** menu, choose **Technique Browser**.

The **Technique Browser** appears (Figure 4.1). The **Technique Browser** contains two main views:

- **Groups** — Displays all user-created groups that contain a subset of techniques in the project; refer to *Biomek i-Series Software Reference Manual*, PN B56358, *Creating Technique Groups*, for more information.
- **Techniques View** — Lists all techniques defined in the selected group with their technique properties.

Figure 4.1 Technique Browser



1. **Groups**: Filters all techniques to show only those techniques in a selected group.
2. **Techniques View**: Displays all techniques in the selected group and their parameters. Available techniques are selected automatically for different pipetting operations in a method.

Identifying Techniques

Techniques are identified by name in the **Technique Browser** (Figure 4.1). Because the name is how the software identifies a particular technique, changing the name of the technique will require modifying the methods that use it by specifying the new name in the **Technique** field (Figure 4.3).

Creating New Techniques

The default techniques are sufficient for some pipetting operations and are meant as a starting point; there are instances when additional techniques may be required. For example, a method may call for a technique for a 384-well titerplate that transfers a volume between 5 µL and 10 µL of DMSO. When creating a new technique, the properties of the technique must be configured. For best results, all techniques should be evaluated and fine-tuned for the specific application through experimentation.

Techniques are automatically selected using properties. Properties identify certain aspects of the pipetting operation which might affect how the pipetting operation is performed. For a technique to be available for selection for a specific pipetting operation, all properties for the operation must match the properties in the technique.

The following properties are used to determine the optimal technique to use:

- **Head** — Identifies which head is applicable for which technique. For example, a technique could be created to only be used with a 384-Channel head; the technique is only selected when a 384-Channel head is used in the pipetting operation matches this selection.
- **Labware** — Identifies labware types for which the technique is applicable; for example, a technique could be created which is only to be used when pipetting from a certain type of labware, such as reservoirs, deepwell microplates, or test tube racks. The technique is only used when the labware type used in the pipetting operation matches this selection.
- **Liquid type** — Identifies the liquid types for which the technique is applicable; for example, a technique could be created that is only to be used when pipetting a certain liquid type, such as DMSO or water. This can be useful to create special techniques when aspirating or dispensing viscous liquids. The technique is only used when the liquid type used in the pipetting operation matches this selection.
- **Pod** — Identifies the pod performing the pipetting operation; for example, separate techniques could be created for use with each pod type. The technique is only used when the pod type used in the pipetting operation matches this selection.
- **Syringe Type** — Identifies the syringe sizes for probes on a Span-8 pod for which the technique is applicable. The technique is only used when the syringe type for the probes used in the pipetting operation matches this selection.
- **Tips** — Identifies the tip types for which the technique is applicable; for example, a technique could be created which is only to be used with a certain type of tips, such as barrier tips. The technique is only used when the tip type used in the pipetting operation matches this selection.
- **Volume** — Identifies the volume range for which a technique is applicable; for example, a technique could be created that is only to be used when pipetting low volumes, such as 0-10 µL. The technique is only used when the volume entered in the step configuration falls within the specified range.

- **Do not Auto-Select** — When checked, excludes the technique from the possible selected techniques for a step when **Auto-Select** has been checked for the step configuration.
- **Rank** — Sets the order for selecting similar techniques. A lower number is chosen before a higher number.

NOTE If groups have been created (refer to *Biomek i-Series Software Reference Manual* (PN B56358), *Creating Technique Groups*), an additional property is listed to allow the new group to be added to an existing group, if desired. **Group** is for organizing techniques only and is not used for selecting the technique to use.

Create additional techniques using the **Technique Browser** (Figure 4.1).

NOTE Automatic selection of techniques may be turned off and new techniques created within a step configuration (refer to *Selecting and Modifying Techniques Manually in a Method*).

To create a new technique and set its properties:

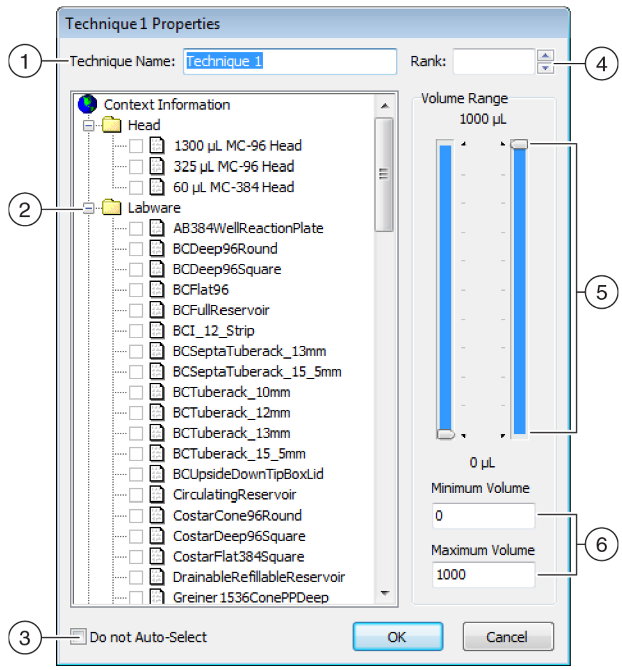
---

1 On the **Utilities** tab, in the **Project** group, select 

(**Technique Browser**). **Technique Browser** appears (Figure 4.1).

2 In the **Technique Browser**, choose the **New** icon. **Technique Properties** appears (Figure 4.2).

Figure 4.2 Setting Technique Properties



1. **Technique Name**: Allows input of a unique name for the new technique or rename for an existing technique.
2. **Context Information**: Specifies the Group (if applicable), Labware, Liquid Type, Pod, Head, and Tips used for the technique.
3. **Do not Auto-Select**: When checked, excludes the technique from the possible selected techniques for a step when **Auto-Select** has been checked for the step technique configuration.
4. **Rank**: Sets the order for selecting similar techniques. A lower number is chosen preferentially above a higher number.
5. **Graphical Volume Range**: Handles allow adjustment of minimum and maximum pipetting volumes.
6. **Volume Range**: Sets the minimum and maximum volumes that the technique can pipette

NOTE **Graphical Volume Range** and **Volume Range** set the same values. The **Graphical Volume Range** sliders allow for gross adjustments, and text entered into the **Volume Range** fields allow for precise entries.

3 In **Technique Name**, enter a name to identify the technique.

4 In **Rank,** enter a value to set the relative preference of the technique to other techniques with similar properties.

NOTE **Rank** allows Biomek Software to give some techniques priority over others. A lower number indicates a higher priority ranking. For example, when two techniques (**Technique A** and **Technique B**) are assigned the same properties and the same volume, but **Technique A** has a rank of **1** and **Technique B** has a rank of **99**, **Technique A** is selected because it has the higher priority rank value.

Auto-selection first looks for the most number of matching factors, then looks for the technique with the highest priority rank. For example, a technique that specifies more than one matching factor, such as **Water** and **Pod1,** will be picked over a technique that specifies only one matching factor, such as **Water**, regardless of rank.

NOTE If the **Rank** field is left blank, the software will assign the lowest priority ranking to this technique. That is, if **Auto-Select** is chosen during method set-up, this technique will be chosen last when there are other techniques matching the same number of properties.

5 In **Context Information**, select the desired **Head, Labware, Liquid Type, Pod,** and **Tips** to use for the technique.

NOTE If no selection is made for a category, the technique is applicable for all items within that category. For example, if no labware types are selected under **Labware**, the technique is available for use with all labware types.

NOTE To remove all current selections from the **Technique Properties**, right click in **Context Information** and select **Clear Selections**. **Clear Selections** removes all selections from all categories.

NOTE If you have created a group, the **Group** category is present in **Context Information**, but it is not used to determine technique selection.

6 In **Volume Range**, enter the **Minimum Volume** and **Maximum Volume** for the technique to aspirate or dispense.

OR

Change the minimum and maximum volumes graphically using the handles on the graphical **Volume Range** (Figure 4.2).

NOTE The left gauge is for **Minimum Volume** and the right gauge is for **Maximum Volume**.

7 Select **Do not Auto-Select** to exclude the new technique from the possible selected techniques for a step, such as **Transfer** or **Combine**, when the **Auto-Select** has been checked for the step technique configuration. The technique will not be automatically selected by Biomek Software for any pipetting operations, but is still available when manually selecting a technique if the properties match (refer to *Selecting and Modifying Techniques Manually in a Method*).

NOTE A technique that has **Do not Auto-Select** selected displays in the **Technique Browser** with a red **x** in the icon next to a technique.

8 Choose **OK**. The technique is created and added to the list in **Technique Browser**. To access the properties of an existing technique to view or modify them:

Right click on the technique entry in the browser and select **Properties** from the menu.

OR

Click on the technique entry in the browser and select the **Properties** icon.

Configuring Pipetting Techniques

A technique stores a set of values and properties that instruct the instrument in performing pipetting operations, such as aspirate, dispense, mix, pod height, pod speed, and tip touch. Biomek Software also stores a set of properties related to each technique, such as labware type and liquid type. Based upon these values and properties, the appropriate technique is selected automatically for the pipetting operation.

Techniques, along with information about tip and labware types; liquid types; well patterns; and pipetting templates, are stored as part of a project. Projects store a history of all changes, additions, and deletions of items from the project. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Using Project Files*, for more information on projects.

Modifying Saved Techniques

When a method uses pipetting requirements that are slightly different from the requirements of previously created techniques, modify the technique that most closely resembles the new pipetting requirements by copying and pasting.

To copy and paste techniques:

1 In **Technique Browser,** select the technique to copy.

2 Choose the **Copy** button.

OR

Right click and choose **Copy** from the menu.

3 Choose the **Paste** button. The copy appears with the name **Copy of (Technique)**.

OR

Right click and choose **Paste** from the menu.

4 Select the copied technique.

5 Choose the **Properties** button.

OR

Right click and choose **Properties** from the menu.

6 Enter a new name for the technique, if desired.

7 Make any changes to the technique properties (refer to *Creating New Techniques*).

8 Choose **OK.**

9 Double click on new technique. **Technique Editor** opens. Update the technique as needed (refer to *Biomek i-Series Software Reference Manual* (PN B56358), *Setting Technique Values*).

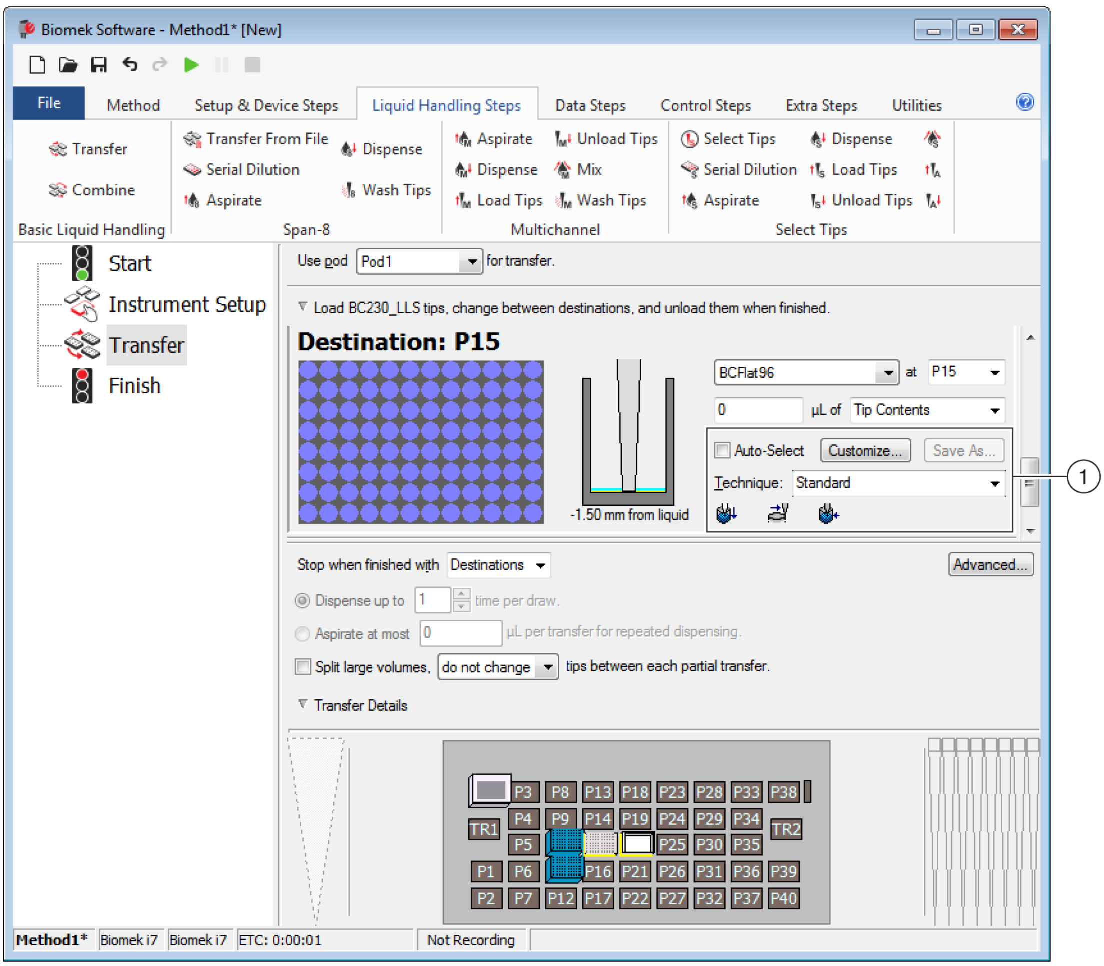
10 Select **OK** to close the **Technique Editor.**

11 Select **Close** to exit the **Technique Browser.**

Selecting and Modifying Techniques Manually in a Method

By default, **Auto-Select** is unchecked, allowing manual selection of techniques in the source and destination configuration of a pipetting step, such as **Transfer** or **Combine**. Biomek Software shows all techniques that match the properties of the step configuration (pod, head, tips, labware type, liquid type, volume) in a drop-down list in the **Technique** field (Figure 4.3)

Figure 4.3 Customize Techniques or Manually Select Techniques from a List in Source or Destination Configurations of a Pipetting Step



1. **Technique Selection**: Techniques are selected automatically, manually from the drop-down list, or customized using the **Customize** button.

Certain circumstances may require modifications to techniques due to the current setup or liquid type; therefore, many pipetting steps provide access to the **Technique Editor** during method development.

Modifying a Technique Through a Method Step

Custom techniques created within a method are saved within the current method step only and are accessible only in the pipetting operation for which the technique was created. The technique can be saved for global use after configuration. It is strongly recommended to save a customized technique with a unique name to save the pipetting parameters specific for that method. Otherwise, it cannot be used in any other steps within the method and can potentially create several techniques named **Customized**.

When modifying techniques or creating new techniques within a method, only the parameters for the specific operation, along with **Liquid Type**, **Liquid Level Detection**, and **Calibration** settings, can be modified.

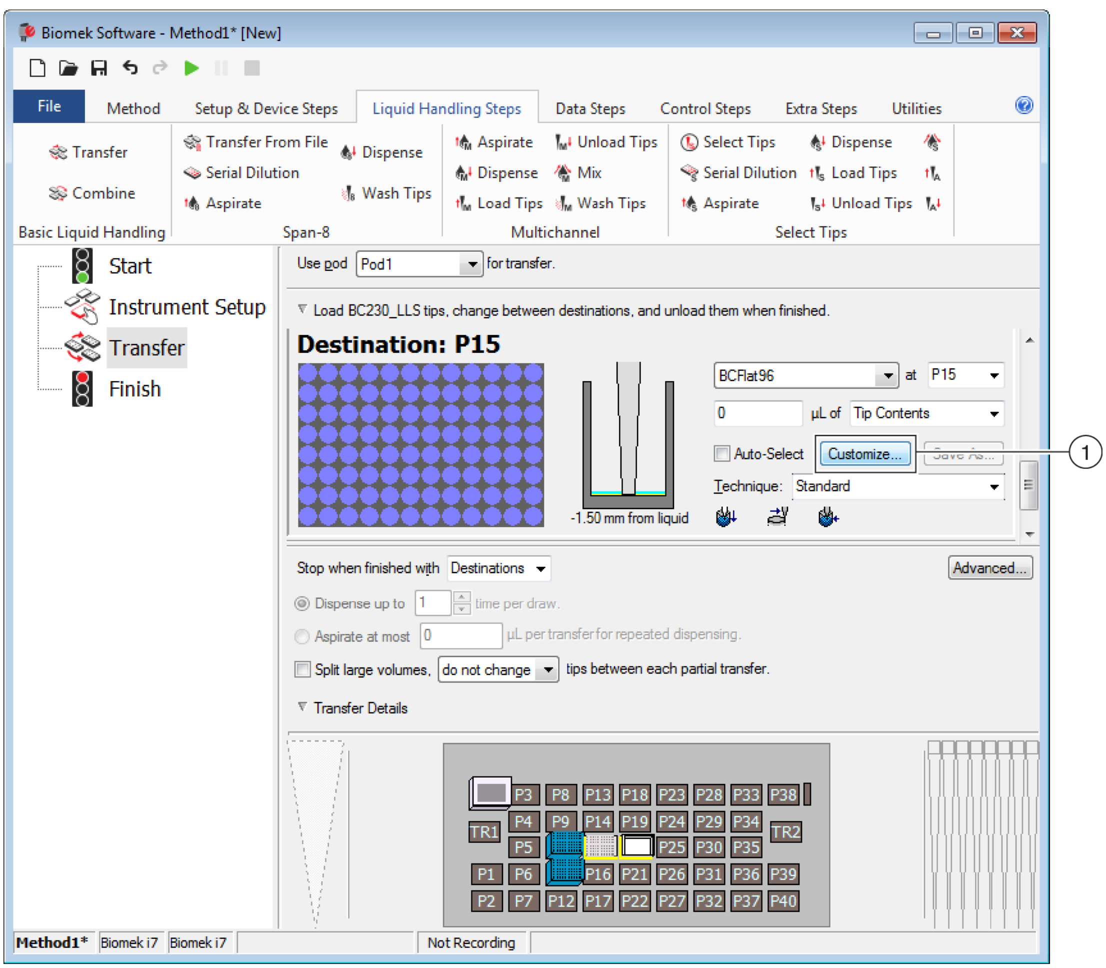
To modify a technique within a step or method:

1 Select the desired step in the method.

2 Select the desired source or destination.

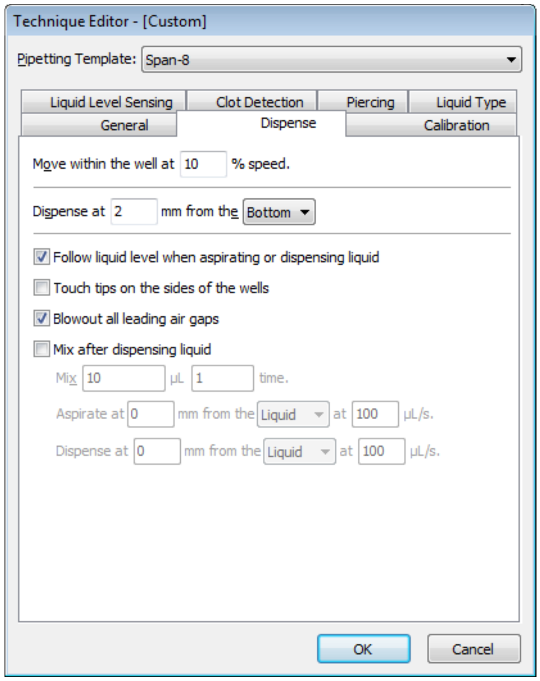
3 Choose the **Customize** button (see Figure 4.4). **Technique Editor** - [**Custom**] displays (Figure 4.5).

Figure 4.4 Technique Selection Within a Method



1. **Custom Technique**: Choose **Customize** to modify the technique.

Figure 4.5 Dispense Tab Appears When Customize is Selected from Destination



4 Customize the technique as needed (refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Setting Technique Values*).

NOTE **Technique Properties**, such as **Labware Type** and **Tips**, cannot be configured for the custom technique when creating the technique within a method. The technique uses the known properties of the specific operation being customized. **Technique Properties** are configured upon saving the technique for global use (refer to *Saving Custom Techniques*).

5 Choose **OK**. [**Custom**] replaces the technique name.

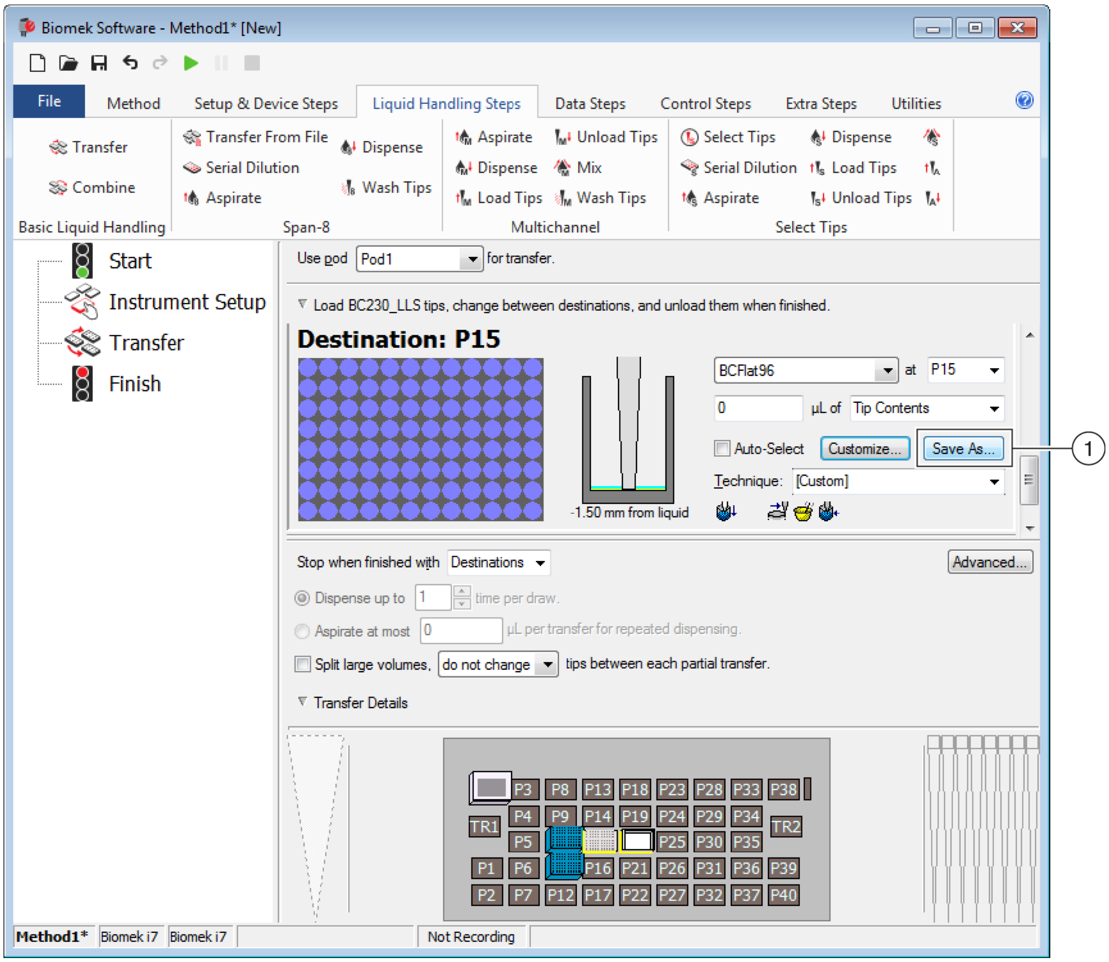
Saving Custom Techniques

A custom technique is saved within the method in which it was created; however, any custom technique can be saved for global use.

To save a custom technique for global use:

1 Choose Save As... in the step configuration (Figure 4.6). **Technique Properties** appears.

Figure 4.6 Save a Custom Technique Within a Step



1. **Custom Technique**: Choose **Save As** to save the technique for global use.

2 Enter the **Technique Name**, then select the properties desired for the technique (refer to *Creating New Techniques*).

3 Choose **OK.** The new technique name appears in **Technique.**

CHAPTER 5

File Management and Compliance

Overview

This chapter describes several advanced features of Biomek Software, including the following:

- *21 CFR Part 11 Compliance Support*: Beckman Coulter Accounts & Permissions is a feature that enables compliance for closed system users. Electronic signatures and user activity are logged using this feature, as each user has his or her own account and assigned permission set. Read through this section to familiarize yourself with the options available when using this feature.
- *Importing/Exporting Methods*: Methods can be transferred from one Biomek i-Series instrument to another using the provided procedures.
- *Importing/Exporting Projects*: Follow the instructions provided in this section to transfer system parameters (labware definitions, technique settings, etc.) between Biomek i-Series instruments.

21 CFR Part 11 Compliance Support

Beckman Coulter Accounts & Permissions is an integrated set of features built into the Beckman Coulter software that assists users in complying with electronic signature requirements (such as 21 CFR Part 11) for closed systems. With Biomek Software, support is extended only for the instrument; devices integrated with the instrument are not supported unless specified in separate documentation.

Accounts & Permissions provides support only for closed systems; multiple systems cannot share a single (centralized/networked) repository for Accounts & Permissions. In a location where several Beckman Coulter systems are present, Accounts & Permissions must be installed and enabled separately for each system where compliance is desired.

Users require a separate account for each system they need to access. For each Beckman Coulter system, a single administrator sets up the level of support provided by Accounts & Permissions, creates, manages, and sets permissions for user accounts, and configures system parameters relating to Accounts & Permissions.

For more information on CFR 21 Part 11, visit the following website:
http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm135680.htm

NOTE Supplemental information on Beckman Coulter Accounts & Permissions can be found in the *Biomek i-Series Software Reference Manual* (PN B56358), *Using Accounts and Permissions*.

Support Options

21 CFR Part 11 support options in Biomek Software include the following:

Option	Description
No Support	• User accounts are not required to access Biomek Software. Users have access to all software operations and functionality.
Accounts and Permissions	• Users must log in to use Biomek Software and may access only features and operations for which they have permission.
Accounts and Permissions, with password for signing and check-in	• Enables the use of user accounts and permissions with electronic signatures for Biomek Software. • Users must log in to use the software and may access only features and operations for which they have permission. • Support for 21 CFR Part 11 is provided by requiring password checks for operations such as saving, validating, and signing methods.

Account Management

System administration tasks for Beckman Coulter Accounts & Permissions are performed in Account Management, a separate application from Biomek Software. The system administrator sets up and configures user accounts, passwords, and permissions, and configures system settings such as automatic password expiration and system logout time.

NOTE A single system administrator password is used on a system. System administration tasks may be performed only on the Automation Controller where Account Management is installed; multiple systems cannot share a single (centralized/networked) repository for Beckman Coulter Accounts & Permissions.

Administrative Functions

Administrative functions include the following:

Function	Description
Accounts	Displays user account information and allows the administrator to create, enable, and disable accounts, set account passwords, and change account permissions.
Settings	Allows the administrator to configure several login and password options, as well as project specific access.
Audit	Displays an audit log of all administrator activity and failed attempts to log into Beckman Coulter software applications installed on the system.
Roles	A role is a set of permissions defined by the administrator and assigned to user accounts as desired. Roles are created and edited in the **Roles** tab, which also lists existing roles and permissions available for each compatible software application installed on the system.
Repositories	All Accounts & Permissions data, including user accounts, administrator settings, and audit logs of system administration and user activity, is stored in a repository. The **Repositories** tab allows the administrator to create and delete repositories, change the active repository, and make backup and archive files of repository data.

Importing/Exporting Projects

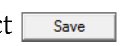
System parameters (labware definitions, technique settings, etc.) can be transferred from one system to another. This section provides instructions for the following:

- *Exporting a Project*
- *Importing a Project*

NOTE Additional information on importing and exporting projects can be found in the *Biomek i-Series Software Reference Manual* (PN B56358), *Understanding and Using Projects*.

Exporting a Project

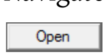
To export a project:

1. From the **File** tab, select **Export** > **Project**.
2. Select the items you wish to export, and then click **OK**.
3. In the **Save As** dialog, navigate to the location where you wish to save the exported project.
4. Enter a file name for the exported project in the **File name** field, and then select 

to complete the process.

Importing a Project

To import a project:

1. From the **File** tab, select **New** > **Project**.
2. Enter a name for the new project, and then select **OK**.
3. From the **File** tab, select **Import** > **Project**.
4. Navigate to the location of the project that you wish to import and select it, and then select 

.

5 Select the project items you wish to import, and then select **OK** to complete the process.

Importing/Exporting Methods

Methods can be transferred from one Biomek i-Series system to another by importing and exporting method files. This section provides instructions for:

- *Exporting a Method*
- *Exporting All Methods*
- *Importing a Method*

IMPORTANT Biomek i-Series instruments can only import methods exported from other Biomek i-Series instruments. Do not attempt to import methods from previous Biomek Software versions; e.g., Biomek Software, version 4.41 or earlier.

NOTE Additional information on importing and exporting method files can be found in the *Biomek i-Series Software Reference Manual* (PN B56358), *Creating and Using Methods*.

Exporting a Method

To export a method:

1 Open the method you wish to export.

2 From the **File** tab, select **Export** > **Method**.

3 Navigate to the location where you wish to save the exported method file, and choose Save.

Exporting All Methods

To simultaneously export all methods saved within Biomek Software:

1 From the **File** tab, select **Export** > **All Methods**.

2 Browse to the folder location where you wish to save the exported methods.

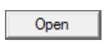
3 Select the folder, and select **OK** to complete the process.

Importing a Method

To import a method:

1 Ensure the desired project that you want the method imported into is open.

2 From the **File** tab, select **Import > Method**.

3 Navigate to the location of the file that you wish to import and select it, and then select .

4 Select the project items you wish to import, and then select **OK** to complete the process.

CHAPTER 6

Troubleshooting

Overview

This chapter covers the most commonly encountered Biomek i-Series system issues, and the resolutions for how to solve the issues. Topics include:

- *Hardware Troubleshooting*
- *Software Troubleshooting*

Hardware Troubleshooting

In the case of any other instrument-related problems or if service is required, contact us.

⚠ WARNING

Risk of equipment damage. Do not connect or disconnect any cables while the instrument is on. Turn off the main power before connecting or disconnecting cables.

Hardware troubleshooting information is separated by topic and can be found in the following tables:

- *Instrument Troubleshooting*
- *Multichannel Pod Troubleshooting*
- *Span-8 Pod Troubleshooting*
- *Gripper Troubleshooting*
- *Resetting the Circuit Breaker*

NOTE Refer to the *Biomek i-Series Software Reference Manual* (PN B54474) for instructions on the remedies listed in the tables below.

Instrument Troubleshooting

Table 6.1 Troubleshooting the Biomek i-Series Instrument

If...	Then...
All indicator lights are out,	Check circuit breaker.
The power is on, but system does not run,	Check circuit breaker. Check that the appropriate instrument **Name** is selected in **Hardware Setup**.
All indicator lights are out, the power is on, the circuit breaker is okay, and the system does not run,	Contact us.
The following error message appears: ***`Failed to connect. Ensure the instrument is connected and powered on. If the instrument has recently been powered on, try again.`***	Check that the instrument is powered on and the USB cable is connected to the instrument and controller. If the instrument was recently powered on, it may still be booting up. Wait a minute and try again. The booting process should take no more than 10 minutes. If a Biomek FX^P/NX^P active ALP (as opposed to a Biomek i-Series ALP) was recently plugged in, power off the instrument, unplug the active ALP, and try again. If the problem persists, contact us.
Power is lost to arm and pod,	Contact us.
X-axis motion is choppy,	Contact us.
Y-axis motion is choppy,	Contact us.
A grinding or growling noise is heard,	Contact us.
Experiencing problems relating to the Multichannel pod,	Table 6.3 for more information.
Experiencing problems relating to the Span-8 pod,	Table 6.2 for more information.
Constant light curtain errors, even when no violation occurs,	Clean light curtain panels as described in the *Biomek i-Series Hardware Reference Manual* (PN B54474). Contact us.
Deck lights are out,	Contact us.
Observation cameras are not working,	Contact us.
Observation cameras are not focused,	Contact us.
Observation camera video resolution is poor,	Ensure that the appropriate **Observation Camera Resolution** setting has been selected in **Hardware Setup** > **Vision System**. Contact us.

NOTE In the case of any other instrument-related problems, contact us.

Multichannel Pod Troubleshooting

CAUTION

Risk of equipment damage. Do not connect or disconnect any cables while the instrument is on. Turn off the main power before connecting or disconnecting cables.

In the case of any other Multichannel pod-related problems, contact us.

Span-8 Pod Troubleshooting

IMPORTANT Be careful to not gouge the tubing with the Span-8 mandrel while inserting into the tubing. Gouged tubing can clog mandrels, leading to D-axis syringe pump overload issues.

Table 6.2 Span-8 Pod Troubleshooting

If...	Then...
Power is lost to the pod,	Contact us.
Motion is lost in an axis,	Contact us.
The probes do not work properly,	Contact us.
The Span-8 pod is leaking from tubing connections,	Cut off approximately 13 mm (1/2 in.) off the end of the tubing to remove the damaged portion before reattaching the tubing.
Leaking is occurring around syringes,	Tighten the syringes.
Leaks are occurring around fixed tips,	Make sure the tip is inserted securely into the tubing. Cut approximately 13 mm (1/2 in.) off the end of the tubing to ensure a tight fit. Make sure the collar is securely tightened to the tip interface.
Leaks are occurring around disposable tips,	Make sure the disposable tip mandrel is inserted securely into the tubing. Cut approximately 13 mm (1/2 in.) off the end of the tubing to ensure a tight fit. Make sure the collar is securely tightened to the tip interface.
Disposable tips are not mounting correctly,	Make sure the tip shuck tube is securely tightened to the tip interface.
Disposable tips are not shucking,	Make sure the collar is securely tightened to the tip interface. If the collar is loose, turn the collar clockwise until a tight fit is achieved. Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474) for more information.
Liquid level sensing is not working,	Make sure LLS tips are being used. Make sure LLS tips are correctly mounted to the probes. Make sure LLS is enabled in the Technique governing the method. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358). Contact us.
Aspirate and dispense actions are not being completed,	Ensure there is system fluid in the supply container.

Table 6.2 Span-8 Pod Troubleshooting *(Continued)*

If...	Then...
Aspirate and dispense actions are inaccurate,	Ensure tubing connections are secure. Ensure fixed tip seating is secure. Ensure disposable tip mandrels are correctly mounted. Ensure system fluid and tubing have been purged of air. Calibrate volume .
Tips are clipping edges of labware or not able to access labware,	Reframe the position. Check to see if tip or mandrel is obviously bent. Contact us.

NOTE In the case of any other Span-8 pod-related problems, contact us.

Gripper Troubleshooting

⚠ CAUTION

Risk of equipment damage. Do not connect or disconnect any cables while the instrument is on. Turn off the main power before connecting or disconnecting cables.

Table 6.3 Gripper Troubleshooting

If...	Then...
Power is lost to the Gripper Y-axis,	Contact us.
The gripper is not deploying,	Contact us.
Gripper shaft is bent,	Contact us.
Gripper finger is bent,	Contact us.
Gripper pads look worn,	Contact us to order replacement gripper pads.

NOTE In the case of any other pod-related problems, contact us.

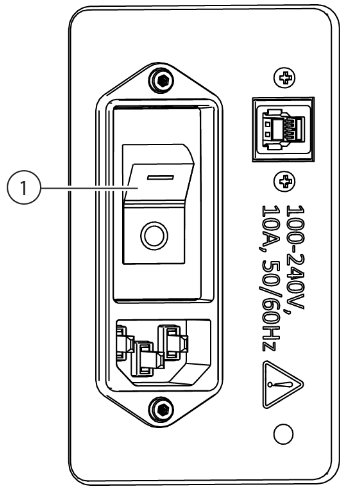
Resetting the Circuit Breaker

⚠ CAUTION

Risk of equipment damage. Do not remove tower covers to access electrical wiring. Contact us if further access is required.

The Biomek i-Series instrument is capable of using any AC power source between 100V and 240V. The main AC circuit breaker is located on the outside of the right rear tower (Figure 6.1) and also operates as the main AC power switch. When the circuit breaker trips, the switch moves to a neutral position.

Figure 6.1 Main AC Power Switch/Circuit Breaker



1. Power Switch/Circuit Breaker

To reset the circuit breaker:

1 Turn the instrument's main AC power switch to off (**O**).

2 Turn the instrument's main AC power switch to on (**I**).

Software Troubleshooting

In Table 6.4 and Table 6.5 are common Biomek Software error messages; Table 6.5 provides error messages specific to the pod/grippers finding a path to the destination position. Recommended actions are listed in an escalated manner, with the most common resolutions listed first. If none of the recommended actions work, contact us for more information.

Table 6.4 Common Biomek Software Errors and Resolutions

Issue	Possible Cause	Recommended Action
The* Source/ Destination *specified for* Pod {#} *is over a position that the pod cannot move to.	**1.** One of the locations defined in the step (e.g., aspirate, dispense, or tip box location) is inaccessible using the selected pod.	**1.** In the **Instrument Setup** step, move the **Source/ Destination** to another position that is within reach of the pod, and update the method to match. **2.** Make sure the **Source/Destination** is not surrounded by obstacles (such as tall labware) that prevent access. **3.** In the **Deck Editor**, inspect safe heights for positions on the deck (especially any that were recently changed). **4.** Make sure labware definitions for new labware (especially stacked labware) are correct. **5.** In **Hardware Setup**, make sure the gripper has been framed.
	2. The pod started in an invalid location.	**1.** Open **Manual Control**, and move the pod to a different location. Make sure the pod is not surrounded by tall obstacles, such as labware or trash, and then retry the method. **2.** For labware on the deck, check the labware definitions (especially stacked labware) for correct stack offsets and heights. **3.** In the **Deck Editor**, inspect safe heights for positions on the deck (especially any that were recently changed). **4.** In **Hardware Setup**, make sure the gripper has been framed.
The* Source/ Destination *specified for* Pod {#} *is outside of allowable boundaries.	**1.** The **Source** or **Destination** for the step (e.g., aspirate, dispense, or tip box location) is located beyond where the selected pod can reach.	**1.** In the **Instrument Setup** step, move the **Source/ Destination** to another position that is within reach of the pod and update the method to match. **2.** In **Hardware Setup**, make sure the axis limits for the pod have been set. **3.** In **Hardware Setup**, make sure the gripper has been framed.
There is not any labware in the gripper, when there is.	**1.** The labware **Squeeze** setting is incorrect.	In the **Labware Type Editor**, make sure movement information settings for any new or modified labware are correct (especially the X and Y dimensions and gripper squeeze values).
	2. The gripper is not correctly framed.	In **Hardware Setup**, make sure the gripper has been framed.
	3. Labware cannot be detected through squeezing.	If using labware that easily deforms or flexes when gripped (for example, some soft-sided PCR plates), in the **Movement Information** section in the **Labware Type Editor**, consider turning off **Use the gripper sensor...** for the specific labware type.

Table 6.4 Common Biomek Software Errors and Resolutions

Issue	Possible Cause	Recommended Action
An integrated device prematurely moves (usually with the corresponding step becoming highlighted too early in method execution).	**1.** The instrument is not configured to model device usage.	**1.** Make sure the integrated device is associated with the corresponding position on the deck. **2.** If the device is being controlled via the **Run Program** step, ensure the step is properly configured. This includes both the drop-down list **after the resource {resource name}** is available and the options under **When the program is started**.
	2. Something else is controlling the device.	Check third-party software to ensure it is not actively using the device.
`Invalid variable` name or similar error.	**1.** The variable name is wrong or missing.	**1.** Make sure the variable is actually defined (for example, in the **Start** step, **Let** step, or **Set Global** step). **2.** Variable names must begin with a letter and contain only letters, numbers and underscore. Rename the variable to follow this rule. **3.** Make sure the variable is not misspelled.
	2. The variable is defined, but not accessible to the step.	**1.** Variables defined in **Scripted Let** must be used before the **End Let**. **2.** Variables defined in a **Script** step are only visible in the **Script** step.
	3. The expression is not valid VBScript or JScript.	If using an expression, check that it is properly formed. Pay special attention to double-quotes (") and use the ampersand (&) not plus (+) for string concatenation (that is, combining strings) if using VBScript. If using JScript, pay attention to capitalization, commas, and semicolons. Make sure that VBScript only uses one equal sign (=), while JScript uses two (==). More information on VBScript and JScript syntax can be found online.
`{name} is not an` array or similar error.	**1.** The variable name is wrong or missing.	**1.** Variable names must begin with a letter and contain only letters, numbers and underscore. Rename the variable to follow this rule. **2.** Make sure the variable is actually defined (for example, in the **Start** step, **Let** step, or **Set Global** step). **3.** Make sure the variable is not misspelled.
	2. The expression is not valid VBScript or JScript.	**1.** If using an expression, check that it is properly formed. Pay special attention to double-quotes (") and use ampersand (&) not plus (+) for string concatenation (that is, putting strings together) if using VBScript. If using JScript, pay attention to capitalization, commas, and semicolons. Make sure that VBScript only uses one equal sign (=), while JScript uses two (==). **2.** When referring to data sets (such as **Volume**), the variable used typically needs to be an array. Consult a VBScript or JScript reference for details on arrays.

Table 6.4 Common Biomek Software Errors and Resolutions

Issue	Possible Cause	Recommended Action
Cannot pipette relative to unknown liquid level.	**1.** The software was instructed to pipette relative to liquid height, but it cannot measure the liquid height.	**1.** In the **Instrument Setup** step, set labware to use known volume. **2.** Pipette relative to the bottom or top of plate. **3.** Use the conductive tips and a Span-8 pod, allowing to liquid level sense when pipetting.
The tips are X cm long and cannot reach a depth of Y cm without causing the pod to hit the labware.	**2.** The tips are not long enough to reach the depth in the labware specified.	**1.** Pipette relative to top of labware to a depth that the tips can reach. **2.** Use longer tips.
	3. The software incorrectly modeled the well or tip geometry.	**1.** For new tips, ensure the height is correct. **2.** For new labware, ensure the well dimensions are correct.
Cannot pipette X µL; the well only has Y µL.	**1.** An incorrect starting volume was entered.	In the **Instrument Setup** step, check that the labware starts with enough known liquid.
	2. The software was incorrectly configured to pipette multiple times when one time was intended.	In the liquid transfer step, make sure the **stop when finished with** field is correctly set. Note that selecting one source and 12 destinations will transfer once if **stop when finished with sources** is selected, and 12 times when **stop when finished with destinations** is selected.
	3. The number of transfers specified in the **Transfer from File** step is larger than expected.	If using a **Transfer From File** step, ensure the file used is correct.
	4. The volume transferred is unexpectedly large due to multiple dispenses in a single trip.	When using volume calibration, ensure that the source starts with enough overage to compensate for the calibrated volume.
Cannot find the box that the tips came from.	**1.** The tips were configured to be returned to a tip box that can no longer be found by the software.	This occurs when you leave tips on the pod, but remove the tip box from the deck (such as by selecting **Clear current instrument setup of all labware...** in the **Finish** step.) Use **Manual Control** to unload tips to a box, and then use an **Instrument Setup** step with **Verify Pod Setup** configured to have the pod not have tips loaded.
	2. The **Instrument Setup** step is configured to verify that the tips are on the pod and no empty tip bois on the deck.	This also occurs when you use the **Instrument Setup** step to verify tips are loaded on the pod, and the tips did not exist before. Unload the tips physically, and then configure the **Verify Pod Setup** option to have no tips loaded.

Table 6.4 Common Biomek Software Errors and Resolutions

Issue	Possible Cause	Recommended Action
Cannot find enough tips to use.	**1.** The software can find tips on deck, but cannot find enough.	Ensure that there are enough tips on the deck. Do not count empty tip boxes, and consider that partially-filled tip boxes might not include enough tips. For the Multichannel pod, when not using Select Tips pipetting, partial tip boxes cannot be used.
	2. The software can find tips in the Cytomat, but cannot identify how to move the tips onto the deck.	Ensure the Cytomat is installed as per the instructions.
	3. The user expects the software to reuse tips. The tips are not configured for reuse.	If you plan to reuse tips, ensure **Load no more than X times** is set to the maximum number of reuses.
	4. The software can find tips on deck, but cannot determine how to access them.	Ensure the tip boxes are not surrounded by obstacles, such as the BC1070 tip box.
The selected probes cannot reach the given section of the reservoir.	**1.** Not all tips can fit into the given section of the reservoir (e.g., 8 probes do not fit into a modular reservoir).	**1.** In the liquid transfer step, select fewer mandrels. **2.** Use different labware.
Unable to auto-select a technique.	**1.** Expected technique does not match the liquid type defined for the plate.	Ensure the liquid types are defined for the plate.
	2. Expected technique cannot be used because it does not match the selection criteria.	Review the technique properties to ensure your pipette volume is within the max/min. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358) for more information.
	3. The expected technique cannot be used because it does not match the labware or pod selection criteria.	Ensure that the technique properties include your labware and pod.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to find a path for {pod name} pipettor to approach position {position name}… Or ***Unable to find a path for {pod name} pipettor to approach position {position name} with X clearance of {#} and {#}***… *Issue continued on next page…*	***Specified pipettor destination {axis name} {#} is outside of travel range, which is between {#} and {#}.***	n/a	The pod is attempting to move to a location beyond its travel limit.	In **Hardware Setup**, make sure axis limits for the pod have been set. In method development, use a position closer to the middle of the deck.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Issue continued from previous page… ***Unable to find a path for {pod name} pipettor to approach position {position name}***… Or ***Unable to find a path for {pod name} pipettor to approach position {position name} with X clearance of {#} and {#}***… *Issue continued on next page…*	Failed to leave source configuration, where…	***{gripper part name} of {pod name} gripper interferes with {obstacle information}***	Right before the start of this move, the pod is in a place where the gripper (upper hand, lower hand, fingers, or gripped labware) cannot escape.	Make sure the gripper is not too close to surrounding obstacle such as left or right shields, back towers, pump banks , Trash ALP, or a tall labware stack If so, use **Advanced Manual Control** to move the gripper to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect the **Min Safe Height** for the starting position on the deck (especially if it has recently changed).
			At the starting position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
		{pipettor part name} of {pod name} interferes with {obstacle information}	Right before the start of this move, the pod is in a place where the pipettor (head, head mounting flange or tips) cannot escape.	Make sure the pipettor is not too close to surrounding obstacle, such as left or right shields, back towers, pump banks, the Trash ALP, or a tall labware stack. If so, use **Advanced Manual Control** to move the pipettor to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect the **Min Safe Height** for the start position on the deck (especially if it has recently changed).
			At the starting position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Issue continued from previous page… ***Unable to find a path for {pod name} pipettor to approach position {position name}***… Or ***Unable to find a path for {pod name} pipettor to approach position {position name} with X clearance of {#} and {#}***…	***at destination configuration, {detailed interference information}***	***{pipettor part name} of {pod name} interferes with {obstacle information}***	The software incorrectly models the destination position to require a large clearance to allow access.	In the **Deck Editor**, inspect **Min Safe Height** for the destination position on the deck (especially if it has recently changed).
			The destination position is under an obstacle or near an obstacle, tall labware, or the Trash ALP; accessing the position will make the pipettor collide with the obstacle.	Consider using a different destination position, or remove the nearby tall labware or ALP that prevent access.
			Destination position is framed incorrectly, appearing to overlap with another position.	Make sure the destination position being accessed is correctly framed.
			At the destination position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
	all possible paths exhausted or search limit reached	n/a	The pod is within travel limits, but cannot find a path to the target position.	Make sure the pod is not accessing a position surrounded by obstacles that prevent access.
			If the gripper is rotated beneath the pod at the start of the method, the software incorrectly models the gripper and pod to be colliding.	Make sure the gripper is not rotated beneath the pod at the start of a method. Use Advanced Manual Control to rotate the gripper away from the pod.
Unable to find a path for {pod name} gripper to approach position {position name} (using {grip side} grip)… *Issue continued on next page…*	***specified pipettor destination {axis name} {#} is outside of travel range, which is between {#} and {#}***	n/a	The pod is attempting to move to a location beyond its travel limit.	In **Hardware Setup**, make sure axis limits for the pod have been set. In method development, use a position closer to the middle of the deck.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Issue continued from previous page… ***Unable to find a path for {pod name} gripper to approach position {position name} (using {grip side} grip)****…* *Issue continued on next page…*	***failed to leave source configuration, where {detailed interference information}***	***{gripper part name} of {pod name} gripper interferes with {obstacle information}***	Right before start of this move, the pod is in a place where the gripper (upper hand, lower hand, fingers or gripped labware) cannot escape.	Make sure the gripper is not too close to surrounding obstacle such as left or right shields, back towers, pump banks , the Trash ALP, or a tall labware stack. If so, use **Advanced Manual Control** to move the gripper to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect **Min Safe Height** for the starting position on the deck (especially if it has recently changed).
			At the source position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
		{pipettor part name} of {pod name} interferes with {obstacle information}	Right before start of this move, the pod is in a place where the pipettor (head, head mounting flange, or tips) cannot escape.	Make sure the gripper is not too close to surrounding obstacle such as left or right shields, back towers, pump banks , the Trash ALP, or a tall labware stack. If so, use **Advanced Manual Control** to move the gripper to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect **Min Safe Height** for the starting position on the deck (especially if it has recently changed).
			At the source position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Issue continued from previous page… ***Unable to find a path for {pod name} gripper to approach position {position name} (using {grip side} grip)****…*	***at destination configuration, {detailed interference information}***	***{gripper part name} of {pod name} gripper interferes with {obstacle information}***	The software incorrectly models the destination position to require a large clearance to allow access.	In the **Deck Editor**, inspect **Min Safe Height** for the destination position on the deck (especially if it has recently changed).
			The destination position is under an obstacle or near an obstacle, tall labware, or the Trash ALP; accessing the position will make the pipettor collide with the obstacle.	Consider using a different destination position or remove the nearby tall labware or ALP that prevents access.
			Destination position is framed incorrectly, appearing to overlap with another position.	Make sure the destination position being accessed is correctly framed.
			At the destination position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
	all possible paths exhausted or search limit reached	n/a	The pod is within travel limits, but cannot find a path to the target position.	Make sure the pod is not accessing a position surrounded by obstacles that prevent access.
			If the gripper is rotated beneath the pod at the start of the method, the software incorrectly models the gripper and pod to be colliding.	Make sure the gripper is not rotated beneath the pod at the start of a method. Use **Advanced Manual Control** to rotate the gripper away from the pod.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to minimize {pod name} probes span in order to find a path for the pipettor to approach position {position name}…	n/a	***{pipettor part name} of {pod name} interferes with {obstacle information}***	Obstacle information identifies the gripper is interfering with the Span-8 pipettor.	If the gripper is interfering with the Span-8 pipettor, use **Advanced Manual Control** to move gripper out of the way.
			Obstacle information identifies a position is interfering with the Span-8 pipettor.	If another position is interfering with the Span-8 probes, examine the **Min Safe Height** for the position using the **Deck Editor**, making sure the safe height is not too tall. Use the **Labware Type Editor** to verify that the labware located on the position is modeled correctly.
			Obstacle information identifies an obstacle interfering with the Span-8 pipettor.	If it is another obstacle such as the side of a Trash ALP, left/right shield, light curtain wall, pump bank or back tower is interfering with the Span-8 pipettor, reconsider deck layout to avoid this situation.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to find a path to move both the multichannel pipettor and gripper to safe Z heights… Or ***Unable to find a path to move the gripper to Z height of {#}***…	failed to leave source configuration, where…	{gripper part name} of {pod name} gripper interferes with…	Right before the start of this move, the pod is in a place where the gripper (upper hand, lower hand, fingers or gripped labware) cannot escape.	Make sure the gripper is not too close to surrounding obstacle such as left or right shields, back towers, pump banks, the Trash ALP, or a tall labware stack. If so, use **Advanced Manual Control** to move the gripper to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect **Min Safe Height** for the starting position on the deck (especially if it has recently changed).
			At the source position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
		{pipettor part name} of {pod name} interferes with…	Right before start of this move, the pod is in a place where the pipettor (head, head mounting flange, or tips) cannot escape.	Make sure the pipettor is not too close to surrounding obstacle such as left or right shields, back towers, pump banks, the Trash ALP, or a tall labware stack. If so, use **Advanced Manual Control** to move the pipettor to a clear position.
			The software incorrectly models the starting position to require a large clearance to allow flyover.	In the **Deck Editor**, inspect safe height for the start position on the deck (especially if it is recently changed).
			At the source position, the software incorrectly models the labware or stack of labware as if it is taller than it is.	Make sure labware definitions for new labware (especially stacked labware) are correct.
	all possible paths exhausted or search limit reached	n/a	If the gripper is rotated beneath the pod at the start of the method, the software incorrectly models the gripper and pod to be colliding.	Make sure the gripper is not rotated beneath the pod at the start of a method. Use **Advanced Manual Control** to rotate the gripper away from the pod.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to move {pod name} pipettor Z axis from {#} to {#} when accessing position {position name}…	n/a	***{pipettor part name} of {pod name} interferes with {obstacle information}***	Neighboring positions or obstacles are interfering with the Z motion of the pipettor (position or obstacle can be identified from the obstacle information). It could be a neighboring position that is framed to be too close to the target position, a neighboring labware/ obstacle is too tall or modeled incorrectly, a neighboring position has an unusually tall **Min Safe Height** specification, or another position is overlapping the accessed position.	If neighboring position or the accessed position is framed incorrectly, reframe the neighboring position.
				If the neighboring labware is modeled incorrectly, correct the labware model using the **Labware Type Editor**.
				If another position is overlapping the accessed position, try using a different position for this operation.
				If neighboring position has an unusually tall **Min Safe Height**, consider using the **Deck Editor** to change the **Min Safe Height** of the neighboring position.
				If the neighboring obstacle/ labware is too tall, examine the deck layout for the method to determine if additional space between the accessed position and neighboring position/ obstacles can solve the problem.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to change {pod name} gripper GG axis from {#} to {#} when accessing position {position name}...	n/a	***{gripper part name} of {pod name} gripper interferes with {obstacle information}***	Neighboring positions or obstacles are interfering with the motion of the gripper (position or obstacle can be identified from the obstacle information). It could be that a neighboring position is framed to be too close to the target position, a neighboring labware/obstacle is too tall or modeled incorrectly, or a neighboring position has an unusually tall **Min Safe Height** specification, or another position is overlapping the accessed position.	If neighboring position or the accessed position is framed incorrectly, reframe the neighboring position.
				If the neighboring labware is modeled incorrectly, correct the labware model using the **Labware Type Editor**.
				If another position is overlapping the accessed position, try using a different position for this operation.
				If neighboring position has an unusually tall **Min Safe Height**, consider using the **Deck Editor** to change the **Min Safe Height** of the neighboring position.
				If the neighboring obstacle/ labware is too tall, examine the deck layout for the method to determine if additional space between the accessed position and neighboring position/ obstacles can solve the problem.

Table 6.5 Pod/Gripper Path to Destination Errors

Issue	Reason for Issue	Source of Interference	Possible Cause	Recommended Action
Unable to move {pod name} gripper GZ axis from {#} to {#} when accessing position {position name}...	n/a	***{gripper part name} of {pod name} gripper interferes with {obstacle information}***	Neighboring positions or obstacles are interfering with gripper GZ axis' motion, which position or obstacle can be identified from obstacle information part. It could be neighboring position is framed to be too close to the target position, neighboring labware/ obstacle is too tall or modeled incorrectly, or neighboring position has an unusual big safe height specification or another position is overlapping the accessed position.	If neighboring position or the accessed position is framed incorrectly, reframe the neighboring position.
				If the neighboring labware is modeled incorrectly, correct labware model using the **Labware Type Editor**.
				If another position is overlapping the accessed position, try use a different position for this operation.
				If neighboring position has an unusual big safe height, consider using the **Deck Editor** to change safe height of the neighboring position.
				If neighboring obstacle/ labware is too tall, reexamine deck layout to see if leaving more space between the accessed position and neighboring position/obstacles can solve the problem.

CHAPTER 7

Preventive Maintenance

Overview

To maintain system performance:

- Clean the instrument, ALPs and accessories (refer to *Cleaning*).
- Make sure Automation Controller maintenance/best practices are being performed (*Automation Controller*).
- Inspect and adjust mechanical components (*Instrument*).
- Inspect and clean accessories (*ALPs and Accessories*).

Cleaning

- ❑ Use mild cleaner to wipe down the deck, work surface, ALPs and all exposed parts of the instrument.
- ❑ Use a mild plastic or glass cleaner to clean both the exterior and interior of the safety shields.
- ❑ Inspect the head(s) for contamination and clean as necessary.

  NOTE Use caution when cleaning the head(s).

- ❑ Clean the Automation Controller and display unit.
- ❑ Check all tubing on the Span-8 system for mold or algae growth. Clean as needed or contact us for replacement.
- ❑ Check all tubing on active washes for mold or algae growth. Clean, or contact us for replacement.
- ❑ Empty Trash ALPs and containers. Dispose of labware and tips.
- ❑ Empty waste bottles.

Automation Controller

- ❑ Ensure automatic updates and anti-virus software are working properly, as specified in CHAPTER 1, *Automation Controller Security*.
- ❑ Clean up files on the Automation Controller.
- ❑ Check that instrument files, projects, and methods are stored/saved as backups.

Instrument

Multichannel Pod

- ❑ Clean the Multichannel pod surfaces with a 10% bleach (sodium hypochlorite) or 70% ethanol solutions.
- ❑ Wipe up all spills immediately.
- ❑ Return heads to their original packaging when they are not attached to the pod.
- ❑ Check and tighten head mount screws and gripper mount screws.
- ❑ Make sure that gripper fingers and pads are secured. Tighten with supplied tool, if required. Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474) for instructions on finger removal/replacement.
- ❑ Inspect gripper pads for damage. Contact us to order replacements.

Span-8 Pod

- ❑ Make sure source fluid bottle is filled with clean, properly degassed, deionized water.
- ❑ Return fixed tips, disposable tip mandrels, syringes, and accessories to their original packaging when they are not in use.
- ❑ Check that syringe connections to 3-port valve are finger tight.
- ❑ Check that syringe set screws are tight.
- ❑ Check for leaks at all tubing fittings periodically to make sure that all are tight.

  NOTE When tubing is repeatedly removed and reattached, the end of the tubing may stretch out or split If tubing is not forming a tight fit, cut off approximately 1.27 cm (0.5 in.) of tubing to remove the damaged portion before attaching the tubing to the mandrel.

- ❑ Check that disposable tip collars are securely tightened to the tip interfaces each week.
- ❑ Make sure that gripper fingers and pads are secured. Tighten with supplied tool, if required. Refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474) for instructions on finger removal/replacement.
- ❑ Inspect gripper pads for damage. Contact us to order replacements.

Light Curtain

- ❑ Once a week, verify proper operation of light curtain using **Manual Control** in Biomek Software and the light curtain test rods supplied with the instrument:

  1. Insert the large test rod approximately 2.54 cm (1 in.) past and 53.34 cm (21 in.) above the light curtain at the center of the instrument. Ensure that the scrolling green status indicator light bar changes to flashing red. If not, contact us.
  2. Insert the small test rod into the top left and top right corner of the front instrument opening, such that it extends approximately 2.54 cm (1 in.) past the light curtain. Ensure that the scrolling green status indicator light bar changes to flashing red. If not, contact us.

- ❑ When necessary, clean the light curtain panels with a lint-free cloth.
- ❑ Once every 2-3 months, clean the light curtain lenses with a non-abrasive cleaner, making sure not to scratch the strip.

Status Indicator Lights

- ❑ Check that status indicator lights are operational. If not, contact us.

Deck Lights

- ❑ Verify that deck lights are operational. If the deck light switch does not operate, contact us.

Door Operation

- ❑ For enclosed systems, check the front door operation by moving it to the fully open position. If the door fails to remain open, contact us.
- ❑ For enclosed systems, check the front door operation by closing it and latching it to the magnet. If door fails to remain closed, contact us.

ALPs and Accessories

Orbital Shaker ALP

- ❑ Inspect and clean the exterior surfaces of the Shaker.
- ❑ Using **Device Editor**, exercise the Orbital Shaker and verify operation.

Wash Station ALP

- ❑ Inspect and clean the exterior surfaces of the Wash Station ALP.
- ❑ Check the tubing connections, tubing, and source and waste containers for mold and algae growth.
- ❑ Check that the tubing is secure going into and from the wash station and that there are no signs of leaks.
- ❑ Empty the waste container.
- ❑ Flush the wash station and check for possible clogged holes or build up of solutions or mineral deposits.
- ❑ Using **Device Editor**, exercise the Wash Station ALP and verify operation.

Digital I/O Box

- ❑ Inspect and clean the exterior surfaces of the Digital I/O Box.

AccuFrame

- ❑ Inspect and clean the exterior surfaces of the AccuFrame.

Other ALPs, Accessories and Devices

- ❑ Refer to *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use* (PN B54477) for preventive maintenance tasks specific to each ALP, accessory, or device.

CHAPTER 8

Introduction to Method-Building

Introduction

This chapter is intended to prepare you for building your first Multichannel and/or Span-8 methods. Read thoroughly and complete all applicable activities in this chapter prior to starting the tutorials listed below:

- CHAPTER 9, *Creating a Simple Multichannel Method*
- CHAPTER 10, *Creating a Simple Span-8 Method*

Basic Learning Concepts

This section provides an overview of topics that you will need to be familiar with before beginning a method. These topics include:

- *Biomek Software*
- *ALPs*
- *Hardware*

Biomek Software

Biomek Software is used to control Biomek i-Series instruments. Effectively using Biomek Software includes using the method editor for method building and the various tools and editors to appropriately configure the instrument file and project for the desired task or application. The tutorials in this manual will help you learn how to use Biomek Software though practical applications.

In this section, you will get an overview of Biomek Software through the following topics:

✓ *Launching Biomek Software*

✓ *Understanding the Main Editor*

✓ *Using the Ribbon*

✓ *Understanding Projects*

✓ *Understanding the Deck Editor*

Launching Biomek Software

To launch Biomek Software:

1 Double click on the Biomek Software icon (Figure 8.1), which was created on your desktop during the installation process.

Figure 8.1 Biomek Software Icon

OR

From the **Start** menu, select **All Programs > Beckman Coulter > Biomek Software**.

If Beckman Coulter Accounts & Permissions is enabled on your system, you must have an account established and log in using that account name and password. For more information, contact your system administrator.

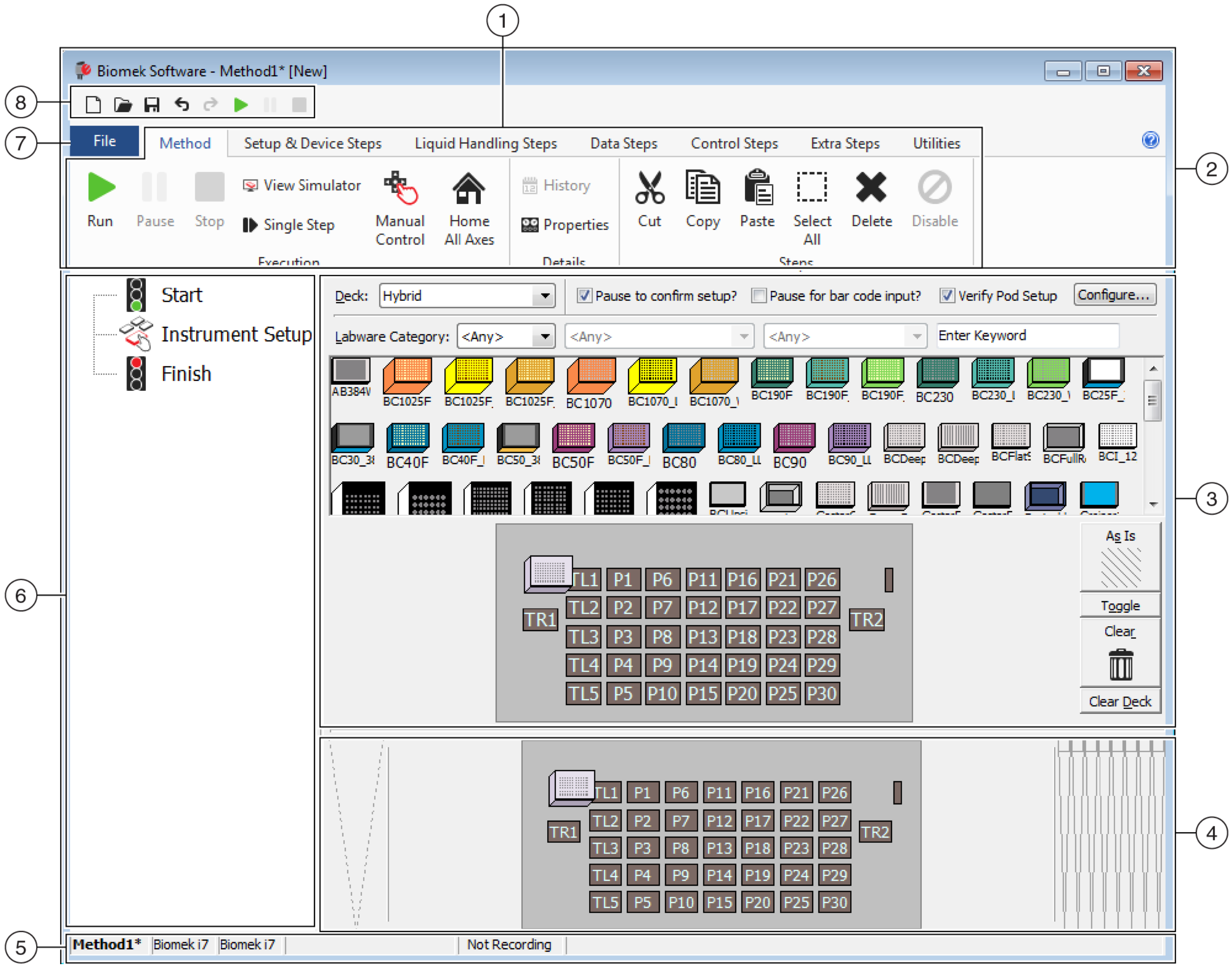
Biomek i-Series Concept	
	Beckman Coulter Accounts & Permissions is an integrated set of features built into Biomek Software that assists users in complying with 21 CFR Part 11 requirements for closed systems. Permissions provide the ability to control user access to specific program operations. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Using Accounts and Permissions*, for additional details.

Understanding the Main Editor

The main editor (Figure 8.2) is your starting point for building liquid-handling methods for the Biomek i-Series instrument. Each component of the Biomek Software main editor is described below. Get to know these terms, as they are used throughout these tutorials and all other Biomek i-Series user manuals.

TIP *Refer to the Biomek i-Series Automated Workstations Software Reference Manual* (PN B56358) for in-depth descriptions of each component of the Biomek Software main editor.

Figure 8.2 Biomek Software Main Editor



1. **Ribbon**: Provides convenient access to steps or utilities for completing a task. The number of tabs on the ribbon can vary slightly, given the options that are enabled in the software. Additional information is found here: *Using the Ribbon*
2. **Title Bar**: Displays the software name, current method file name, the At-A-Glance Status (when a method is executing), and contains the Quick Access Toolbar, Ribbon, and Title Bar buttons.
3. **Configuration View:** The configuration for each step appears in the Configuration View. The view changes to correspond to the step highlighted in the Method View.
4. **Current Instrument Display**: An interactive display that can be used for selecting deck positions while configuring a step. This display reflects the status of the instrument, i.e., the deck and tip presence upon completion of the previous step.
5. **Status Bar**: Contains the file name of the method, current project name, instrument name, estimated time to completion, any current errors, and other information pertinent to the location of your mouse on the user interface.
6. **Method View**: Displays the steps in a method.
7. **File Tab**: Provides the means to create a new method, open or save an existing method, import or export instruments, projects or methods, print methods, configure preferences and more.
8. **Quick Access Toolbar**: Provides convenient access to basic Biomek Software functions. Scrolling your mouse over an icon shows the function each icon serves.

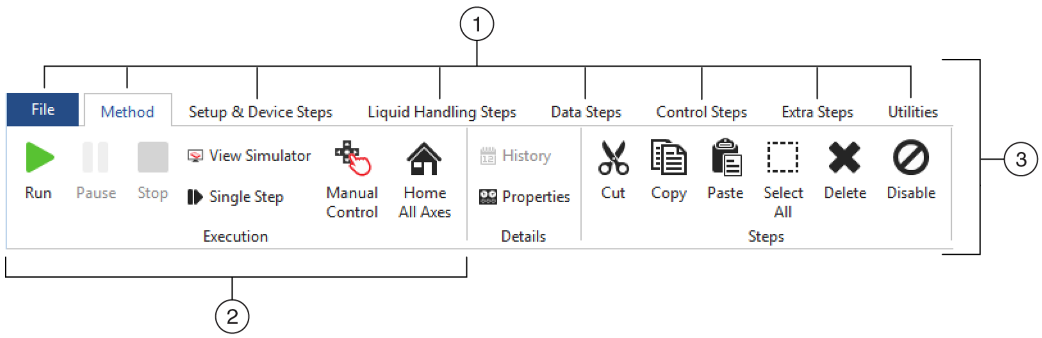
- **Error Bar** (Not Shown): When the method is validated, lists errors pertaining to the current method.

Using the Ribbon

Biomek i-Series Concept	
	Method building, utility, and execution steps are sectioned into ribbon tabs, and further into groups based upon function, as well as the complexity of the operations they control and the depth of knowledge required to configure them.

Refer to Figure 8.3 for an overview of the Biomek Software ribbon.

Figure 8.3 Ribbon



1. **Tabs**: A **Tab** contains steps/options with similar functions. In this example, the **Method** tab is selected. To switch between active tabs, select the title of a different tab on the ribbon.
2. **Group**: A **Group** is a subsection of a **Tab** containing a selection of options that have been further narrowed based on function.
3. **Ribbon**: The **Ribbon** is comprised of multiple **Tabs**.

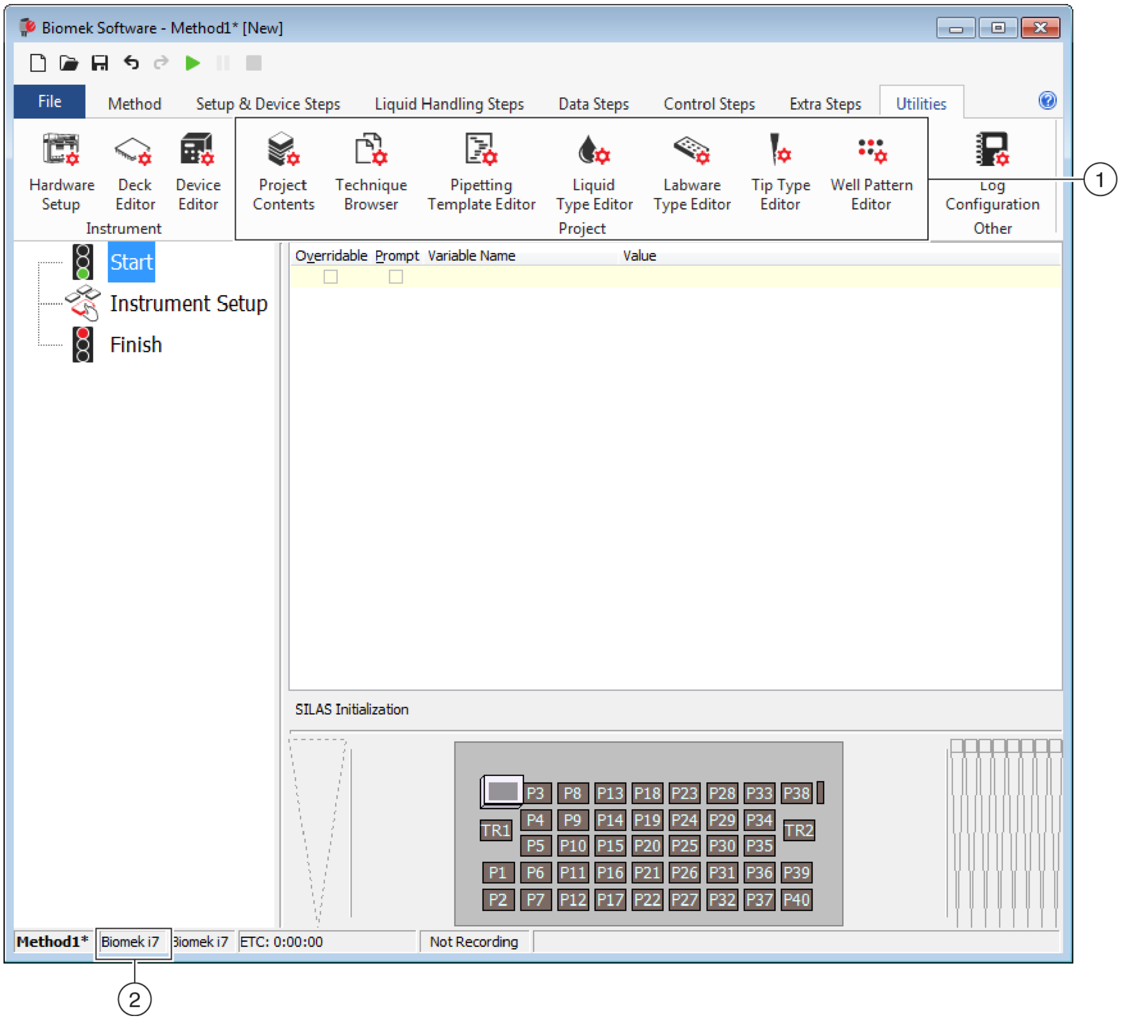
Understanding Projects

While projects may be created, revised, deleted, saved, imported, and exported, in this tutorial you will use the project on your system that was created or imported when your instrument and Biomek Software were installed. *Before you create a new method, get into the habit of ensuring you are using the correct project.*

Biomek i-Series Concept	
	A project stores information about liquid types, labware and tip types, well patterns, pipetting templates, and techniques as revisions that are used by a method file to configure the actions of the instrument. Projects store a history of all changes, additions, and deletions of items from the project. Methods are associated with projects and contain all of the items required to perform the method.

View Figure 8.4 to learn where project information is accessed or viewed from the main editor.

Figure 8.4 Project

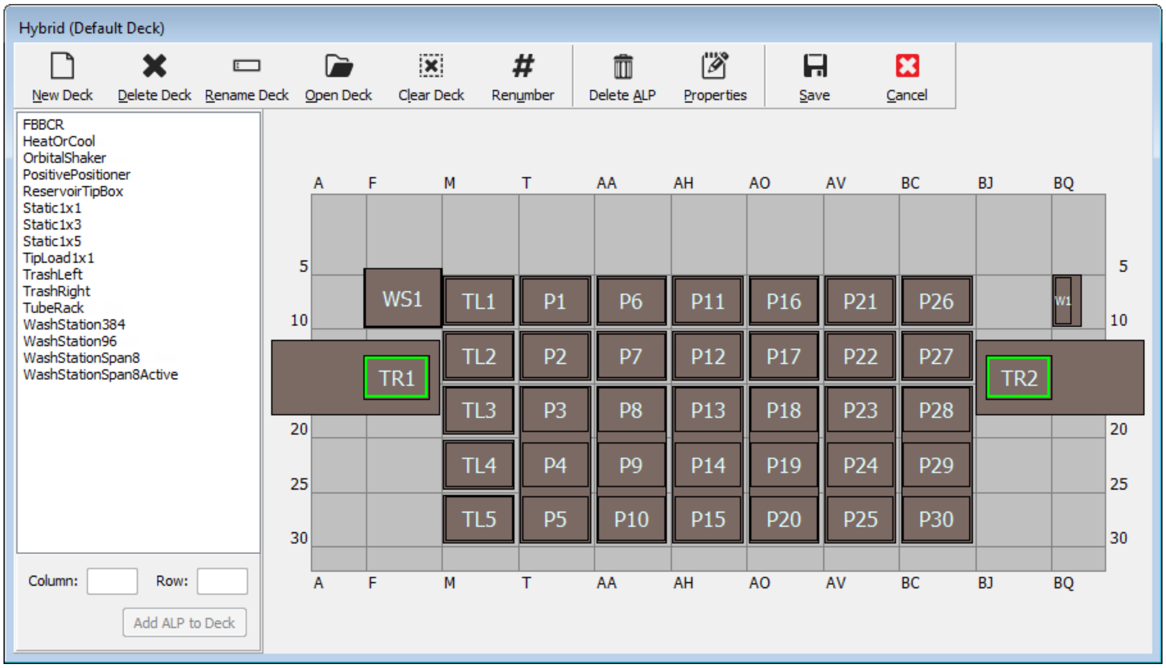


1. The actions and editors associated with projects are displayed on the **Utilities** tab in the **Project** group.
2. **Project**: The currently opened project is displayed here. The project displayed here is the default used when a Biomek i7 instrument is chosen when Biomek Software is installed.

Understanding the Deck Editor

The **Deck Editor** (Figure 8.5) is used to define and change the deck configurations stored in the current instrument file. A deck in Biomek Software is an exact representation of the physical instrument deck; once the instrument deck is set up and framed by a Beckman Coulter Representative, it is then configured and saved as the default deck in the software. This default deck is used for all methods that are executed on the instrument. If the physical deck is changed, the default deck must be updated to reflect changes. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Preparing and Managing the Deck.*

Figure 8.5 Deck Editor — Example from a Biomek i7 Hybrid Instrument



ALPs

Automated Labware Positioners (ALPs) are removable and interchangeable platform structures installed on the deck to allow automated assays to be performed. Complete information on ALPs can be found in the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use (PN B54477).*

When an ALP is mounted to the deck, the **Row** and **Column** coordinates of the ***frontmost*** mounting pin, which is signified by the **pointing feature**, is entered into the **Deck Editor** for proper placement in the software. There are two types of pointing features; the type of pointing feature on the ALP depends on the type of ALP:

- ***For ALPs that do not require a mounting plate***, the location of the pointing feature is frontmost mounting or locking pin (Figure 8.6).
- ***For ALPs equipped with a mounting plate***, the pointing feature is the frontmost notch, located on the mounting plate (Figure 8.7).

NOTE For a list of ALPs that require a mounting plate, refer to the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use (PN B54477)*.

Figure 8.6 Pointing Feature Location on Biomek i-Series ALPs

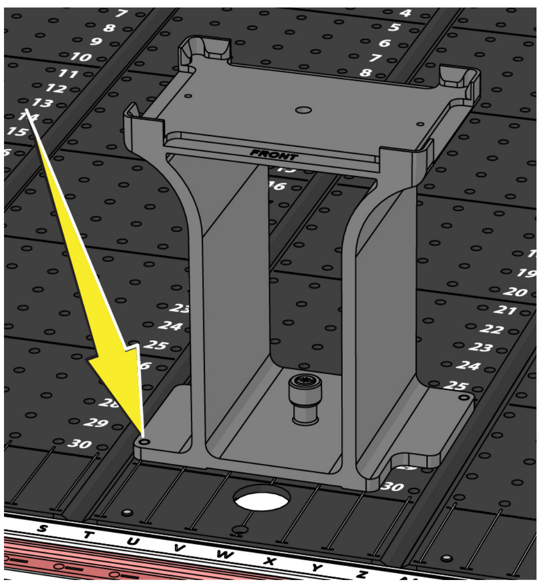
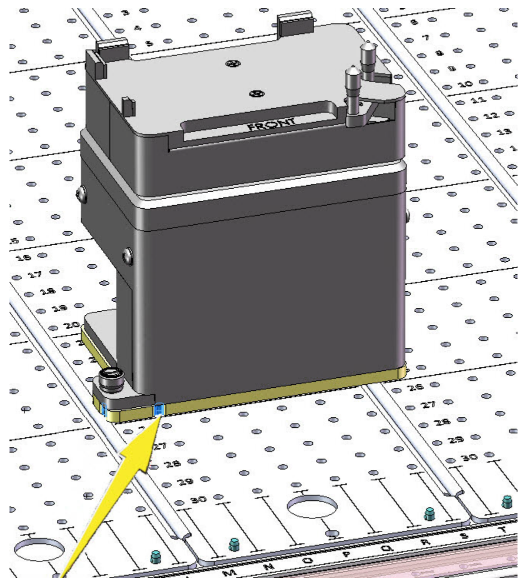


Figure 8.7 Pointing Feature (Notches) Location on Biomek FX^P/NX^P ALPs



Hardware

A Beckman Coulter Representative normally installs and frames ALPs and devices on your deck and defines the **Hardware Setup** configurations for your instrument. ***If you wish to complete these tutorials on the hardware, it will be necessary to make changes to the tutorials to match the physical positions of your deck.***

Determining the Mode for Running Biomek i-Series Tutorials

There are two different modes that you can choose from for learning how to create methods. Determine the mode that's right for you by weighing the options presented in the table below.

IMPORTANT It is recommended that you complete these tutorial exercises in Simulation mode for the first pass, and then, for any subsequent run-throughs, try the tutorials on hardware by altering the tutorial exercises to work with your physical instrument deck.

Mode	Benefits	Drawbacks
Simulation	• Methods can be followed as written. • You can see how ALPs work, even if you do not actually own them.	• You will only see part of the picture, as Simulation mode is lacking the physical component.
Hardware	• You will gain full understanding (physical and virtual) of what it takes to complete a method.	• Specific locations of labware and ALPs in these tutorials might not work on your deck, as your instrument deck probably doesn't match the Simulation deck. • You must have the required ALPs, and they must be framed to a location that is accessible to the pod with which you are working. OR • You must change the tutorials to match to your physical deck.

The next section, *Before Creating a Method*, applies to both modes. Some of these instructions will only be carried out if you are using Simulation mode, while others will only pertain to you if you are running on hardware; these areas will be noted. For learning purposes, however, it is suggested that you read and understand all instructions, as they contain information that will help you better understand how to create and run methods.

Before Creating a Method

Before creating your method, you will need to set up or choose a deck in the **Deck Editor** and define some configurations in **Hardware Setup**.

Creating a Deck In Biomek Software

Biomek i-Series Concept
The **Deck Editor** is used to define and change the deck configurations stored in the current instrument file. A deck in Biomek Software is an exact representation of the physical instrument deck; once the instrument deck is set up and framed by a Beckman Coulter Representative, it is then configured and saved as the default deck in the software. This default deck is used for all methods run on the instrument. If the physical deck is changed, the default deck must be updated or added to the software to reflect changes. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Preparing and Managing the Deck*.

Required ALPs

The steps in the tutorials require the following ALPs to be located on the deck.

Multichannel Pod	Span-8 Pod
✓ Tip Load 1 x 1 ALPs ✓ Static ALPs (labware positioners) (1 x 1 and 1 x 3) ✓ 96-Channel Wash Station ALP ✓ Trash ALP	✓ Static ALPs (labware positioners) (1 x 1 and 1 x 3) ✓ Span-8 Wash Station ALP ✓ Trash ALP

If you are running your method:

- ***In Simulation mode***, follow the instructions in *Creating a Virtual Deck*.
- ***On Hardware***, make sure the items above are accessible to the pod with which you are working. If you wish, you can complete the instructions in *Creating a Virtual Deck* to learn how to create a new deck.

Creating a Virtual Deck

This exercise is optional, as, in the **Deck Editor,** you can select the predefined deck for your instrument type to use for these tutorials. To choose the appropriate default deck without creating it from scratch, complete the instructions in *Selecting the Tutorial Default Deck*. If you wish to learn how to create a new deck, follow the instructions below.

IMPORTANT ***This deck is to be used in simulation mode only*** because the tutorial deck will not likely match your instrument deck, and a mismatch between the hardware and software decks will result in a crash.

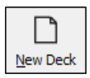
To create a deck:

---

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

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

---

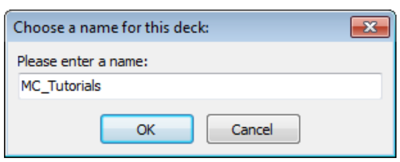
2 On the toolbar, select 

(**New Deck**).

---

3 In **Choose a name for this deck** (Figure 8.8), enter a name for the deck, and then select **OK**.

Figure 8.8 Naming the Deck



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4 Select 

.

---

5 Now you will begin adding ALPs to the deck. If your instrument contains a:

- **Multichannel pod**, go to step 6.
- **Span-8 pod** only, go to step 7.

---

6 ***For instruments containing a Multichannel pod:***

The first ALP you will place on the deck is the 96-Channel Wash Station ALP; this is completed through the following steps:

a. In the ALPs List (left panel), select **WashStation96**. The area capable of supporting the ALP is indicated by blue dashed lines (Figure 8.9).

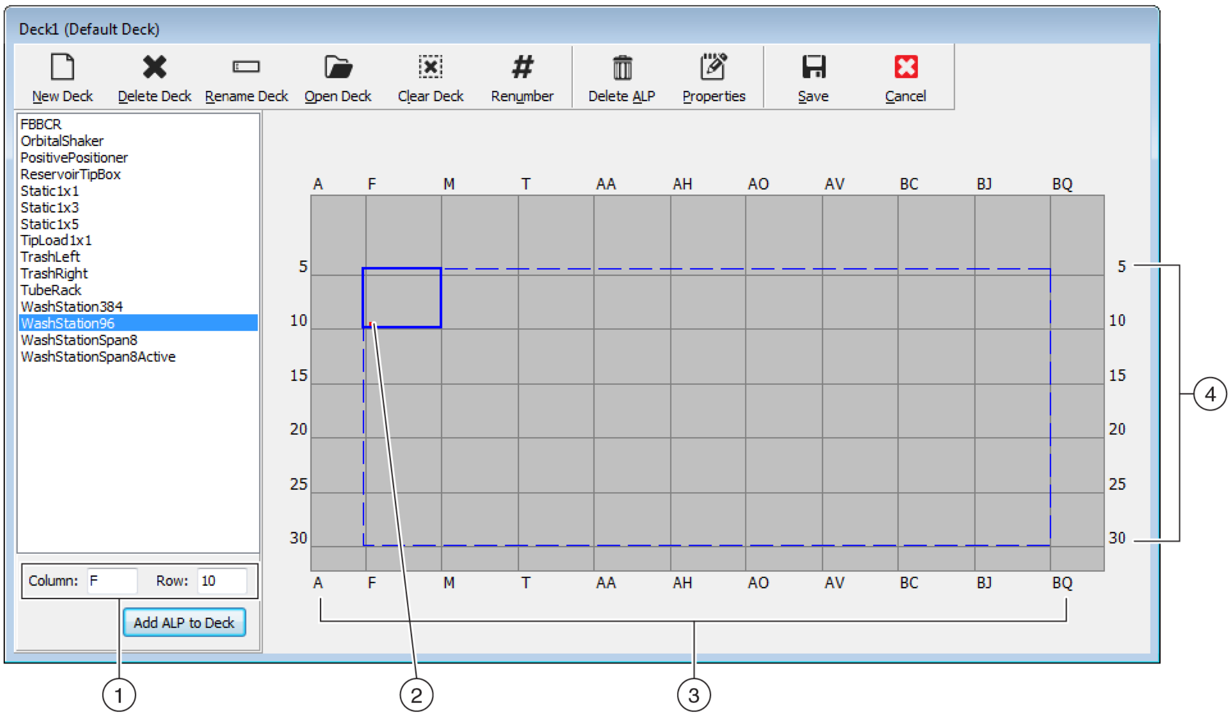
At this point, you would normally determine where the ALP should be located on the physical instrument deck, and once the location is determined, you would take note of the coordinates of the mounting point on the ALP. However, since this is a Simulation deck, the coordinates are provided for you in *Tutorial Decks*.

b. The coordinates for the **WashStation96** are **F10**. Therefore, in the **Column** field, enter ***F***, and in the **Row** field, enter ***10***. A bounding box appears at the location of valid coordinates.

c. Select **Add ALP to Deck** to complete the process.

d. Proceed to step 8.

Figure 8.9 Populating the Deck on a Biomek i7 Hybrid Instrument — Multichannel Pod



1. **Coordinates**: Using the **Column** and **Row** Indicators as a guideline, enter the **Column** and **Row** coordinates of the mounting point where you wish to place the ALP.
2. **Mounting Point**: The mounting point of an ALP is indicated by a red dot; the location of this dot corresponds to the entered **Column** and **Row** coordinates.
3. **Column Indicators** (also located on the top of the deck).
4. **Row Indicators** (also located on the left side of the deck).

---

7 ***For Span-8 pods:***

The first ALP you will place on the deck is the Span-8 Wash Station ALP; this is completed through the following steps:

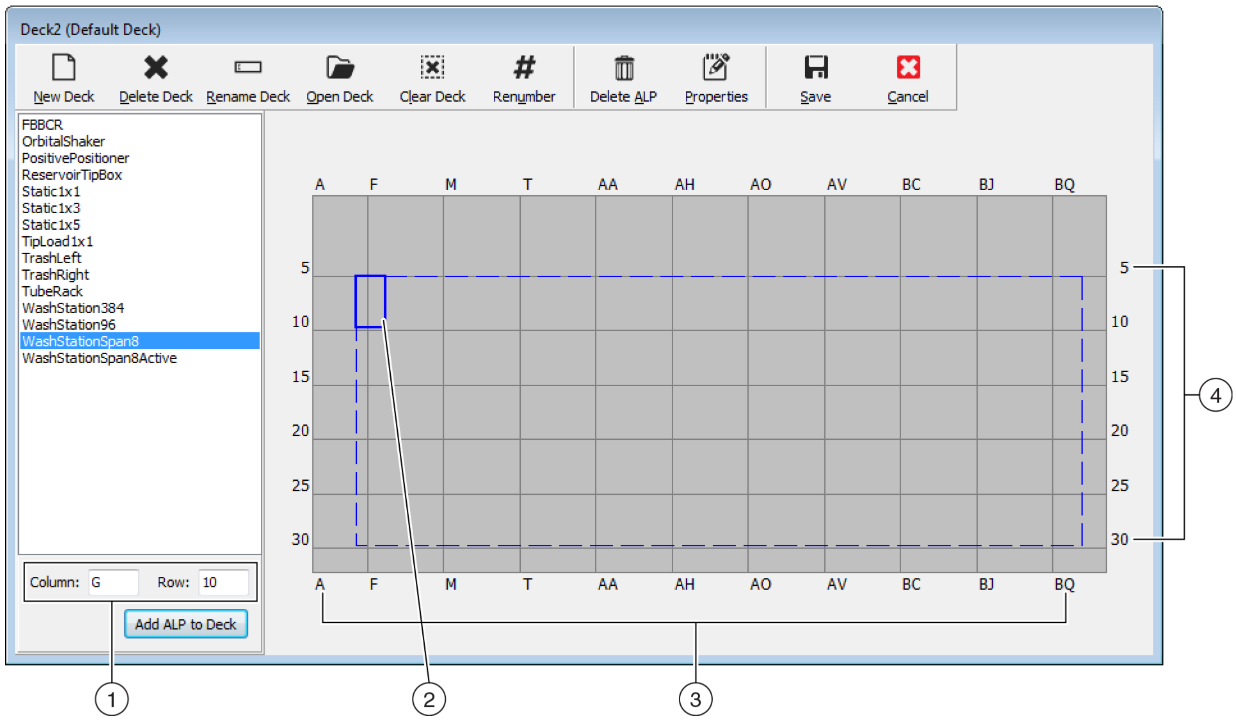
a. In the ALPs List (left panel), select **WashStationSpan8**. The area capable of supporting the ALP is indicated by blue dashed lines (Figure 8.10).

At this point, you would normally determine where the ALP should be located on the physical instrument deck, and once the location is determined, you would take note of the coordinates of the mounting point on the ALP. However, since this is a Simulation deck, the coordinates are provided for you in *Tutorial Decks*.

b. The coordinates for the **WashStationSpan8** are **AQ10** (Biomek i5) or **BS10** (Biomek i7). Therefore, in the **Column** field, enter ***AQ*** or ***BS***, and in the **Row** field, enter ***10***. A bounding box appears at the location of valid coordinates.

c. Select **Add ALP to Deck** to complete the process.

Figure 8.10 Populating the Deck on a Biomek i7 Hybrid Instrument — Span-8 Pod



1. **Coordinates**: Using the column and row indicators as a guideline, enter the **Column** and **Row** coordinates of the mounting point where you wish to place the ALP.
2. **Mounting Point**: The mounting point of an ALP is indicated by a red dot; the location of this dot corresponds to the entered **Column** and **Row** coordinates.
3. **Column Indicators** (also located on the top of the deck).
4. **Row Indicators** (also located on the left side of the deck).

---

8 Repeat steps a. through c. for each ALP listed in *Tutorial Decks* for your instrument type.

---

9 Click the  (**Renumber**) icon to renumber the deck in an orderly fashion.

---

10 Compare the deck you just created to the virtual deck corresponding to your specific instrument type in *Tutorial Decks* and make any necessary changes.

11 Select 

(**Save**) to exit **Deck Editor** and save the deck to create methods in Simulation mode.

IMPORTANT This changes the **Default Deck** to the Tutorial Deck you just created, which doesn't match your instrument deck. After completing the tutorial methods, you must switch the deck back to the deck that was created and framed by a Beckman Coulter Representative.

OR

Select 

(**Cancel**) if you're running this tutorial on hardware, and this exercise was for learning purposes only.

Selecting the Tutorial Default Deck

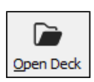
IMPORTANT If you are running your methods on hardware, do not change the default deck. Instead, alter your methods to correspond to your instrument deck.

NOTE If you have already created a default deck from scratch in *Creating a Virtual Deck*, skip to *Configuring Hardware Setup*.

To select a predefined default deck:

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

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

2 On the toolbar, select 

(**Open Deck**).

3 In the list of decks, select the appropriate deck for your instrument type (Figure 8.11).

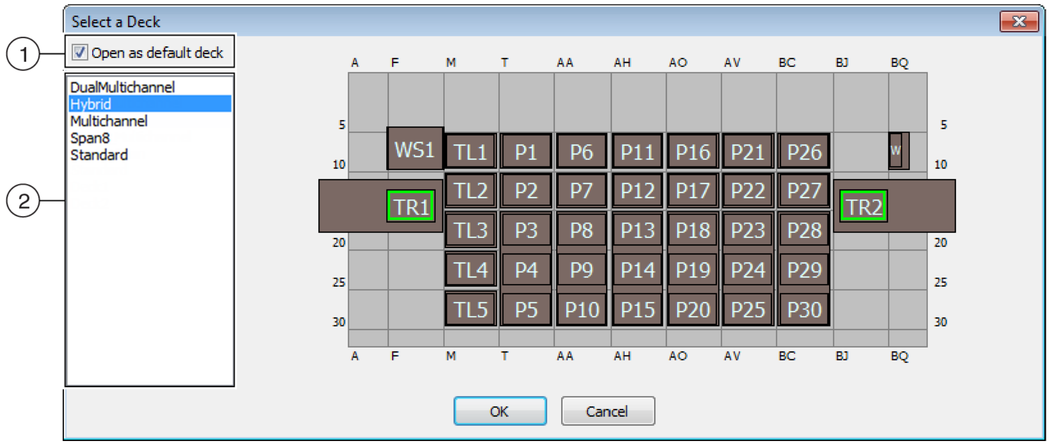


Figure 8.11 Selecting a Deck (Biomek i7 Hybrid shown)

1. Choose this option to open the selected deck as the default deck.
2. **Deck List**: Choose the default deck for these tutorials based on your instrument type.
    - **Biomek i5, Span-8**: Span8
    - **Biomek i5, Multichannel**: Multichannel
    - **Biomek i7, Single Span-8**: Span8
    - **Biomek i7, Single Multichannel**: Multichannel
    - **Biomek i7, Dual Multichannel**: DualMultichannel
    - **Biomek i7, Hybrid**: Hybrid

4 Make sure **Open as default deck** is selected (Figure 8.11).

5 Select **OK** to complete the process.

NOTE Once you have completed these tutorials, make sure to change the default deck back to the version corresponding to your instrument's physical deck.

Configuring Hardware Setup

Configuring the hardware in Biomek Software is different for Multichannel and Span-8 pods. Refer to the appropriate section for more information.

- *Multichannel Hardware Setup*
- *Span-8 Hardware Setup*

Multichannel Hardware Setup

Before starting any method, you will need to verify that the correct head is physically attached to the pod and is selected in the **Hardware Setup** utility. If running your method in Simulation mode, you will need to ensure the head type is correct in the **Hardware Setup** utility only.

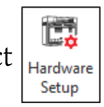
To verify and change head type:

---

1 ***If running the method on the physical instrument***, you will need to change your methods to work with the current instrument setup. For information on altering your methods, refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

NOTE If you wish to change the physical head to match the head used in these tutorials, refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

---

2 In Biomek Software, from the **Utilities** tab, in the **Instrument** group, select 

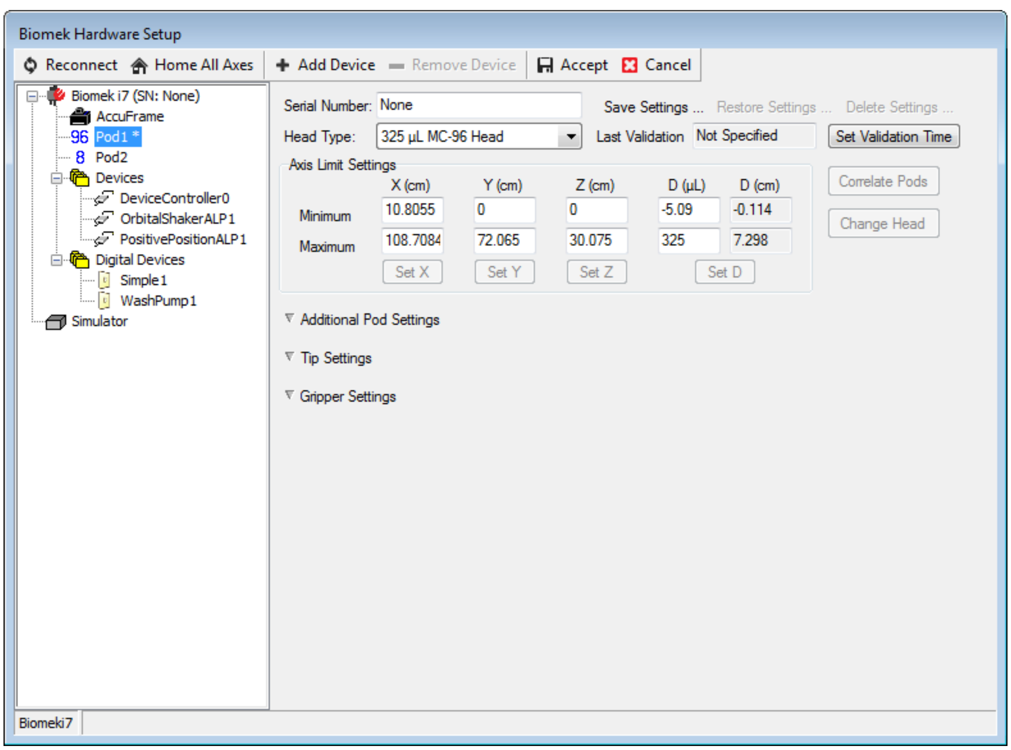
(**Hardware Setup**). **Hardware Setup** appears.

---

3 Select the appropriate Multichannel pod (Figure 8.12).

NOTE A Multichannel pod is identified with a **96** or **384** and a Span-8 pod is identified with an **8**.

Figure 8.12 Hardware Setup Showing the Step User Interface for a Multichannel Pod



1. Multichannel pod in **Hardware Setup**

4 Verify that the appropriate head is selected in **Head Type** (Figure 8.12).

- If the **Head Type** is already correct, continue this procedure with step 7.

5 From the **Head Type** drop-down, select the appropriate head.

6 Change the **Serial Number** to correspond to the serial number on the new head.

NOTE If you are running the method in Simulation mode, and you do not physically have the specified head type, leave the **Serial Number** entry field as **None**.

7 Select **Accept** in the **Hardware Setup** window to complete the process.

Span-8 Hardware Setup

The hardware setup for Span-8 pods should not be altered. You will need to change your methods to work with the current setup. For information on altering your methods, refer to the *Biomek i-Series Software Reference Manual* (PN B56358).

Specifying the Mode for Running Methods

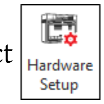
⚠ CAUTION

Risk of procedure failure. Make sure the proper communications port is selected in Hardware Setup. Simulate is used only when running methods on the Biomek Simulator. To run methods on the instrument, choose the USB port (in Name) to which the instrument is connected.

When a method is run in Simulation mode, the Simulator appears, showing an animated 3-D model of the instrument performing the method. Setting the mode is configured in **Hardware Setup** (Figure 8.14).

Biomek i-Series Concept	
	**Hardware Setup** is used to configure Biomek Software with the appropriate Biomek i-Series instrument information, including the Simulator. While the Beckman Coulter Representative normally installs and configures new devices, it may be necessary to install, configure, and remove other devices using **Hardware Setup**. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Accessing Hardware Setup*.

To choose the mode for running your method:

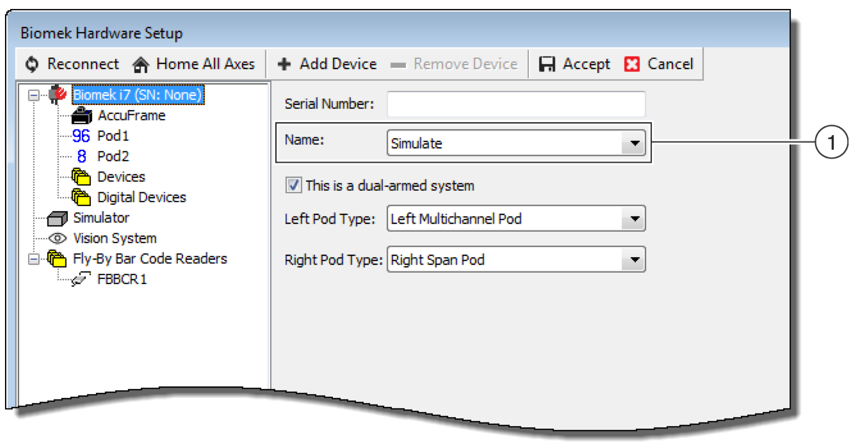
1 From the **Utilities** tab, in the **Instrument** group, select 

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

2 Determine the mode that you will be using to run your method; see *Determining the Mode for Running Biomek i-Series Tutorials* for hints on choosing the mode that's right for you. If running...

- ***On Hardware***, in **Name**, select the correct name from the drop-down list.
- ***In Simulation mode***, in **Name**, choose **Simulate** (Figure 8.13).

Figure 8.13 Hardware Setup



1. Choose **Simulate** here to for methods to be run in the Simulator.

IMPORTANT When changing the **Name** to **Simulate**, take note of the original name so you can easily switch back when running on hardware.

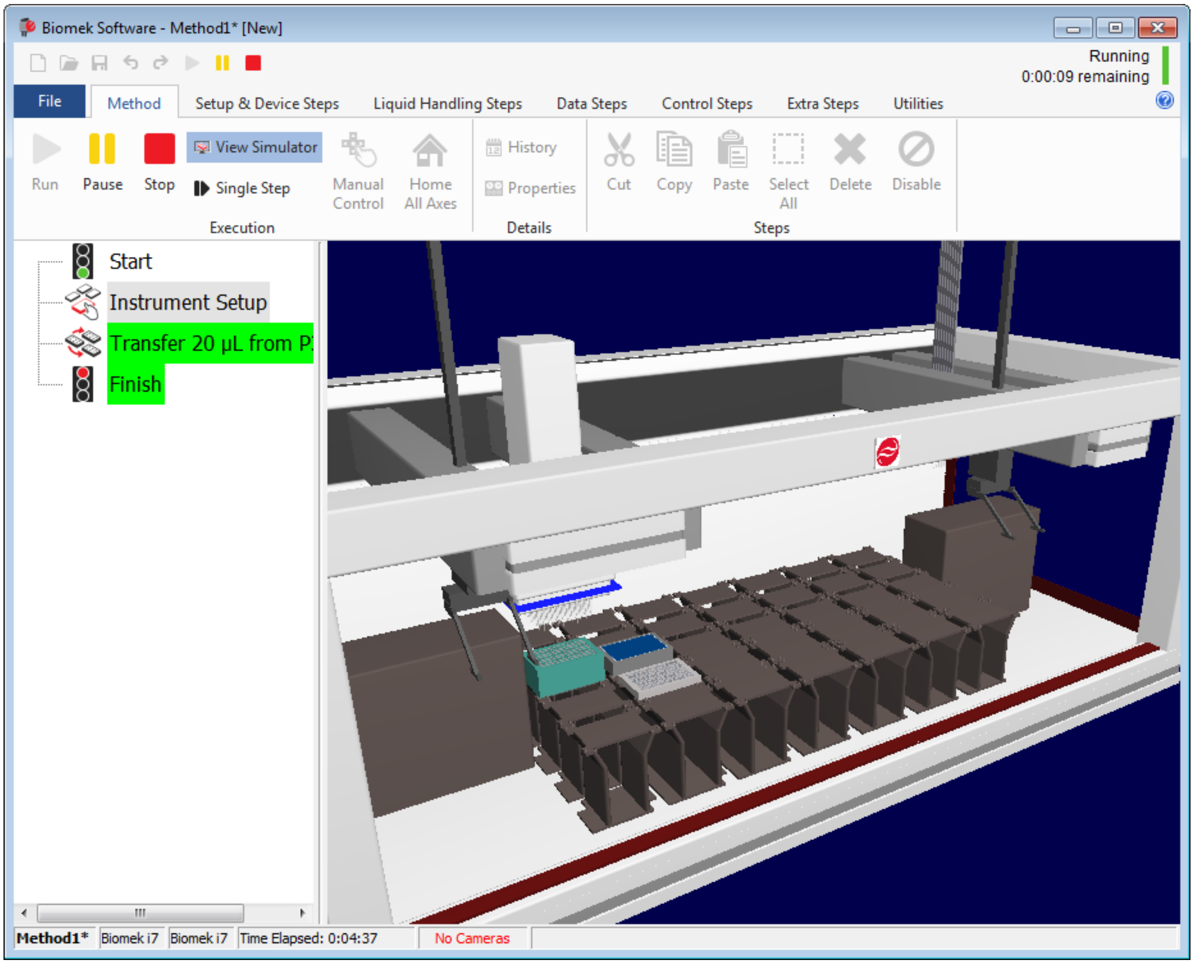
3 Choose **Accept**.

If you are using Simulate mode, an animated 3-D model of the instrument is displayed (Figure 8.14). You can now watch a simulation of the instrument perform the steps in the method.

IMPORTANT When switching from **Simulation** mode to running a method on hardware, the instrument must be homed. More information on homing the instrument is in CHAPTER 9, *Running the Method on Hardware*, for **Multichannel** tutorials or CHAPTER 10, *Running the Method on Hardware*, for **Span-8** tutorials.

TIP The simulator can be a useful tool to test methods to ensure that they are performing as expected without using up valuable reagents or tips, and can save time not only in set up, but also by running at an accelerated speed. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Simulator*, for more information on the simulator.

Figure 8.14 Running a Method in Simulation

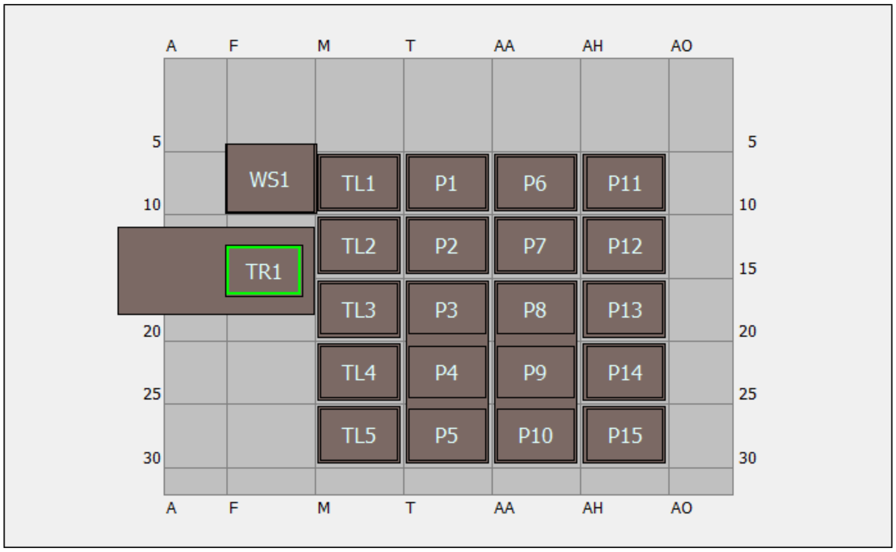


Tutorial Decks

This section provides the tutorial deck layouts and coordinates for each type of instrument. Select the link below to see the deck for your instrument type.

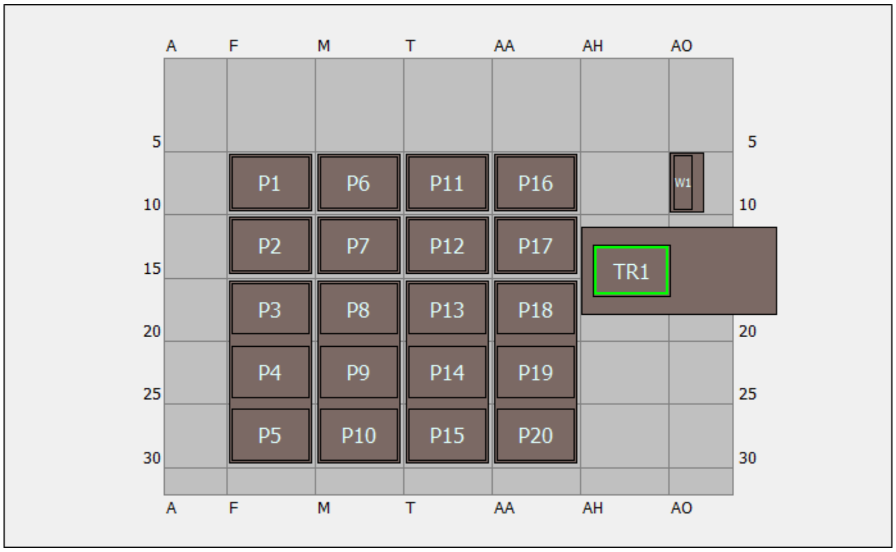
- *Biomek i5 Multichannel Pod Simulation Deck*
- *Biomek i5 Span-8 Pod Simulation Deck*
- *Biomek i7 Single Multichannel Pod Simulation Deck*
- *Biomek i7 Single Span-8 Simulation Deck*
- *Biomek i7 Dual Multichannel Pod Simulation Deck*
- *Biomek i7 Hybrid Simulation Deck*

Biomek i5 Multichannel Pod Simulation Deck



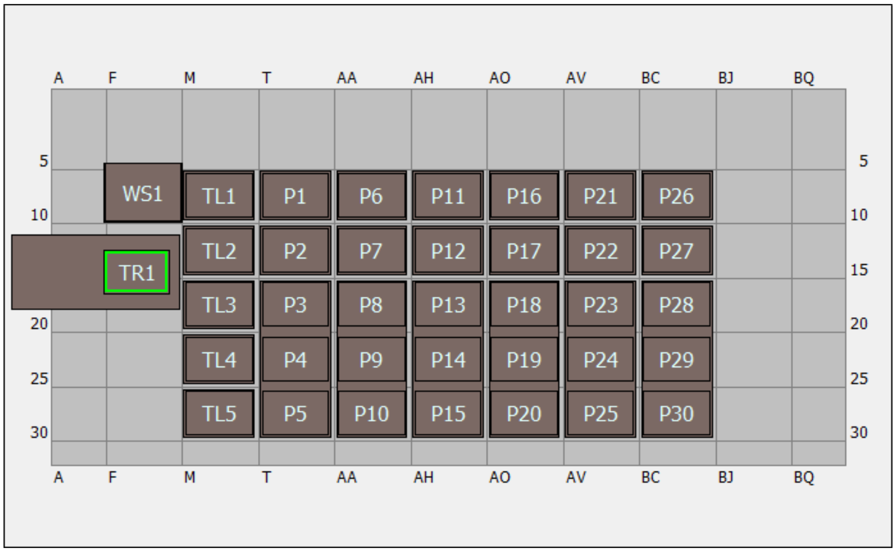
ALP	ALP Name in Deck Editor	Instrument Coordinates					
Wash Station	**WashStation96**	F10					
Trash	**TrashLeftSlide**	F18					
Tip Load ALP	**TipLoad1x1**	M10	M15	M20	M25	M30	
Static 1 x 1 ALP	**Static1x1**	T10	T15	AA10	AA15	AH10	AH15
Static 1 x 3 ALP	**Static1x3**	T30	AA30	AH30			

Biomek i5 Span-8 Pod Simulation Deck



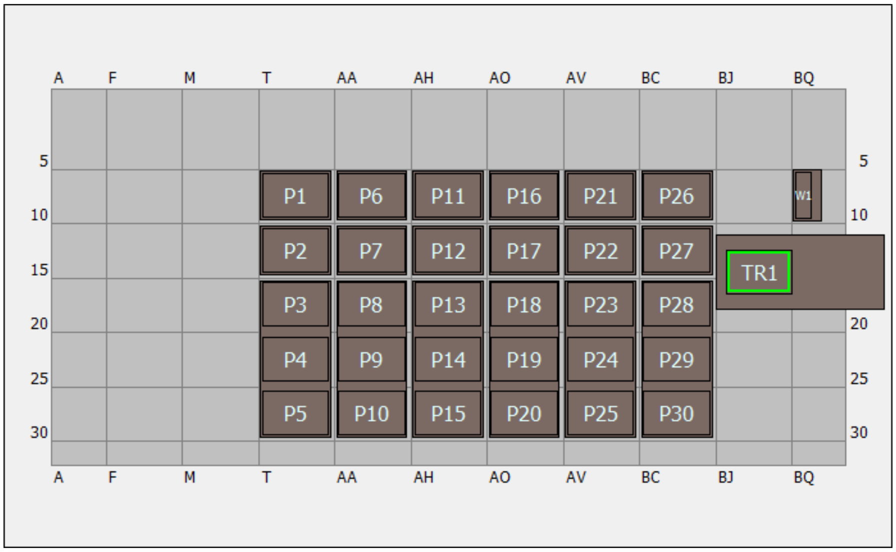
ALP	ALP Name in Deck Editor	Instrument Coordinates			
Wash Station	**WashStationSpan8**	AQ10			
Trash	**TrashRightSlide**	AH18			
Static 1 x 1 ALP	**Static1x1**	F10	F15	M10	M15
		T10	T15	AA10	AA15
Static 1 x 3 ALP	**Static1x3**	F30	M30	T30	AA30

Biomek i7 Single Multichannel Pod Simulation Deck



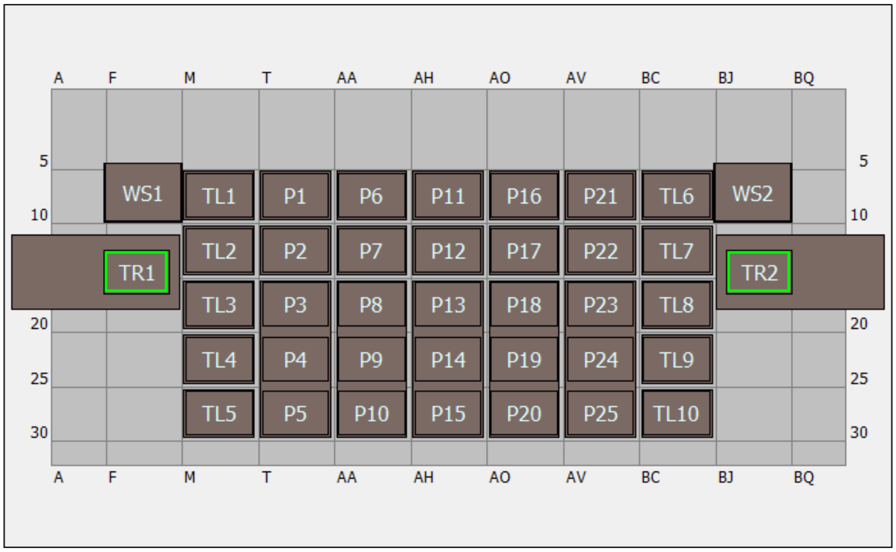
ALP	**ALP Name in Deck Editor**	**Instrument Coordinates**					
Wash Station	**WashStation96**	F10					
Trash	**TrashLeftSlide**	F18					
Tip Load ALP	**TipLoad1x1**	M10	M15	M20	M25	M30	
Static 1 x 1 ALP	**Static1x1**	T10	T15	AA10	AA15	AH10	AH15
		AO10	AO15	AV10	AV15	BC10	BC15
Static 1 x 3 ALP	**Static1x3**	T30	AA30	AH30	AO30	AV30	BC30

Biomek i7 Single Span-8 Simulation Deck



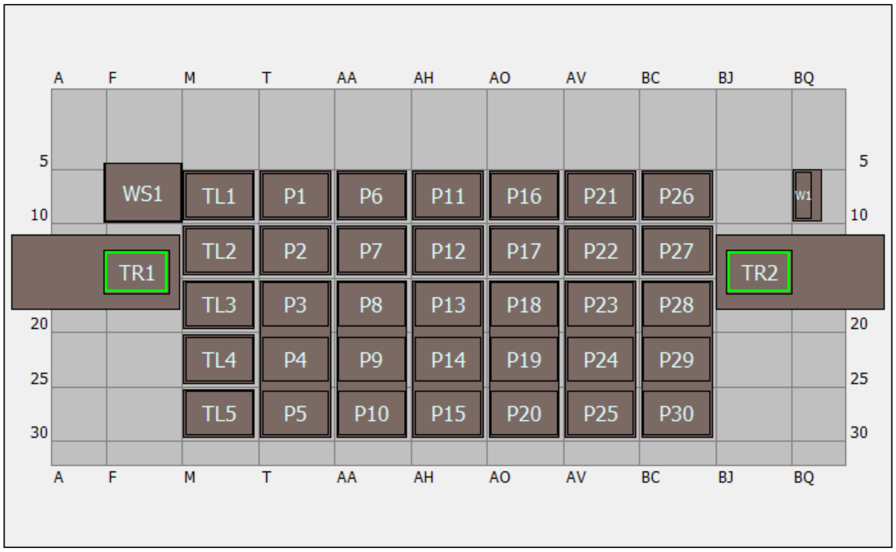
ALP	ALP Name in Deck Editor	Instrument Coordinates					
Wash Station	WashStationSpan8	BS10					
Trash	TrashRightSlide	BJ18					
Static 1 x 1 ALP	Static1x1	T10	T15	AA10	AA15	AH10	AH15
		AO10	AO15	AV10	AV15	BC10	BC15
Static 1 x 3 ALP	Static1x3	T30	AA30	AH30	AO30	AV30	BC30

Biomek i7 Dual Multichannel Pod Simulation Deck



ALP	ALP Name in Deck Editor	Instrument Coordinates					
Wash Station	WashStation96	F10	BJ10				
Trash	TrashLeftSlide	F18					
	TrashRightSlide	BJ18					
Tip Load ALP	TipLoad1x1	M10	M15	M20	M25	M30	BC10
		BC15	BC20	BC25	BC30		
Static 1 x 1 ALP	Static1x1	T10	T15	AA10	AA15	AH10	AH15
		AO10	AO15	AV10	AV15		
Static 1 x 3 ALP	Static1x3	T30	AA30	AH30	AO30	AV30	

Biomek i7 Hybrid Simulation Deck



ALP	ALP Name in Deck Editor	Instrument Coordinates					
Wash Station	WashStation96	F10					
	WashStationSpan8	BS10					
Trash	TrashLeftSlide	F18					
	TrashRightSlide	BJ18					
Tip Load ALP	TipLoad1x1	M10	M15	M20	M25	M30	
Static 1 x 1 ALP	Static1x1	T10	T15	AA10	AA15	AH10	AH15
		AO10	AO15	AV10	AV15	BC10	BC15
Static 1 x 3 ALP	Static1x3	T30	AA30	AH30	AO30	AV30	BC30

CHAPTER 9

Creating a Simple Multichannel Method

What You'll Learn in Getting Started with Biomek Software

IMPORTANT Prior to beginning this chapter, read thoroughly and complete all applicable activities in CHAPTER 8, *Basic Learning Concepts*.

In this chapter, you will learn how to create a basic liquid transfer method on a Multichannel pod. Topics covered in this chapter are presented below:

- *Creating a New Method*
- *Configuring the Instrument Setup Step*
- *Setting Up the Liquid Transfer*
- *Saving a Method*
- *Running the Method*

Creating a New Method

Starting a new method includes:

- *Creating a New Method File*
- *Understanding the Start and Finish Steps*

Biomek i-Series Concept	
	A method is a series of steps that control the operation of the instrument. The steps, located on ribbon tabs, present groups of icons representing the steps available for a method. To build a method, you first select the step in the Method View above where you would like the next step to be located, and then, from the appropriate ribbon tab, you select the step icon you want in your method. Place and configure each step to perform the operations as desired. **NOTE** Steps already added to the Method View can be rearranged by simply selecting and dragging to the desired new location.

Creating a New Method File

To begin a method, you have the option of creating a new method or opening an existing method. In this tutorial, you'll create a new method. To create a new method:

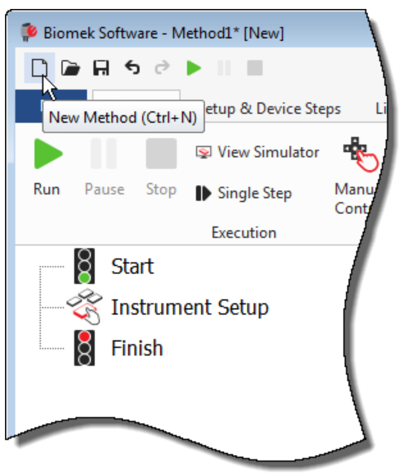
1 Select **File** > **New** > **Method**.

OR

Select **New Method** from the Quick Access Toolbar (Figure 9.1).

This creates the beginning for your new method.

Figure 9.1 New Method on the Quick Access Toolbar



2 If desired, expand the Biomek Software editor to fill the entire screen.

Understanding the Start and Finish Steps

As you can see (Figure 9.1), the Method View of the main editor now contains the **Start** and **Finish** steps that appear automatically when you create a method. These two steps are always there and indicate the beginning and end of your method. You'll insert all the rest of the steps you want the Biomek i-Series instrument to complete between **Start** and **Finish**.

When the **Start** step is highlighted in the method view, you are presented with the opportunity to create some variables in the Configuration View. Ignore this configuration for our first chapter in this tutorial.

If you want to know more in-depth information on the **Start** configuration right now, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Start Step*.

You'll learn more about using the **Finish** step in *Determining the Estimated Time for Completion (ETC) of the Method*.

Configuring the Instrument Setup Step

The next activity of this tutorial is to configure the **Instrument Setup** step for your liquid-transfer procedure. You will place on the deck:

- Tips
- Source reservoir
- Destination microplate

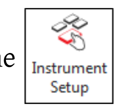
TIP If the **Instrument Setup** step, or any step, is inserted into the wrong location in the Method View, you can drag and drop it to the proper location.

To insert the **Instrument Setup** step:

---

1 Choose (highlight) **Start** in the Method View.

---

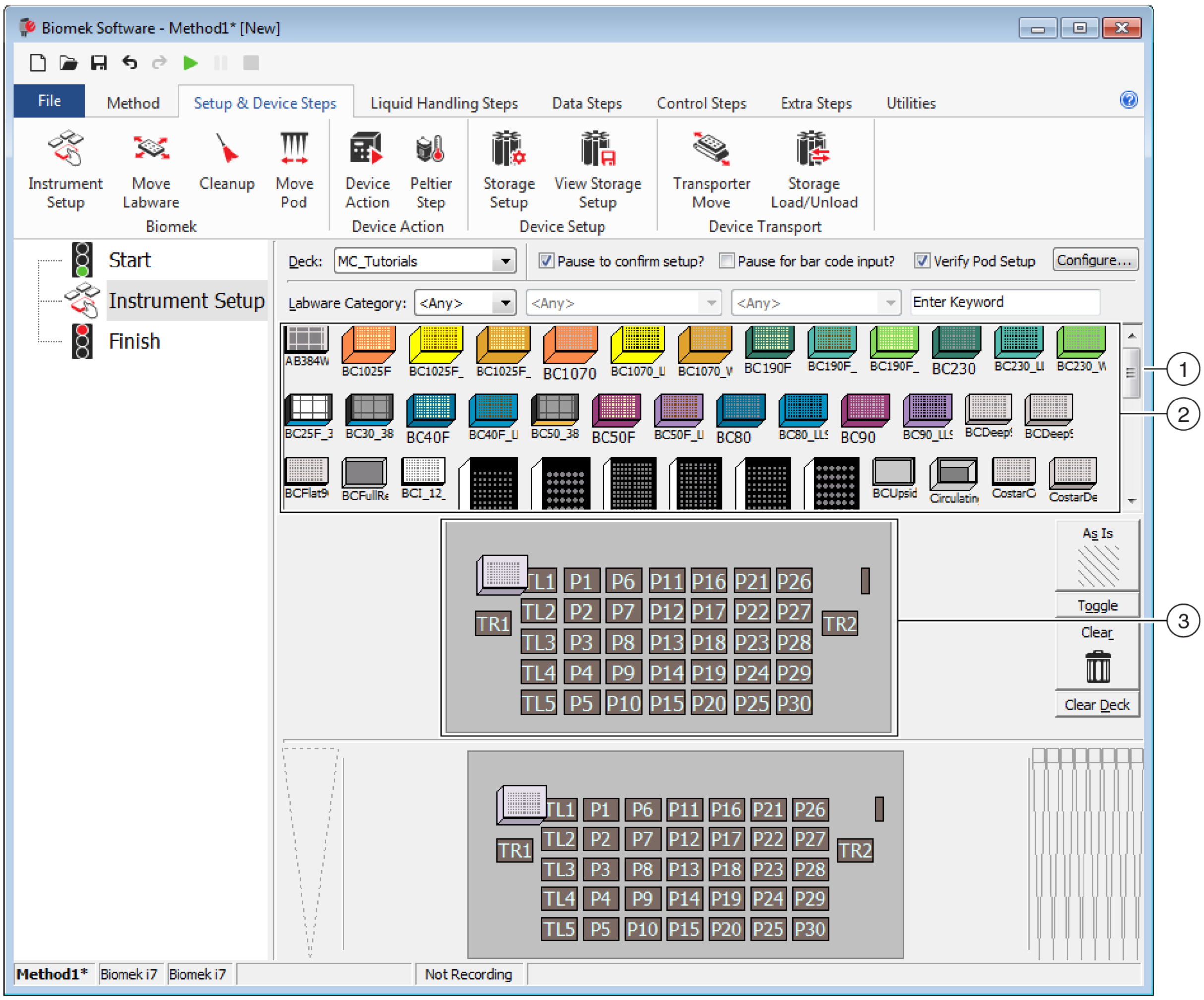
2 On the **Setup & Devices Steps** tab, in the **Biomek** group, hover your mouse over the 

(**Instrument Setup**) icon. As you hover, look at the Method View and you'll see a black bar appear just below **Start**. This black bar indicates the insertion point where your next step will appear. In this case, it's where the **Instrument Setup** step will be inserted.

TIP Another way to insert a step into the method is to click on the step icon (on the ribbon tab) and drag it to the Method View, releasing the mouse button when the black bar is in the appropriate location.

3 Click the **Instrument Setup** icon to insert the step. The **Instrument Setup** configuration appears (Figure 9.2).

Figure 9.2 Instrument Setup Step Configuration



1. Move this scroll bar down to display all the labware choices.
2. **Labware Available**: Represents the labware choices for your method. Move your selections onto the Deck Layout display.
3. **Deck Layout**: Represents the layout of your deck. Place your labware selections onto the desired deck layout positions.

TIP Each pane can be resized by hovering your mouse over the bottom or side edge of the pane until the cursor changes to a double-sided arrow (⇕ or ⇔). Click and drag the edge of the pane up, down, or to the side, depending on whether you need to make it smaller or larger, and then release the mouse when finished.

Using the **Instrument Setup** step you just inserted, you'll learn how to select and place:

- **BC230** tips onto deck position **TL2** (Tip Load Position 2)
- **Reservoir** onto deck position **P2**
- **BCFlat96** microplate onto deck position **P3**

To select and place your labware:

1 In **Deck,** verify that the correct deck is being used for this tutorial. If the correct deck is not selected, click on the drop-down and select it. Refer to CHAPTER 8, *Selecting the Tutorial Default Deck*, for details.

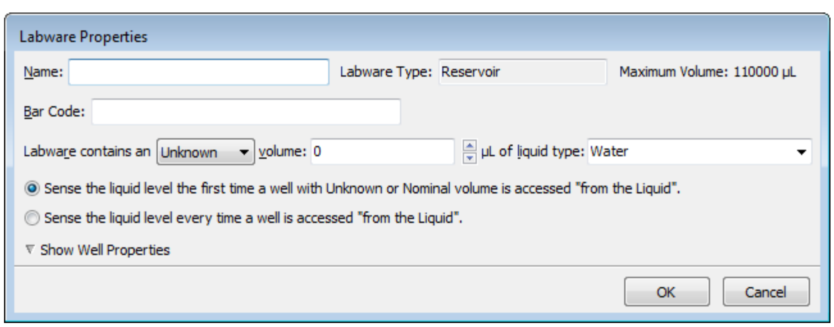
2 From the Labware Available display, click the **BC230** tips icon, then click on deck position **TL2** in the Deck Layout. Notice that when you hover the cursor over the tip box on the Deck Layout, a tool tip identifies the deck position and labware. This procedure applies to all the labware you place on the deck.

3 Using the above procedure, place a **Reservoir** onto the deck position **P2**.

4 After you have positioned the reservoir on the deck, double click it or right click and select **Properties**. This opens **Labware Properties** (Figure 9.3). Each piece of labware added to the Deck Layout is configured using **Labware Properties**. The information provided in **Labware Properties** is used when steps of a method are run or when tips are loaded and unloaded.

TIP Using **Labware Properties**, tips can be configured to be loaded back to the tip box (Multichannel pod only) or to the trash.

Figure 9.3 Labware Properties for Reservoir



5 In **Labware Properties**, you can give the reservoir a name. You'll name this one "**Rsvr**," but in general you can assign labware any name you want. Type **Rsvr** in the **Name** field. After configuration is complete, the name will appear over the reservoir in the Current Instrument Display (Figure 9.4).

TIP It's helpful to name your labware on the deck. You can assign a name that identifies the contents of the labware, or a descriptive name that fits the work being done in your laboratory. In addition, naming labware allows you to refer to it by name, rather than by position. For these reasons, naming labware can reduce confusion considerably. The name can then be used in other steps and appears in log files.

6 Leave **Bar Code** blank for this tutorial, but it can be used to identify a specific plate in certain methods.

7 In **Labware contains an**, select **Known**.

8 In the **Volume** field, type **100000**. This means you know you have 100,000 microliters of liquid in the source reservoir.

9 Choose **Water** from the **Liquid Type** drop-down menu, or type **Water** into this field.

10 Leave the default **Sense the liquid level the first time a well with Unknown or Nominal volume is accessed "from the Liquid"** selected. You'll learn more about liquid level sensing, only available with a Span-8 pod, later in the Span-8 tutorial.

11 Choose **OK**.

12 Place a **BCFlat96** microplate onto the deck in position **P3**.

13 Double click on the **P3** microplate, or right click and select **Properties**.

14 Type **Dest** in the **Name** field to represent the destination.

15 In **Labware contains a(n)**, select **Known** to indicate that you know the volume of liquid in the microplate.

16 In the **Volume** field, leave this value at **0**.

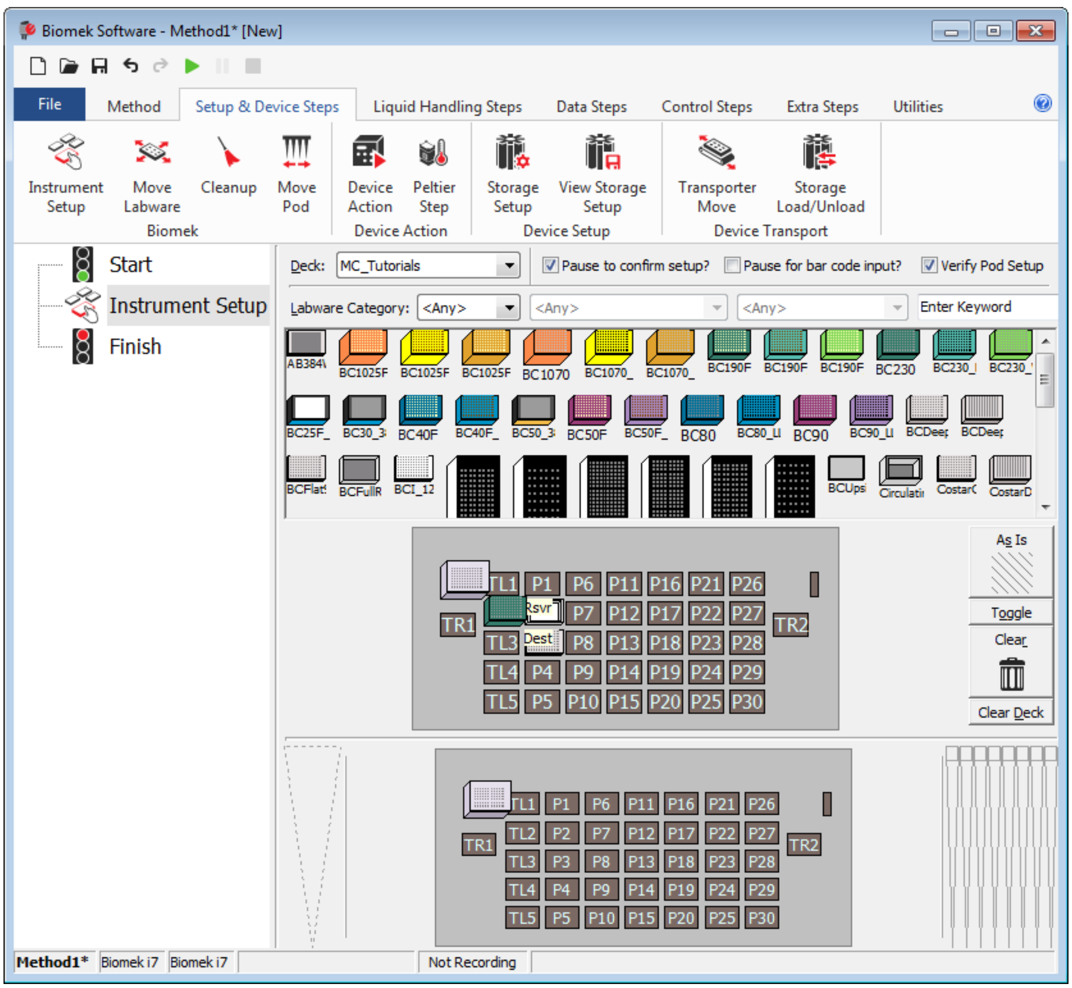
17 Do not specify a **liquid type** for this destination plate since it is presently empty.

18 Choose **OK.**

TIP Properties set for labware, such as in the steps above (name, volume, and liquid type), can be retained for easy reuse by other methods. To do this, from the **Labware Category** drop-down, which is located just above the Labware Available display, select **<Custom>**. Then drag the configured labware from the Deck Layout and drop it into the Labware Available display. The customized labware is now available for all methods using the current project.

That's it. Your deck is now set up for transferring liquid, and the main editor should look like Figure 9.4.

Figure 9.4 Instrument Setup Step Completed



Setting Up the Liquid Transfer

Now you are ready to insert and configure your method to transfer liquid. Biomek Software provides a **Transfer** step, which is located in the **Basic Liquid Handling** group on the **Liquid Handling Steps** tab, that makes it easy to accomplish this task.

Configuring the **Transfer** step includes configuring:

- Tip handling
- Source labware
- Destination labware

Biomek i-Series Concept	
	The **Transfer** step for the Multichannel pod transfers liquid from one source to one or more destinations. The **Transfer** step will by default complete the following: load tips, aspirate liquid, dispense liquid, and unload tips. This concept eliminates the need to insert four separate steps, although occasionally a method may require these steps be performed individually. These individual steps are covered in the *Biomek i-Series Tutorials* (PN B54475), *Multichannel Pod — Using Individual Steps to Transfer Liquid and Handle Labware*.

Configuring Tip Handling

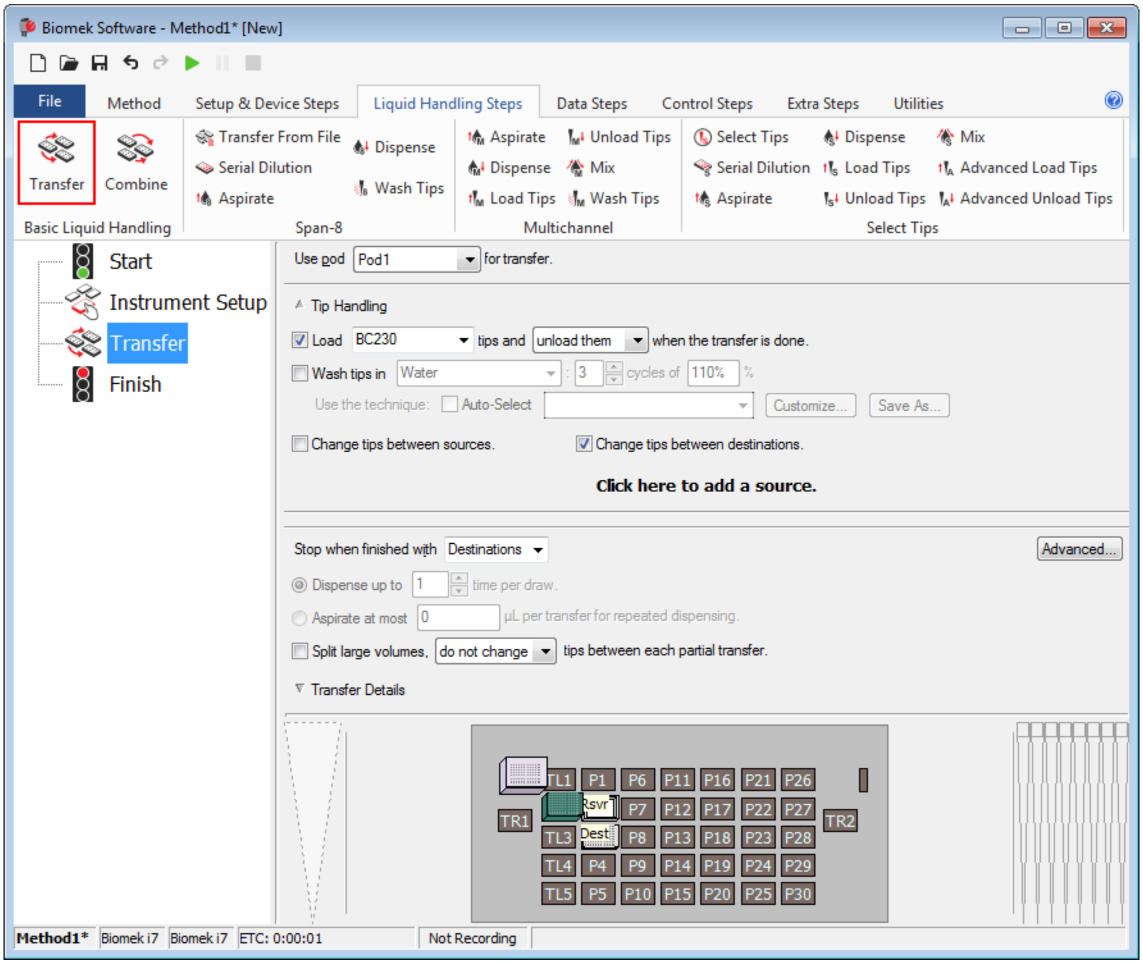
To set up a liquid transfer, insert the **Transfer** step into the Method View in the main editor, and configure the **Tip Handling** by completing the following:

1 Highlight the **Instrument Setup** step.

2 On the **Liquid Handling Steps**, in the **Basic Liquid Handling** group, click the Transfer (**Transfer**) icon.

The **Transfer** step configuration appears (Figure 9.5). Notice the Current Instrument Display at the bottom of the editor is now populated to illustrate your deck setup since it changes dynamically to match the state of the deck at the start of the current step.

Figure 9.5 Transfer Step Inserted



3 In **Tip Handling**, make sure **Load** is checked.

4 Make sure the type of tips displayed is **BC230**, the type of tips you configured in **Instrument Setup**.

TIP If multiple tip types are on the deck, and the wrong tip type is displayed, you can easily change the tip type by clicking on the correct tip box in the Current Instrument Display.

5 Make sure **unload them** is selected in the next field.

6 Make sure **Wash tips in** is ***not*** selected. Tip washing will not be included in this method.

7 Check **Change tips between sources.**

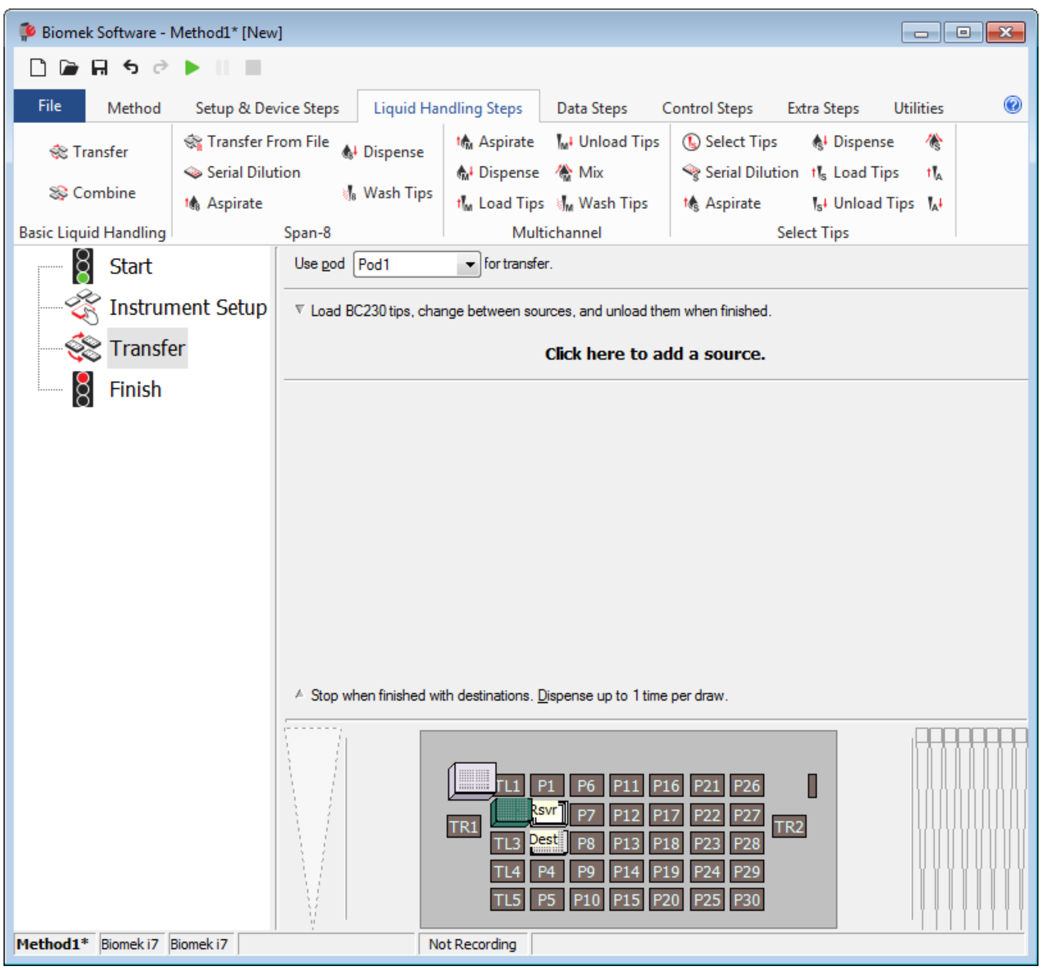
8 Uncheck **Change tips between destinations**.

9 Your tips are configured for your liquid transfer, so click the **up arrow** next to **Tip Handling** (Figure 9.5). This collapses the **Tip Handling** configuration to allow more room for labware configuration. A simple text description of the way tips will be handled is displayed in place of the expanded **Tip Handling** configuration.

TIP To make sure your tips are going to behave the way you want during method execution, simply collapse the **Tip Handling** configuration at any time during the process. The sentence displayed describes what you have configured and how the tips will be handled. If the description is not how you want the tips handled, expand the configuration and change it.

10 You will not be changing the **Transfer Details** section at this time, so click the **down arrow** next to **Transfer Details** to collapse the **Transfer Details** configuration to a summary. This gives you more room for the **Source** and **Destination** configurations. The editor now looks like Figure 9.6.

Figure 9.6 Tip Handling Configured and Collapsed



Configuring Source Labware

Now you will configure the source labware. Here you will specify from which labware liquid will be aspirated and the height to which the tip descends into the labware before aspirating.

To configure the reservoir named **Rsvr** as the source labware:

1. Click on **Click here to add a source**.

2. Click on **Rsvr** labware on the **P2** position in the Current Instrument Display. As you can see, the information you supplied during **Instrument Setup** is displayed in the source labware configuration.

3. In the **Technique** drop-down, select the **MC P300 High** technique.

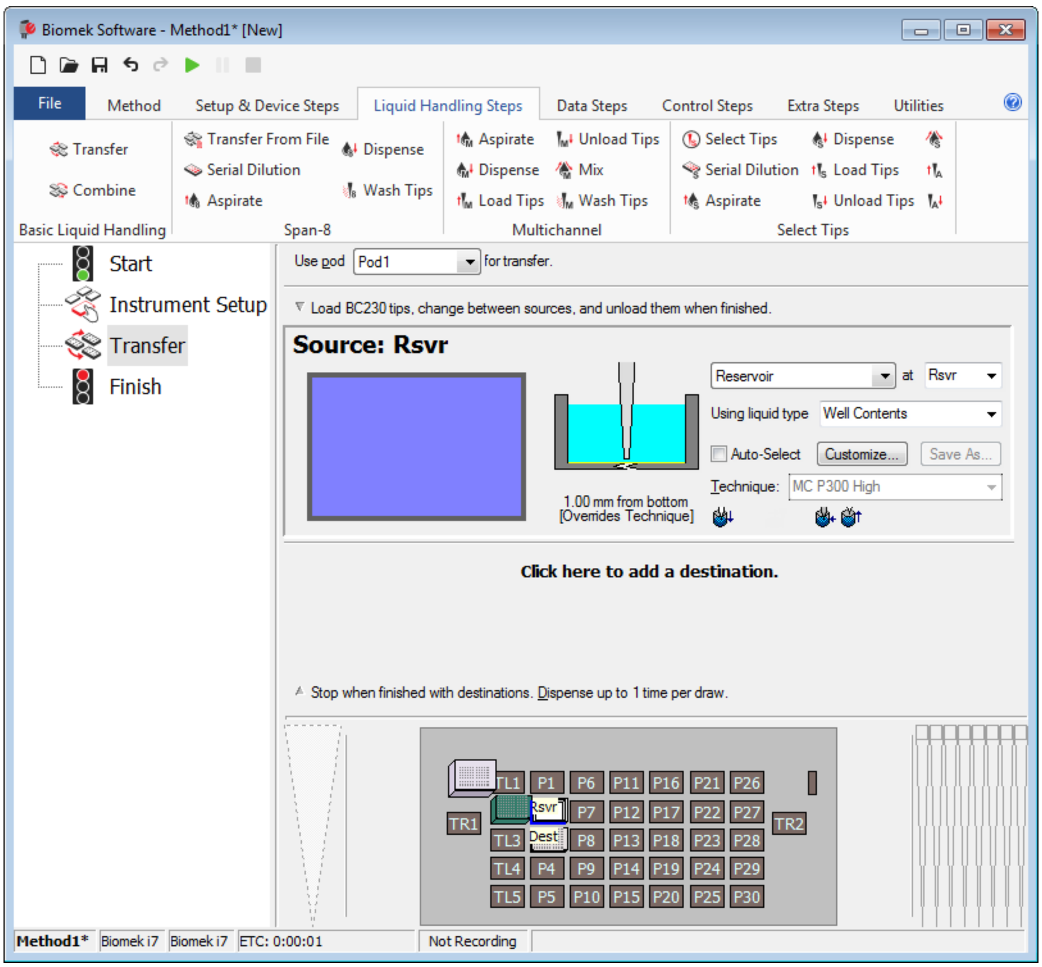
4. Right click on the large tip illustration next to the reservoir graphic in the configuration and choose **Measure from Bottom**.

   TIP After you click on the tip, you can adjust the height more precisely by using the up or down arrow keys on your keyboard to change the height by 0.10 mm or you can use the **Page Up** and **Page Down** keys to change the height by 1.0 mm with each press of the key. You can also right click on the graphic, then select **Custom Height** from the menu that appears. When customizing the tip height, you are overriding the Technique selected for aspirating liquid. To learn more about configuring Techniques and using the **Technique Browser**, refer to the *Biomek i-Series Software Reference Manual*, PN B56358, *Understanding and Creating Techniques*.

5 To adjust and set the aspirate height to which the tip descends into the reservoir, place the **mouse cursor over the tip illustration**. When the cursor turns into a hand, hold the left mouse button down to move the hand up and down until the depth is as close to as you can get. Then adjust the height precisely to 1.00 mm using the **Tip** described in step 4 above. There is a slight break in the bottom of the source reservoir graphic with the large tip that indicates that the reservoir is wider than the graphic can display.

The source labware is complete, and the editor now looks like Figure 9.7.

Figure 9.7 Configured Source Labware



Configuring Destination Labware

Here you will configure where you want the water from the source reservoir to be dispensed. In this case, you want to dispense water into the **BCFlat96** microplate on deck position **P3**.

To do this:

1. Click the **Dest** microplate in the Current Instrument Display. This one operation accomplishes the same tasks as steps 1 and 2 of *Configuring Source Labware*. Notice that the source labware configuration fields are now replaced with a brief sentence summary of the setup. When the source configuration is collapsed, it can be opened by clicking anywhere in the collapsed configuration area.

   TIP If you accidentally open too many destination configurations, just right click on the title in the configuration. Click **Delete** from the menu and the entire configuration goes away.

2. The volume field is highlighted in the destination configuration, which allows you to designate the amount of liquid to be dispensed. For this tutorial, you're transferring 100 µL; so type **100** into the volume field. This means you will be dispensing 100 µL into each of the 96 wells; so in this case, you're dispensing a total of 9600 µL into the 96-well microplate.

3. In the **Technique** drop-down, select the **MC P300 High** technique.

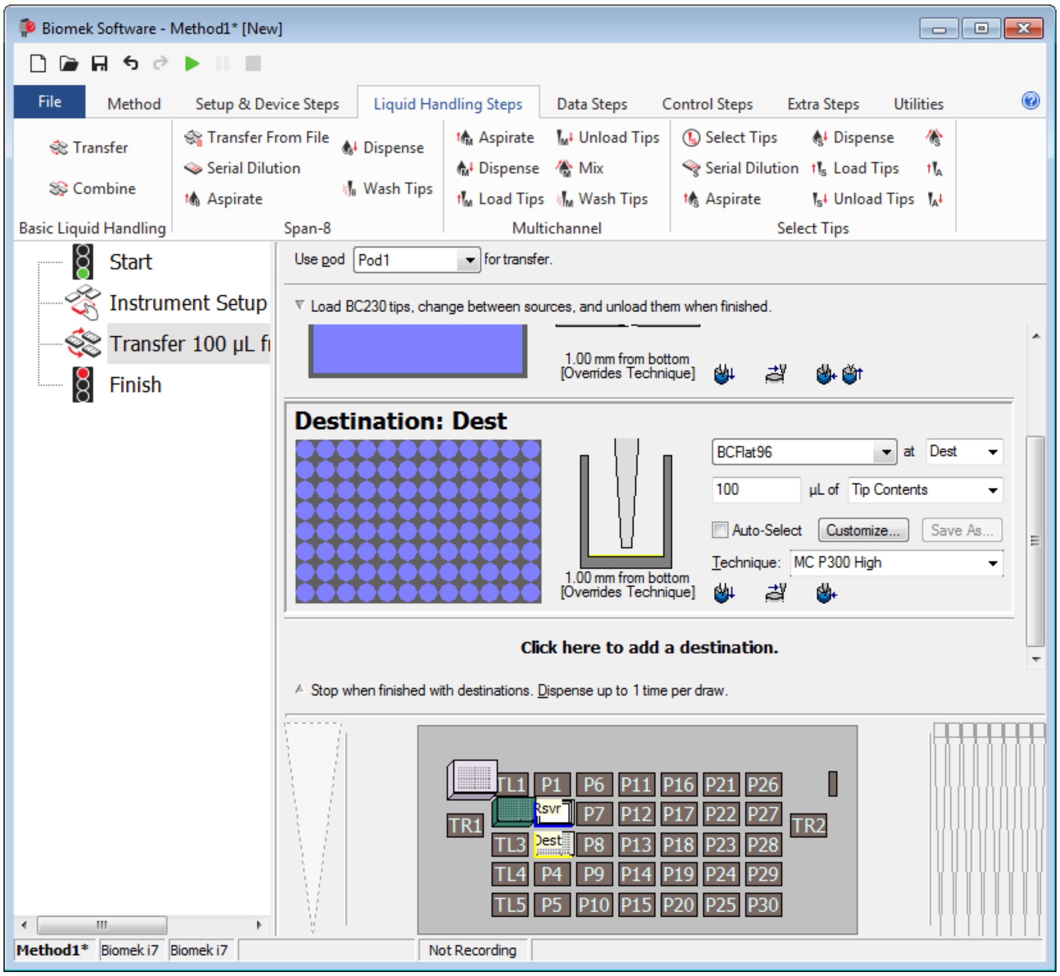
4. Right click on the large tip illustration and choose **Measure from Bottom**.

   NOTE When customizing the tip height, you are overriding the Technique selected for dispensing liquid. To learn more about configuring Techniques and using the **Technique Browser**, refer to the *Biomek i-Series Software Reference Manual*, PN B56358, *Understanding and Creating Techniques*.

5 Set the dispense height in the large tip illustration to **1.00 mm from bottom**, using the same technique as you used for setting the aspirate height.

The destination labware is now configured and the editor looks like Figure 9.8.

Figure 9.8 Configured Destination Labware



Determining the Estimated Time for Completion (ETC) of the Method

Your liquid transfer is set up, so let's see how long it will take to run the entire method by using the **Finish** step.

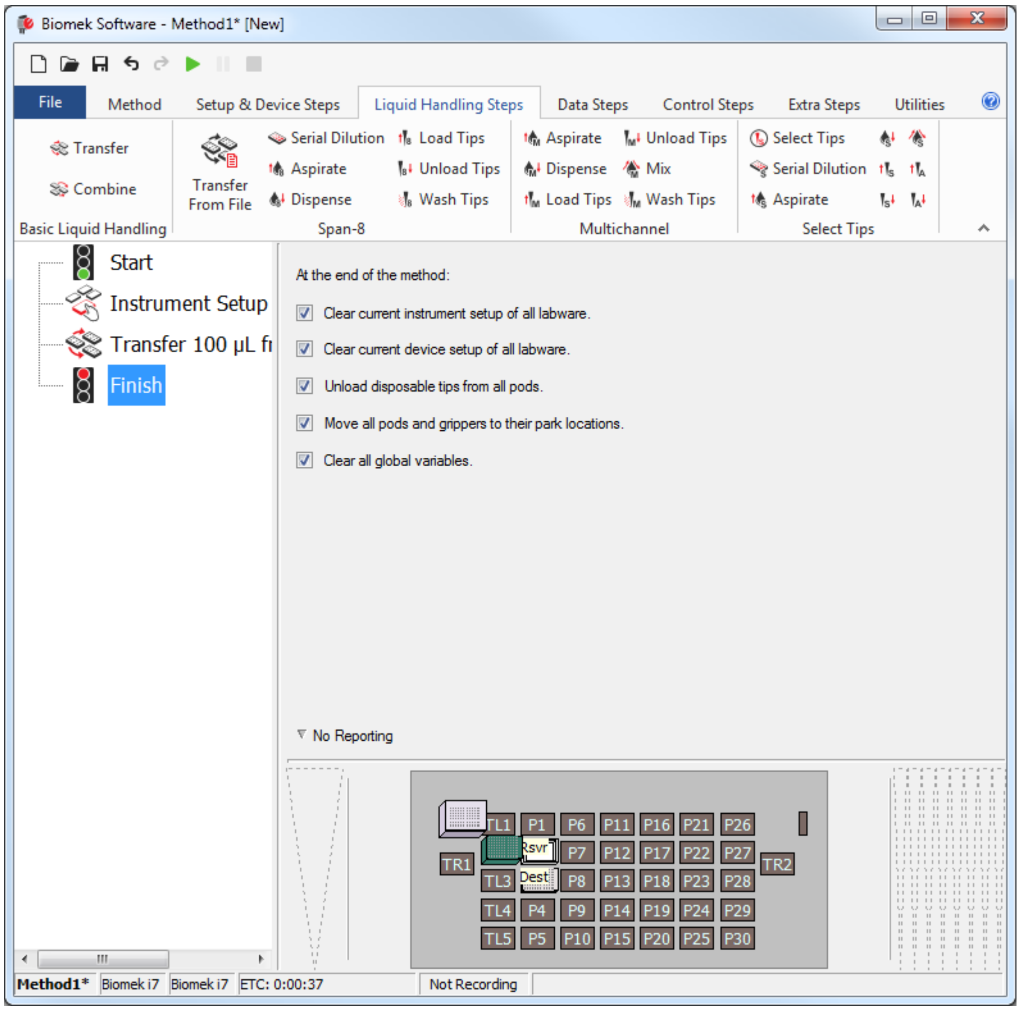
NOTE Selecting the **Finish** step also validates the method by checking for errors.

To do this:

1 Click on the **Finish** step in the Method View.

2 Check the status bar at the bottom of the editor for a display of the ETC. For this method, the ETC is approximately 37 seconds (Figure 9.9). It's all right if your ETC varies slightly.

Figure 9.9 Finish Step Displaying the ETC



1. **ETC**: The Estimated Time of Completion for the method in the Method View.

Congratulations! You've just built a liquid transfer method using Biomek Software that:

- Prepared the main editor for a new method.
- Set up the deck and the configured the labware you want to use using an **Instrument Setup** step.
- Added and configured a liquid transfer using a **Transfer** step.

Saving a Method

You will save the method you've just created.

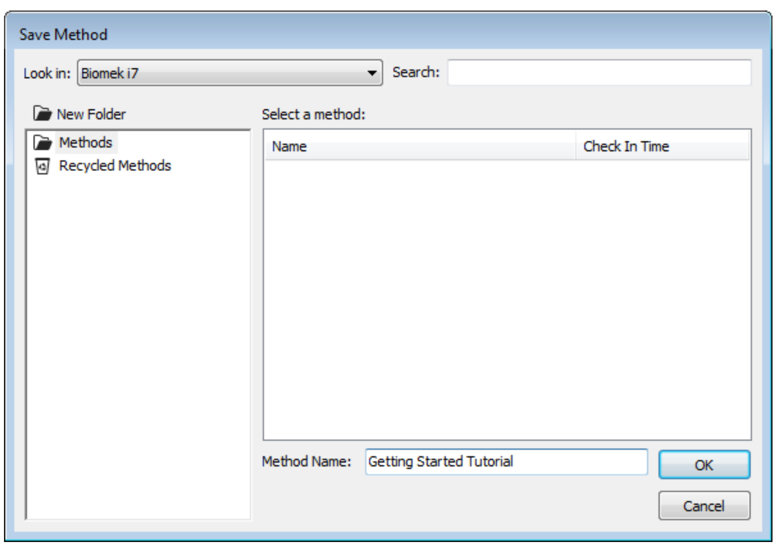
Biomek i-Series Concept	
	Methods can be saved at any time during their development. Saving a method automatically checks in the method, creating a record of the revision that preserves the method configuration at the time it was saved. Revisions may be accessed from the revision history at a later time. If any project items, such as labware definitions or techniques, change after the method is saved, when the method is opened next, the latest definitions are used. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Saving a Method* and *Viewing Method History* for the more information.

To save your method:

1 Select **File** > **Save** > **Method**.

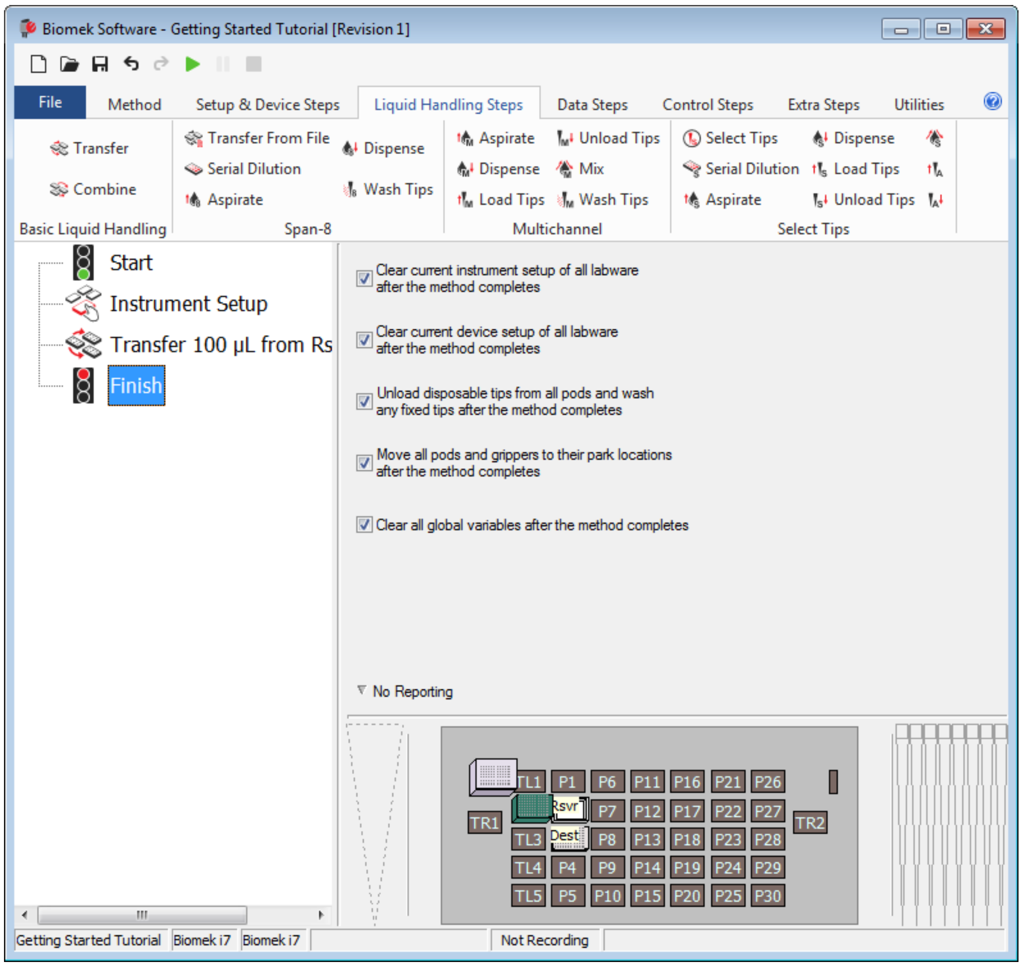
2 In **Method Name**, type the file name under which your method will be saved. For this chapter, type **Getting Started Tutorial** (Figure 9.10).

Figure 9.10 Save Method



3 Choose **OK.** Now notice how the method name in the title bar and in the bottom left corner of the main editor has changed to **Getting Started Tutorial [Revision 1]** (Figure 9.11).

Figure 9.11 Method Name Has Changed



Running the Method

Now that you've built a method, let's run it.

When you select **Run**, the method will be validated internally to check for errors. After this validation is complete, a deck confirmation prompt will appear over the main editor; this prompt displays the deck setup as interpreted by the software.

Run your method by following the instructions in the appropriate section below:

- *Running in Simulation Mode*
- *Running the Method on Hardware*

Running in Simulation Mode

The method runs as soon as you choose **OK** on the **Instrument Setup Confirmation** pop up window. You can visually follow the run in the Method View; steps are highlighted as the step is executed.

To run the method in Simulation Mode:

---

1 Click on the (**Run**) icon on the Quick Access Toolbar.

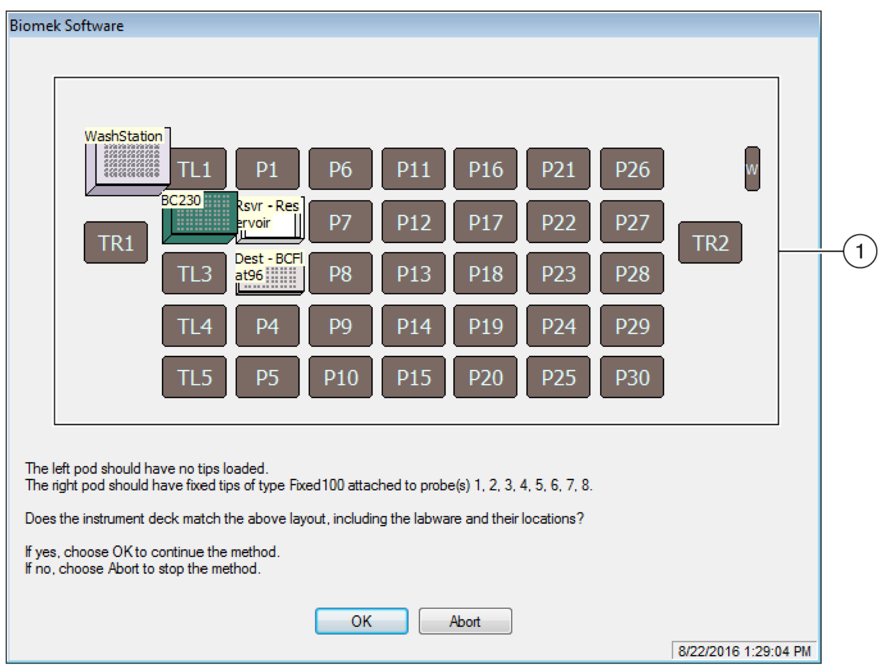
OR

From the **Method** tab, in the **Execution** group, choose Run (**Run**).

---

2 On the Deck Confirmation Prompt (Figure 9.12), select **OK**. You can visually follow the run in the Method View; steps are highlighted as the step is executed. When method is completed, the simulation window automatically disappears.

Figure 9.12 Deck Confirmation Prompt



1. Deck Setup

---

3 If necessary, re-save the method.

---

4 Close the method by selecting **File > Close Method.**

Running the Method on Hardware

To run the method on the physical instrument:

---

1 Before running the method ***on Hardware*** (on your physical instrument), you will need to home all axes:

From the **Method** tab, in the **Execution** group, select (**Home All Axes**). A window appears, showing a list of warnings.

NOTE Choosing **Home All Axes** homes all of the axes for all pods.

---

2 Choose **OK** after confirming that the **Warning** has been addressed appropriately.

NOTE Other Warnings may also appear depending upon the type of heads and deck configuration of the Biomek i-Series instrument. Respond to all warnings appropriately and choose **OK** to continue.

---

3 Click on the (**Run**) icon on the Quick Access Toolbar.

OR

From the **Method** tab, in the **Execution** group, choose (**Run**).

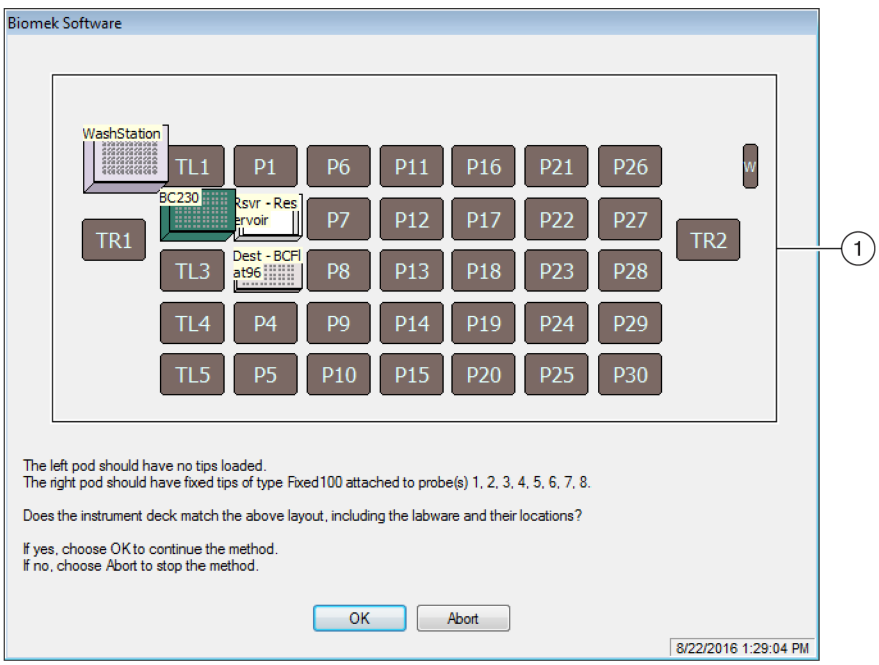
⚠ WARNING

Risk of equipment damage or contamination. Always verify that the physical instrument setup matches the instrument setup in Biomek Software. Inaccurate instrument setup can result in inappropriate pipetting or pod collision, resulting in equipment damage or hazardous waste spills.

4. Visually confirm the physical deck and pod setup, including labware placement and tip state on the pod, matches the Deck Confirmation Prompt (Figure 9.13) before continuing with the method.

   IMPORTANT Biomek Software will not produce an error if the Biomek Software deck does not match the physical instrument deck. Be sure to carefully read the confirmation prompt and follow the instructions prior to choosing **OK**.

   Figure 9.13 Deck Confirmation Prompt



   1. The deck setup is displayed here. Make sure that the correct labware is placed on the deck and the instrument matches what the software expects.

5. If the physical deck does not match the deck shown, move or place labware on the deck so that it does match. Alternatively, you may choose **Abort** and adjust the **Instrument Setup** step to match your physical deck setup.

6. When the physical deck setup matches the deck shown, choose **OK**. The method runs as soon as you choose **OK**.

7 If necessary, re-save the method.

8 Select **File > Close Method**.

CHAPTER 10

Creating a Simple Span-8 Method

What You'll Learn in Getting Started with Biomek Software

IMPORTANT Prior to beginning this chapter, read thoroughly and complete all applicable activities in CHAPTER 8, *Basic Learning Concepts*.

IMPORTANT Do not change the **Hardware Setup** for these tutorials. Instead, modify the tutorials to fit your current **Hardware Setup**. The method in this chapter uses disposable tips; if your instrument is configured with fixed tips, change the method as instructed in the corresponding **IMPORTANT** text. For additional information, refer to the *Biomek i-Series Hardware Reference Manual* (PN B54474).

In this chapter, you will learn how to create a basic liquid-transfer method on a Span-8 pod. Topics covered in this chapter are presented below:

- *Creating a New Method*
- *Configuring the Instrument Setup Step*
- *Setting Up the Liquid Transfer*
- *Saving the Method*
- *Running the Method*

Creating a New Method

Creating a new method includes:

- *Creating a New Method File*
- *Understanding the Start and Finish Steps*

Biomek i-Series Concept	
	A method is a series of steps that control the operation of the instrument. The steps, located on ribbon tabs, present groups of icons representing the steps available for a method. To build a method, you first select the step in the Method View above where you would like the next step to be located, and then, from the appropriate ribbon tab, you select the step icon you want in your method. Place and configure each step to perform the operations as desired. **NOTE** Steps already added to the Method View can be rearranged by simply selecting and dragging to the desired new location.

Creating a New Method File

To begin a method, you have the option of creating a new method or opening an existing method. In this tutorial, you'll create a new method. To create a new method:

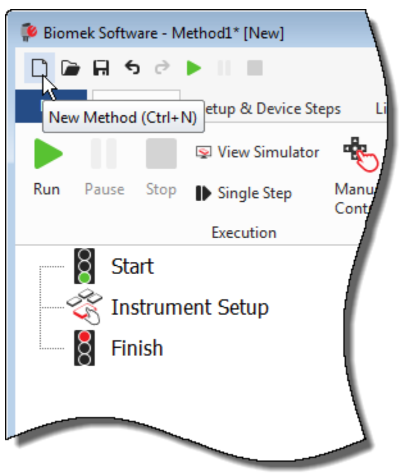
1 Select **File** > **New** > **Method**.

OR

Select **New Method** from the Quick Access Toolbar (Figure 10.1).

This creates the beginning for your new method.

Figure 10.1 New Method on the Quick Access Toolbar



2 If desired, expand the Biomek Software editor to fill the entire screen.

Understanding the Start and Finish Steps

As you can see (Figure 10.1), the Method View of the main editor now contains the **Start** and **Finish** steps that appear automatically when you create a method. These two steps are always there and indicate the beginning and end of your method. You'll insert all the rest of the steps you want the instrument to complete between **Start** and **Finish**.

When the **Start** step is highlighted in the method view, you are presented with the opportunity to create some variables in the Configuration View. Ignore this configuration for our first chapter in this tutorial.

If you want to know more in-depth information on the **Start** configuration right now, refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Configuring the Start Step*.

You'll learn more about using the **Finish** step in *Determining the Estimated Time for Completion (ETC) of the Method*.

Configuring the Instrument Setup Step

The next activity of this tutorial is to configure the **Instrument Setup** step for your liquid-transfer procedure. You will place on the deck:

- Tips

  IMPORTANT ***If Using Fixed Tips...***

  Do not add tip boxes to any of the instructions in this chapter.

- Source reservoir
- Destination microplate

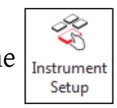
TIP If the **Instrument Setup** step, or any step, is inserted into the wrong location in the Method View, you can drag and drop it to the proper location.

To insert the **Instrument Setup** step:

---

1 Choose (highlight) **Start** in the Method View.

---

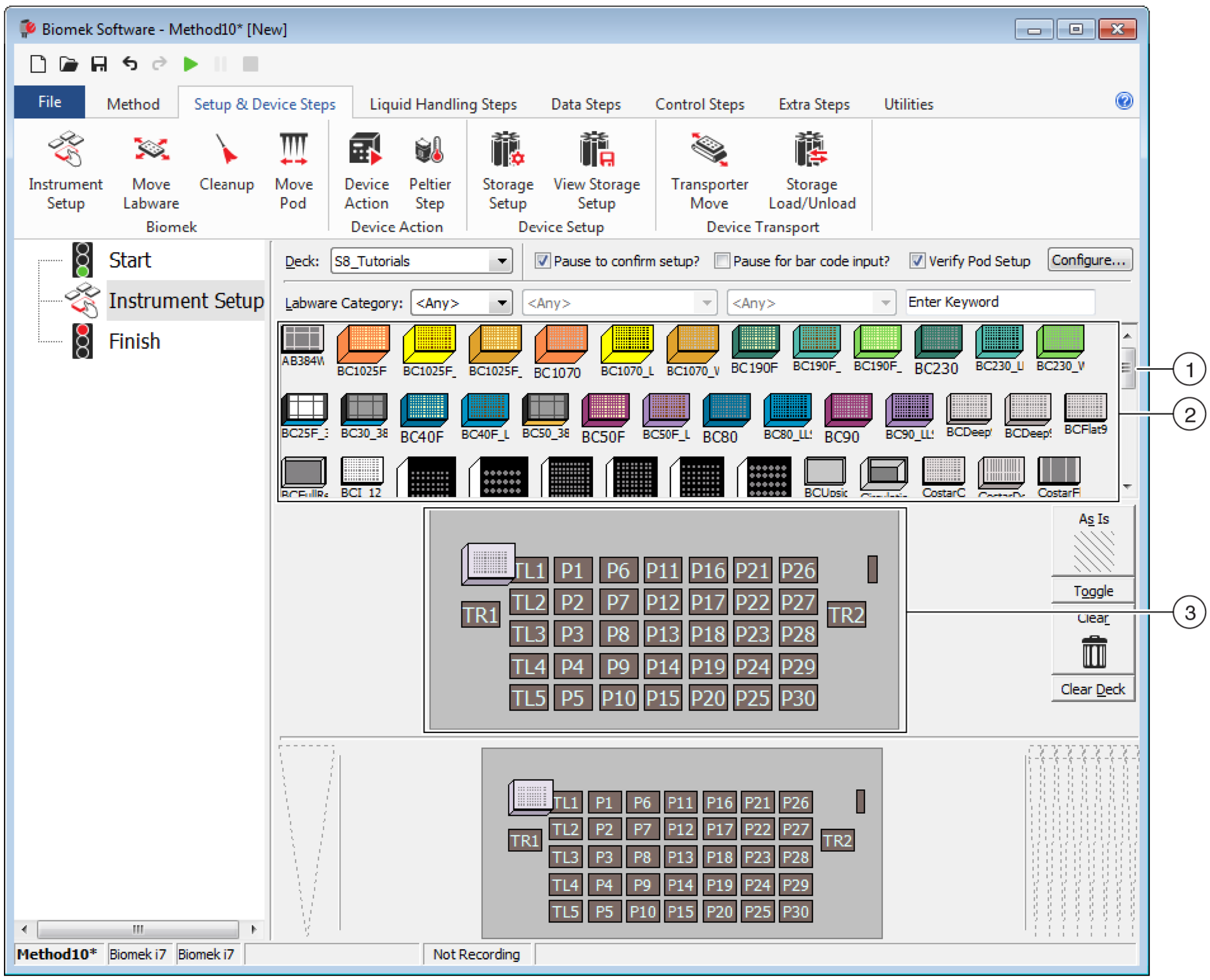
2 On the **Setup & Devices Steps** tab, in the **Biomek** group, hover your mouse over the 

(**Instrument Setup**) icon. As you hover, look at the Method View and you'll see a black bar appear just below **Start**. This black bar indicates the insertion point where your next step will appear. In this case, it's where the **Instrument Setup** step will be inserted.

TIP Another way to insert a step into the method is to click on the step icon (on the ribbon tab) and drag it to the Method View, releasing the mouse button when the black bar is in the appropriate location.

3 Click the **Instrument Setup** icon to insert the step. The **Instrument Setup** configuration appears (Figure 10.2).

Figure 10.2 Instrument Setup Step Configuration



1. Move this scroll bar down to display all the labware choices.
2. **Labware Available**: Represents the labware choices for your method. Move your selections onto the Deck Layout display.
3. **Deck Layout**: Represents the layout of your deck. Place your labware selections onto the desired deck layout positions.

TIP Each pane can be resized by hovering your mouse over the bottom or side edge of the pane until the cursor changes to a double-sided arrow (⇕ or ⇔). Click and drag the edge of the pane up, down, or to the side, depending on whether you need to make it smaller or larger, and then release the mouse when finished.

Using the **Instrument Setup** step you just inserted, you'll learn how to select and place:

- **BC230** tips onto deck position **P12**
- **Reservoir** onto deck position **P13**
- **BCFlat96** microplate onto deck position **P18**

To select and place your labware:

---

1 In **Deck,** verify that the correct deck is being used for this tutorial. If the correct deck is not selected, click on the drop-down and select it. See CHAPTER 8, *Selecting the Tutorial Default Deck*, for details.

---

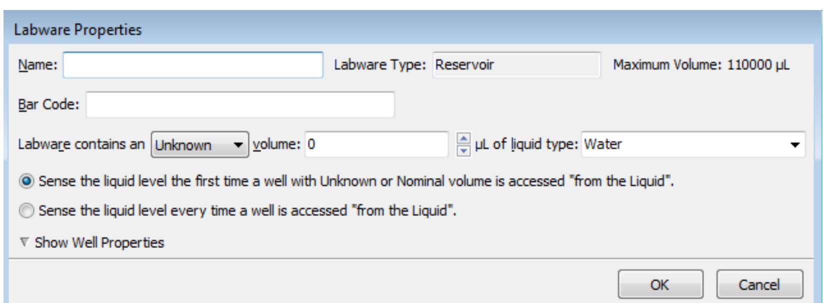
2 From the Labware Available display, click the **BC230** tips icon, and then click on deck position **P12** in the Deck Layout. Notice that when you hover the cursor over the tip boon the Deck Layout, a tool tip identifies the deck position and labware. This technique applies to all the labware you place on the deck.

---

3 Using the above procedure, place a **Reservoir** onto deck position **P13**.

a. After you have positioned the reservoir on the deck, double click it or right click and select **Properties**. This opens **Labware Properties** (Figure 10.3). Each piece of labware added to the Deck Layout is configured using **Labware Properties.** The information provided in **Labware Properties** is used when a pipetting technique is selected or when tips are loaded and unloaded.

Figure 10.3 Labware Properties for Reservoir



b. In **Labware Properties**, you can give the reservoir a name. You'll name this one "**Rsvr**," but in general, you can assign labware any name you want. Type **Rsvr** in the **Name** field. After configuration is complete, the name will appear over the reservoir in the Current Instrument Display (Figure 10.4).

TIP It's helpful to name your labware on the deck. You can assign a name that identifies the contents of the labware, or a descriptive name that fits the work being done in your laboratory. This can reduce confusion considerably.

c. Leave **Bar Code** blank for this tutorial, but it can be used to identify a specific plate in certain methods.

d. In **Labware contains an**, select **Known**.

e. In the **Volume** field, type **100000**. This means you know you have 100,000 microliters of liquid in the source reservoir.

f. Choose **Water** from the **Liquid Type** drop-down menu, or type **Water** into this field.

g. Ignore the two options to **Sense the liquid level**. Since we have known volumes in the labware, we won't use liquid level sensing in this chapter, but you'll use liquid level sensing in later chapters.

h. Choose **OK**.

---

4 Place a **BCFlat96** microplate onto the deck in position **P18**.

a. Double click on the **P18** microplate, or right click and select **Properties**.

b. Type **Dest** in the **Name** field.

c. In **Labware contains an**, select **Known**.

d. In the **Volume** field, leave this value at **0**.

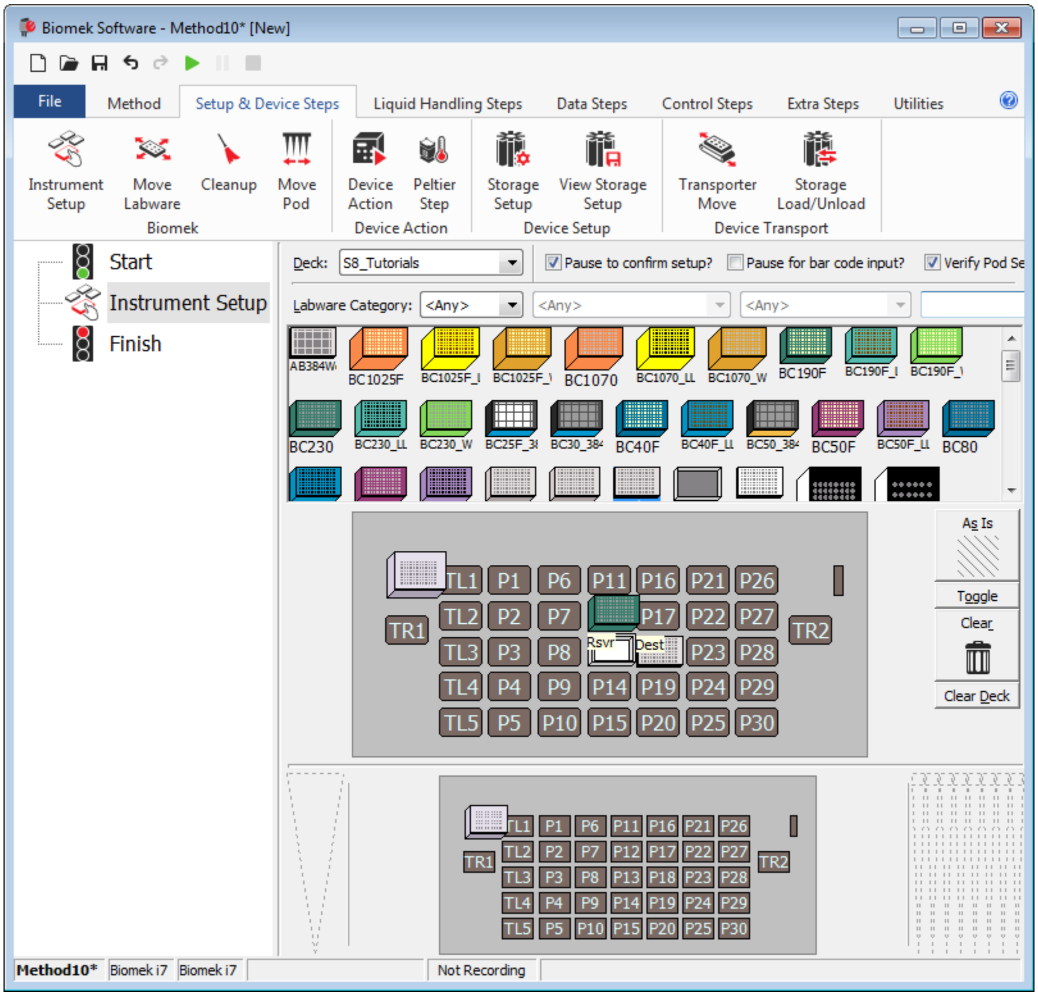
e. Do not specify a **Liquid Type** for this destination plate since it is presently empty.

f. Choose **OK**.

TIP Properties set for labware, such as in the steps above (name, volume, and liquid type), can be retained for easy reuse for other methods. To do this, from the **Labware Category** drop-down, which is located just above the Labware Available display, select **<Custom>**. Then drag the configured labware from the Deck Layout and drop it into the Labware Available display. The customized labware is now available for all methods using the current project.

That's it. Your deck is now set up for transferring liquid, and the main editor should look like Figure 10.4.

Figure 10.4 Instrument Setup Step Completed



Setting Up the Liquid Transfer

Now you are ready to insert and configure your procedure to transfer liquid. Biomek Software provides a **Transfer** step, which is located in the **Basic Liquid Handling** group on the **Liquid Handling Steps** tab, that makes it easy to accomplish this task.

Configuring the **Transfer** step includes configuring:

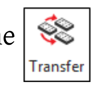
- Tip handling
- Source labware
- Destination labware

Biomek i-Series Concept	
	The **Transfer** step for the Span-8 pod transfers liquid from one source to one or more destinations. The **Transfer** step will by default complete the following: load tips, aspirate liquid, dispense liquid, and unload tips. This concept eliminates the need to insert four separate steps, although occasionally a method may require these steps be performed individually. These individual steps will be covered in the *Biomek i-Series Tutorials* (PN B54475), *Span-8 Pod — Using More Steps in a Method*.

Configuring Tip Handling

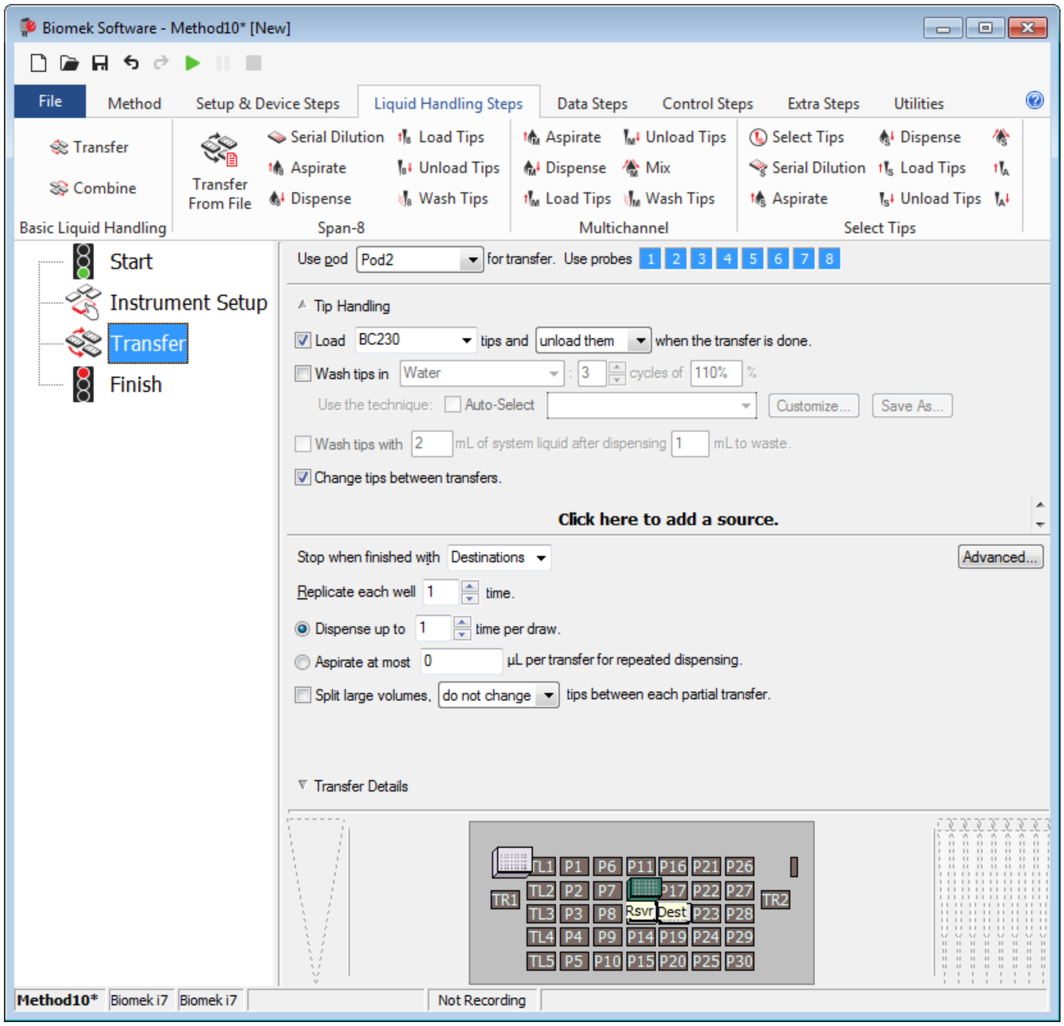
To set up a liquid transfer, insert the **Transfer** step into the Method View in the main editor, and configure the **Tip Handling** by completing the following:

1 Highlight the **Instrument Setup** step.

2 On the **Liquid Handling Steps** tab, in the **Basic Liquid Handling** group, select the 

(**Transfer**) icon. The **Transfer** step configuration appears (Figure 10.5). Notice the Current Instrument Display at the bottom of the editor is now populated to illustrate your deck setup since it changes dynamically to match the state of the deck at the start of the current step.

Figure 10.5 Transfer Step Inserted



3 In **Use pod**, verify the **Span-8 Pod** is selected. The configuration for the **Transfer** step should look like Figure 10.5. If you only have a Span-8 pod on your instrument, the Span-8 pod **Transfer** step configuration will be displayed by default.

IMPORTANT ***If Using Fixed Tips...***
Ensure the **Hardware Setup** is configured appropriately. In the **Tip Handling** section, **Load Tips** will be greyed out; however, the wash configuration will be available.

4 Make sure the type of tips displayed is **BC230**, the type of tips you configured in **Instrument Setup**.

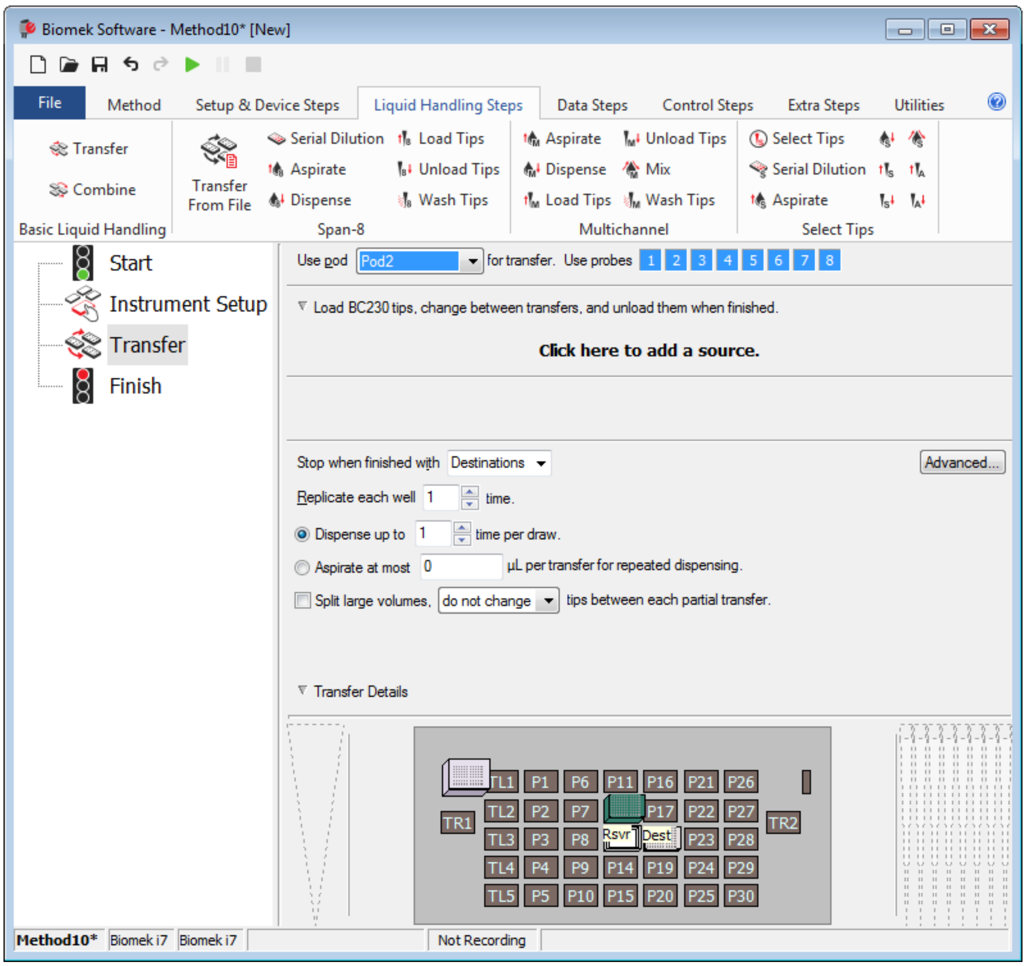
5 Make sure **unload them** is selected in the next field.

6 Ignore the tip washing options, as tip washing will not be included in this method.

7 Select **Change tips between transfers**.

8 Your tips are configured for your liquid transfer, so click the **up arrow** next to **Tip Handling** (Figure 10.5). This collapses the **Tip Handling** configuration to allow more room for labware configuration. A simple text description of the way tips will be handled is displayed in place of the expanded **Tip Handling** configuration. The editor now looks like (Figure 10.6).

Figure 10.6 Tip Handling Configured and Collapsed



Configuring Source Labware

Now you will configure the source labware. Here you will specify from which labware liquid will be aspirated and the height to which the tip descends into the labware before aspirating.

To configure the reservoir named **Rsvr** as the source labware:

1 Click on **Click here to add a source**.

2 Click on **Rsvr** labware on the **P13** position in the Current Instrument Display. As you can see, the information you supplied during **Instrument Setup** is displayed in the source labware configuration.

3 Right click on the large tip illustration next to the reservoir graphic in the configuration and choose **Measure from Bottom**.

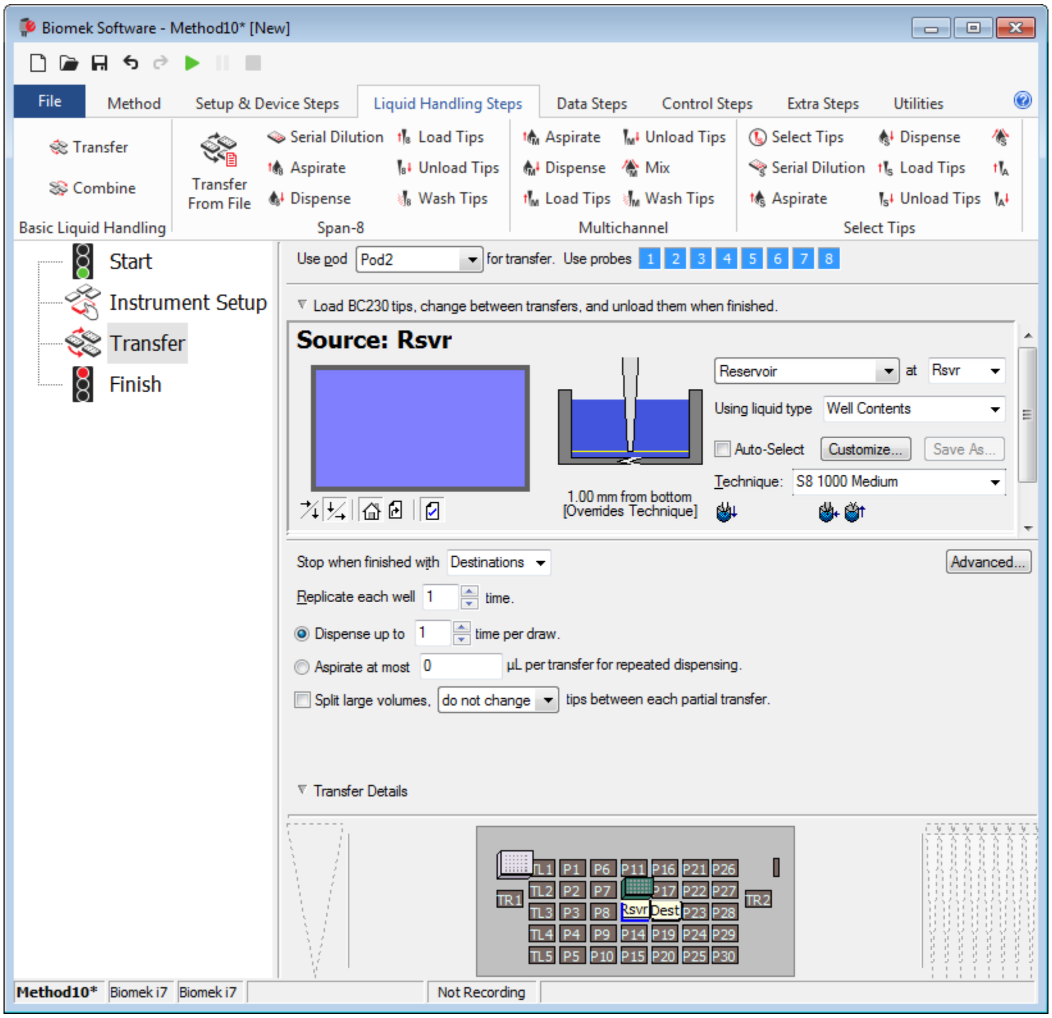
TIP After you click on the tip, you can adjust the height more precisely by using the up or down arrow keys on your keyboard to change the height by 0.10 mm or you can use the **Page Up** and **Page Down** keys to change the height by 1.0 mm with each press of the key. You can also right-click on the graphic, then select **Custom Height** from the menu that appears. When customizing the tip height, you are overriding Technique selected for aspirating liquid. To learn more about configuring Techniques and using the **Technique Browser**, refer to the *Biomek i-Series Software Reference Manual*, PN B56358, *Understanding and Creating Techniques*.

4 To adjust and set the aspirate height to which the tip descends into the reservoir, place the **mouse cursor over the tip illustration**. When the cursor turns into a hand, hold the left mouse button down to move the hand up and down until the depth is as close to **1.00 mm from bottom** as you can get. Then adjust the height precisely to 1.00 mm using the **TIP** described in Step 3. There is a slight break in the bottom of the source reservoir graphic with the large tip that indicates that the reservoir is wider than the graphic can display.

5 In the **Technique** drop-down, select the **S8 1000 Medium** technique.

The source labware is complete, and the editor now looks like Figure 10.7.

Figure 10.7 Configured Source Labware



Configuring Destination Labware

Here you will configure where you want the water from the source reservoir to be dispensed. In this case, you want to dispense water into the **BCFlat96** microplate on deck position **P18**.

To do this:

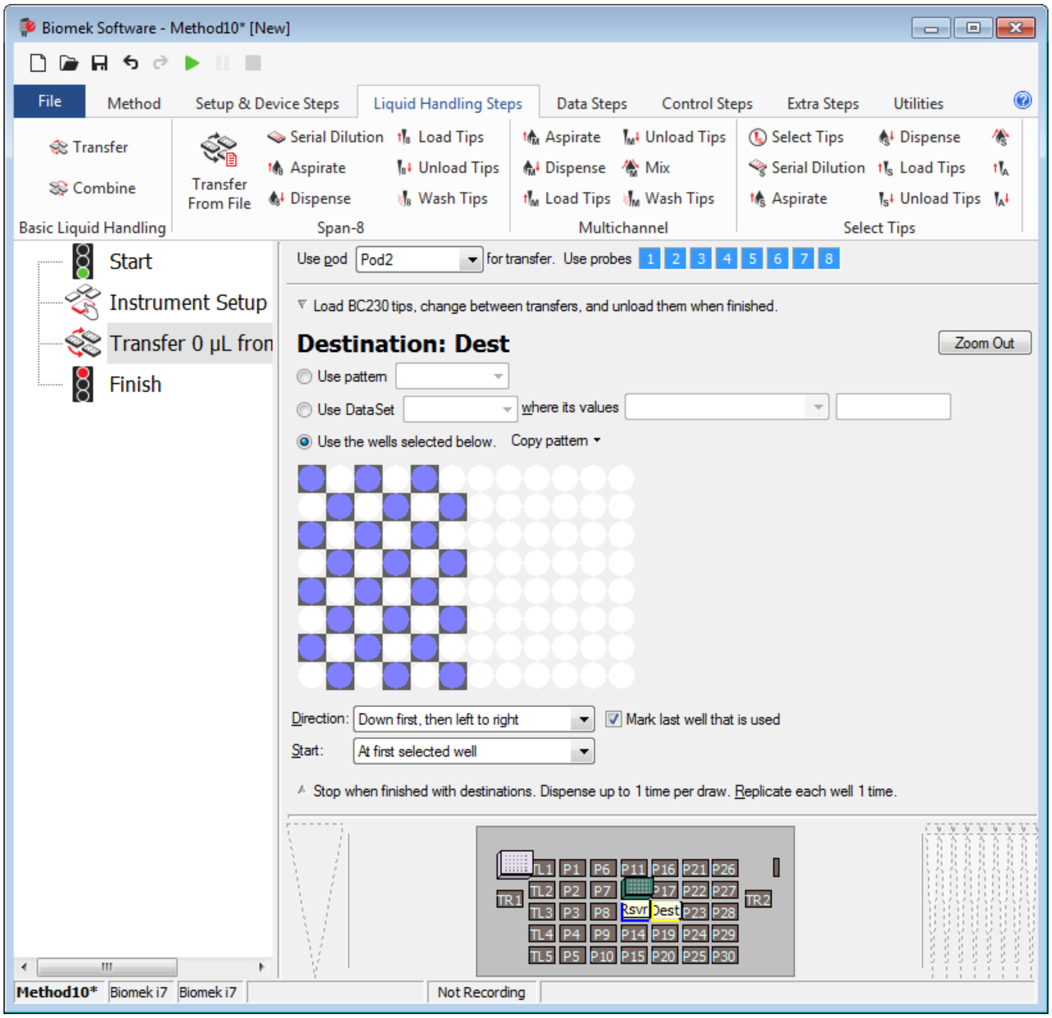
1 Click the **Dest** microplate in the Current Instrument Display. This one operation accomplishes the same tasks as steps 1 and 2 of *Configuring Source Labware*. Notice that the source labware configuration fields are now replaced with a brief sentence summary of the setup. If you want to reopen this source configuration for any reason, click anywhere in the collapsed configuration area.

TIP If you accidentally open too many destination configurations, just right click on the title in the configuration. Click **Delete** from the pop-up menu and the entire configuration goes away.

2 Double click the **Destination Labware** in the step configuration to zoom in on the labware. All of the wells are selected by default.

3 Since all of the wells are selected by default, select the first well of the first column by clicking on the well. Now the only well that is selected is that first well that you just clicked; all the other wells are deselected. Then, select every other well of the first six columns by holding down (Ctrl) key and clicking the wells. Your pattern should look like Figure 10.8. You have just configured which wells will be filled with water from the source reservoir **Rsvr**.

Figure 10.8 Destination Labware Zoomed In



---

4 Allow the default selections in **Direction**, **Start**, and **Mark last well that is used** to remain.

---

5 Choose **Zoom Out**.

---

6 Select the **Volume** field (Figure 10.9), which allows you to designate the amount of liquid to be dispensed. For this tutorial, you're transferring 100 µL; so type **100** into the **Volume** field. This means you will be dispensing 100 µL into each of the wells you selected.

---

7 In the **Technique** drop-down, select the **S8 1000 Medium** technique.

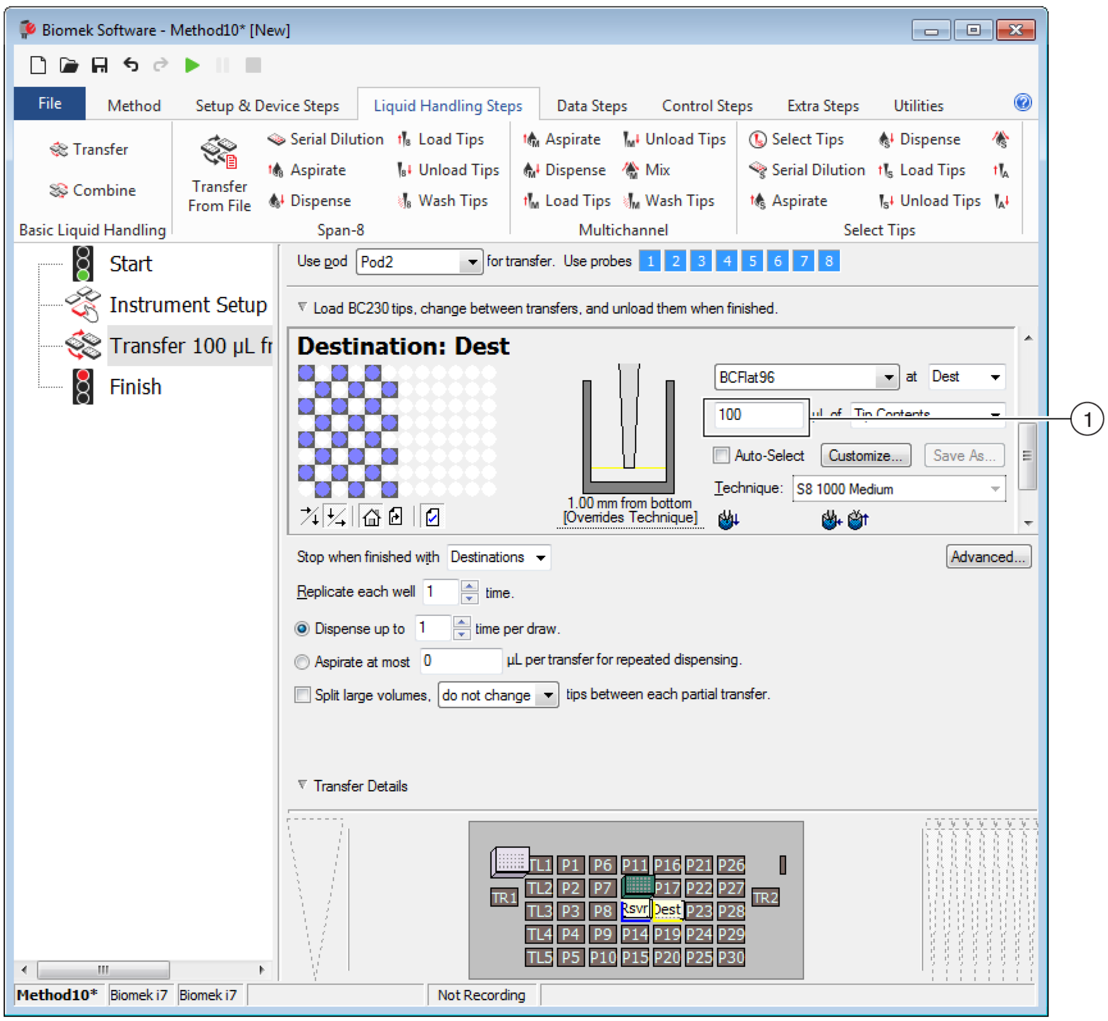
8 Right click on the large tip illustration and choose **Measure from Bottom**.

NOTE When customizing the tip height, you are overriding Technique selected for dispensing liquid. To learn more about configuring Techniques and using the **Technique Browser**, refer to the *Biomek i-Series Software Reference Manual*, PN B56358, *Understanding and Creating Techniques*.

9 Set the dispense height in the large tip illustration to **1.00 mm from bottom**, using the same technique as you used for setting the aspirate height.

The destination labware is now configured and the editor looks like Figure 10.9.

Figure 10.9 Configured Destination Labware



1. **Volume** field

Determining the Estimated Time for Completion (ETC) of the Method

Your liquid transfer is set up, so let's see how long it will take to run the entire method by using the **Finish** step.

NOTE Selecting the **Finish** step also validates the method by checking for errors.

To do this:

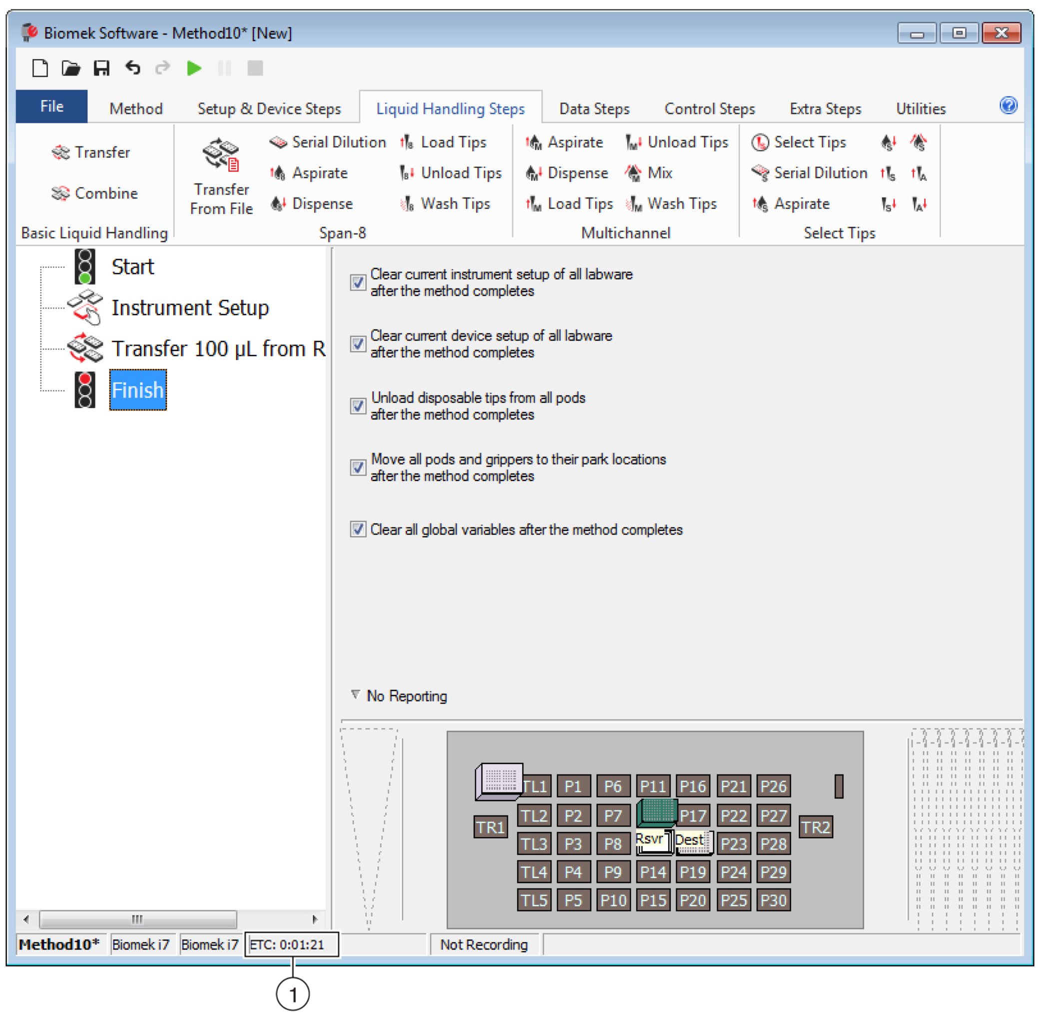
---

1 Click on the **Finish** step in the Method View.

---

2 Check the status bar at the bottom of the editor for a display of the ETC. For this method, the ETC is approximately 1:21 (Figure 10.10). It's all right if your ETC varies slightly. Variations in ETC occur due to your deck layout and/or instrument configuration.

Figure 10.10 Finish Step Displaying the ETC



1. **ETC**: The Estimated Time of Completion for the method in the Method View.

Congratulations! You've just built a liquid transfer method using Biomek Software that:

- Prepared the main editor for a new method.
- Set up the deck and the configured labware you wanted to use using an **Instrument Setup** step.
- Added and configured a liquid transfer using a **Transfer** step.

Saving the Method

You will save the method you've just created.

Biomek i-Series Concept	
	Methods may be saved at any time during their development. Saving a method automatically checks in the method, creating a record of the revision that preserves the method configuration at the time it was saved. Revisions may be accessed from the revision history at a later time. If any project items, such as labware definitions or techniques, change after the method is saved, when the method is opened next, the latest definitions are used. Refer to the *Biomek i-Series Software Reference Manual* (PN B56358), *Saving a Method* and *Viewing Method History* for more information.

To save your method:

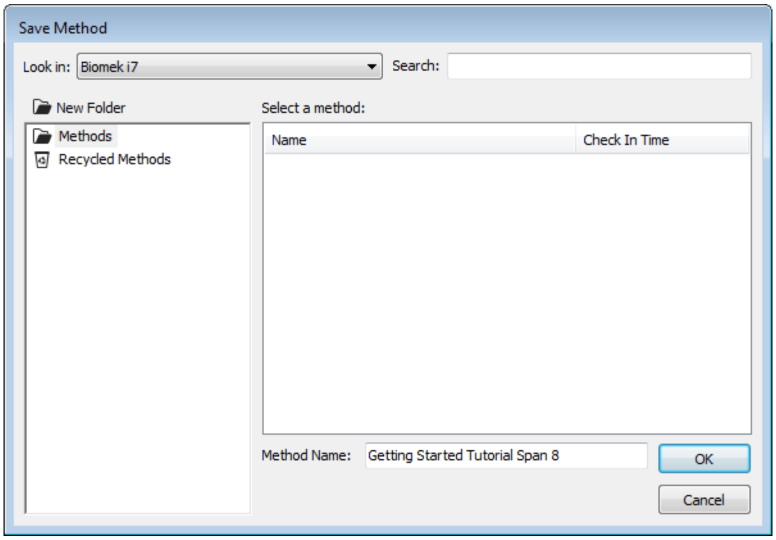
1 Select the (**Save Method**) icon from the Quick Access Toolbar.

OR

Select **File** > **Save** > **Method**.

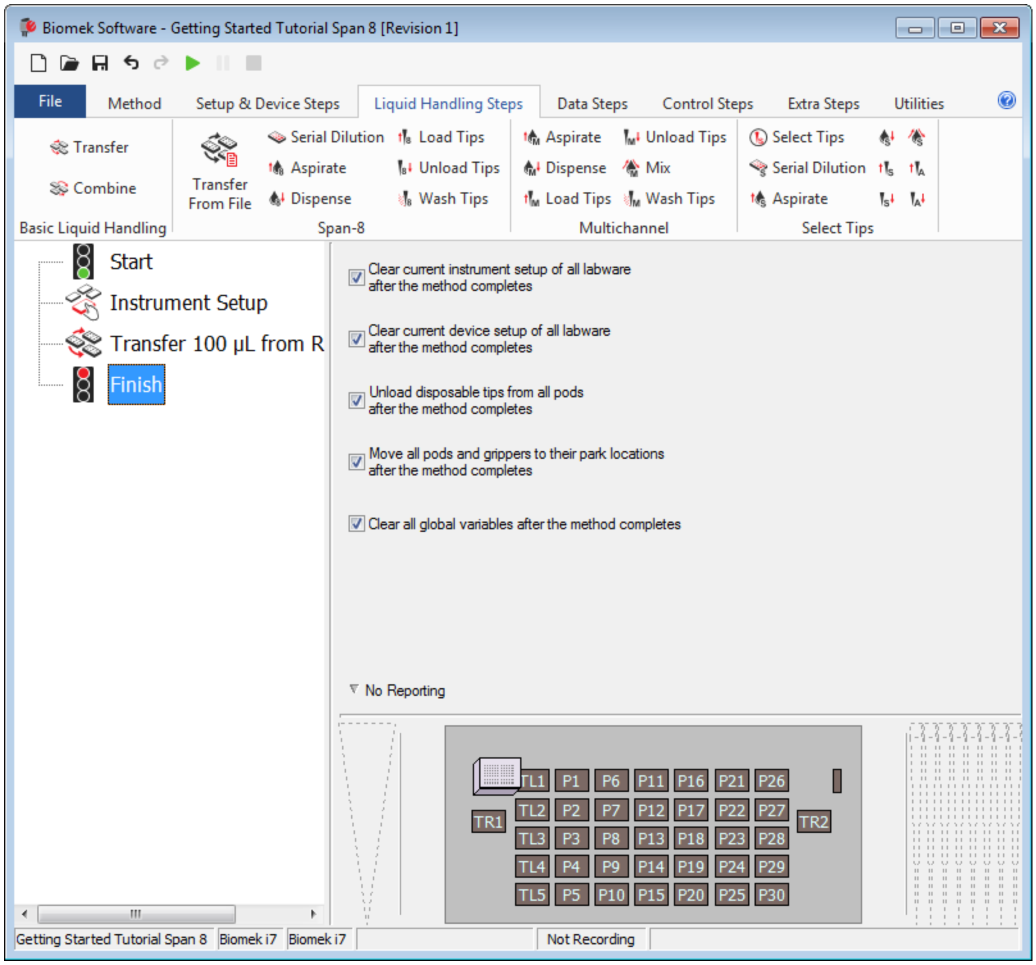
2 In **Method Name**, type the file name under which your method will be saved. For this chapter, type **Getting Started Tutorial Span 8** (Figure 10.11).

Figure 10.11 Save Method



3 Choose **OK.** Now notice how the method name in the main editor has changed to **Getting Started Tutorial Span 8 [Revision 1]** (Figure 10.12).

Figure 10.12 Method Name Has Changed



Running the Method

Now that you've built a method, let's run it.

When you select **Run**, the method will be validated internally to check for errors. After this validation is complete, a deck confirmation prompt will appear over the main editor; this prompt displays the deck setup as interpreted by the software.

Run your method by following the instructions in the appropriate section below:

- *Running in Simulation Mode*
- *Running the Method on Hardware*

Running in Simulation Mode

The method runs as soon as you choose **OK** on the **Instrument Setup Confirmation** pop up window. You can visually follow the run in the Method View; steps are highlighted as the step is executed.

To run the method in Simulation Mode:

---

1 Click on the (**Run**) icon on the Quick Access Toolbar.

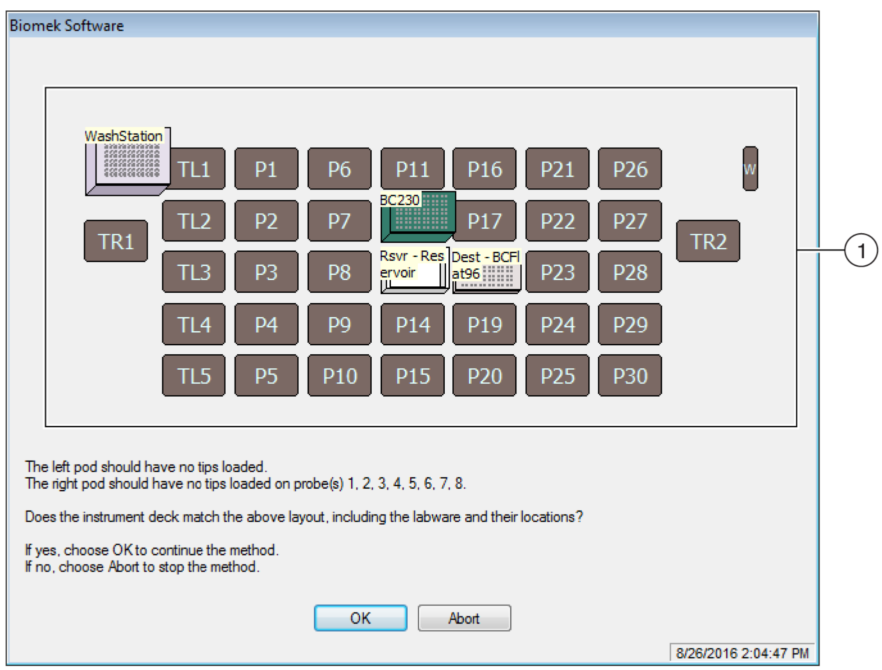
OR

From the **Method** tab, in the **Execution** group, choose Run (**Run**).

---

2 On the Deck Confirmation Prompt (Figure 10.13), select **OK**. You can visually follow the run in the Method View; steps are highlighted as the step is executed. When method is completed, the simulation window automatically disappears.

Figure 10.13 Deck Confirmation Prompt



1. Deck Setup

---

3 If necessary, save the method.

---

4 Close the method by selecting **File > Close Method**.

Running the Method on Hardware

To run the method on the physical instrument:

1 Before running the method ***on Hardware*** (on your physical instrument), you will need to home all axes:

From the **Method** tab, in the **Execution** group, select 

(**Home All Axes**). A window appears, showing a list of warnings.

NOTE Choosing **Home All Axes** homes all of the axes for all pods.

2 Choose **OK** after confirming that the **Warning** has been addressed appropriately.

NOTE Other Warnings may also appear depending upon the type of heads and deck configuration of the Biomek i-Series instrument. Respond to all warnings appropriately and choose **OK** to continue.

3 Click on the  (**Run**) icon on the Quick Access Toolbar.

OR

From the **Method** tab, in the **Execution** group, choose 

(**Run**).

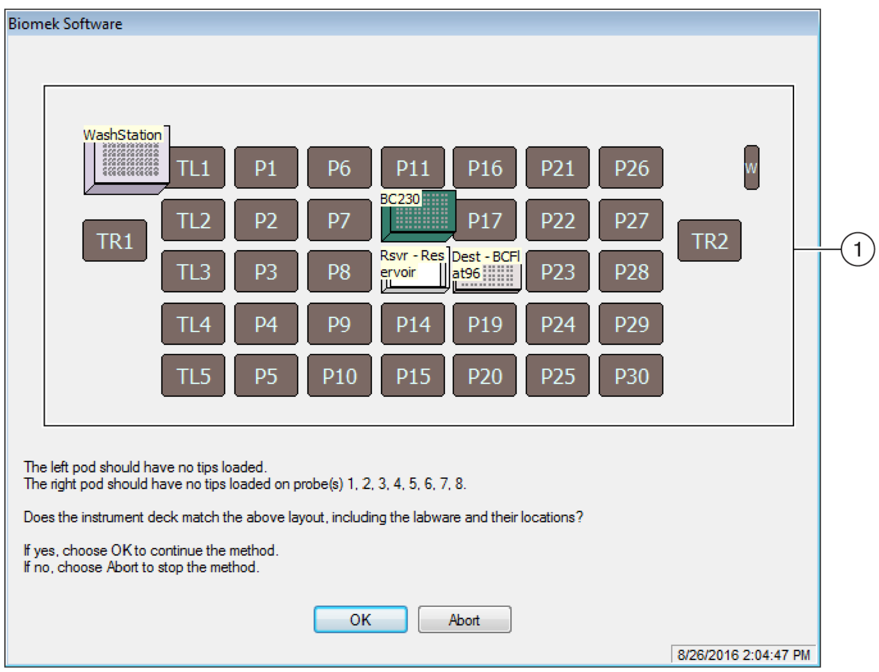
⚠ WARNING

Risk of equipment damage or contamination. Always verify that the physical instrument setup matches the instrument setup in Biomek Software. Inaccurate instrument setup can result in inappropriate pipetting or pod collision, resulting in equipment damage or hazardous waste spills.

4 Visually confirm the physical deck and pod setup, including labware placement and tip state on the pod, matches the Deck Confirmation Prompt (Figure 10.14) before continuing with the method.

IMPORTANT Biomek Software will not produce an error if the Biomek Software deck does not match the physical instrument deck. Be sure to carefully read the confirmation prompt and follow the instructions prior to choosing **OK**.

Figure 10.14 Deck Confirmation Prompt



1. The deck setup is displayed here. Make sure that the correct labware is placed on the deck and the pod matches what the software expects.

5 If the physical deck does not match the deck shown, move or place labware on the deck so that it does match. Alternatively, you may choose **Abort** and adjust the **Instrument Setup** step to match your physical deck setup.

6 When the physical deck setup matches the deck shown, choose **OK**. The method runs as soon as you choose **OK**.

7 If necessary, save the method.

8 Select **File > Close Method**.

APPENDIX A

Notice for Biomek FX^P/NX^P Users

Overview

This appendix provides an overview of ALPs and hardware and software features used with the Biomek FX^P/NX^P system that are either no longer available on the Biomek i-Series system or require support to use with your Biomek i-Series system. In most cases, a similar upgrade has replaced the discontinued items, and, if applicable, these items are discussed in the sections below.

The features that have remained consistent to Biomek FX^P/NX^P are discussed throughout the Biomek i-Series documentation set. See *Biomek i-Series User Manuals* located in the *Introduction* for a description of each manual relating to the Biomek i-Series of instruments.

Hardware Compatibility

The Biomek i-Series instruments are manufactured to contain design enhancements in comparison to Biomek FX^P/NX^P instruments. Due to these improvements, some of the features are no longer necessary to complete the same function on Biomek i-Series instruments. Discontinued features include the following:

- **Purge Pump:** The Purge Pump is not compatible with the Biomek i-Series syringe pumps and system fluid tubing.

  Remedy: Increase time allowed to properly purge system fluid tubing through **Manual Control**. Optimize liquid pipetting speeds for the installed syringe size on the instrument.
- **Speed Pump:** The Speed Pump is not compatible with the Biomek i-Series syringe pumps and system fluid tubing.

  Remedy: Increase time allowed to properly purge system fluid tubing through **Manual Control**. Optimize liquid pipetting speeds for the installed syringe size on the instrument.

Software Compatibility

Biomek Software and SAMI EX Software have been enhanced in comparison to prior versions of the software. Due to system-level changes, there are a few features of the software systems that are not functional on the Biomek i-Series system; these include the following:

- **Biomek FX^P/NX^P Methods**: Biomek FX^P/NX^P methods are not compatible with Biomek Software, version 5.0, as this version has undergone considerable changes to reflect the capabilities of the Biomek i-Series of instruments. The changes that include, but are not limited to, a high-density deck, updated tip and labware definitions and properties, additional techniques, new grippers, etc.

Remedy:

— If you wish to use old methods as a baseline to create Biomek i-Series methods, you can print the method and build Biomek i-Series methods based on previous relevant specifications.

— Attend a Biomek i-Series training course. For information, contact us or visit our website at: **Beckman Coulter Learning Center**, and enter **Biomek** in the **Search** field or contact us.

- **SAMI EX Methods**: Because SAMI EX, version 5.0 software has undergone significant changes, SAMI methods from version 4.1 and prior are not compatible with SAMI EX, version 5.0.

  Remedy:

  — Refer to the *SAMI EX Software for Biomek i-Series Automated Workstations Reference Manual* (PN B59001), *Importing Methods from Previous Versions of SAMI Software*, for complete instructions on updating files from previous versions of SAMI to the current version.

Consumable Compatibility

Discontinued tips include the following:

- **Biomek FX^P/NX^P tips**

  Remedy: Use Biomek i-Series tips.

- **Fixed60 tips**

  Remedy: Use an appropriate fixed tip, as listed in Table 1.6, Fixed Tips (Span-8 only).

ALPs Compatibility

Some of the ALPs that were available for the Biomek FX^P/NX^P instruments are not compatible with Biomek i-Series instruments. Some ALPs have been replaced with similar ALPs that are specifically manufactured for Biomek i-Series instruments, while other ALPs, such as the Tip Loader ALP, are no longer necessary because it is built into the functionality of the Biomek i-Series instrument. Set up Biomek i-Series ALPs by following instructions in the *Biomek i-Series ALPs Reference Manual* (PN B54477). Refer to *Supported Biomek i-Series ALPs* for a complete list of discontinued ALPs.

Supported Biomek i-Series 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, versus the Biomek FX^P/NX^P type, which used threaded fasteners. Refer to the *Biomek i-Series Automated Labware Positioners, Accessories, and Devices Instructions for Use*

(PN B54477) for instructions on attaching mounting plates to ALPs and installing the ALPs (with mounting plates) onto the deck.

- 96-Channel Tip Wash
- 384-Channel Tip Wash
- Circulating Reservoir/Tip Box
- Cytomat 2C[1,b]
- Cytomat 6001[a,b]
- Cytomat Microplate Hotel[a,b]
- Conveyor ALP, Long and Short[2]
- Heating and Cooling
- Device Controller[a] (See **NOTE** below.)
- Orbital Shaker (See **NOTE** below.)
- Positive Positioner (See **NOTE** below.)
- Drainable/Refillable Reservoir[3] (See **NOTE** below.)
- Shaking Peltier
- Static Peltier

1. These are off-deck ALPs, and therefore, they do not require mounting plates.
2. Instructions for these ALPs/mounting plates are provided in the *Biomek i-Series Cytomat ALP and Devices User's Manual*, **PN B91265**.
3. 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**.

Abbreviations

% — percent

°C — degrees Celsius

°F — degrees Fahrenheit

µL — microliter

AC — alternating current

ALP — automated labware positioner

ANSI — American National Standards Institute

API — application programming interface

BCAP — Beckman Coulter accounts and permissions

BIOS — basic input output system

BSE — biological safety enclosure

CAN — controller area network

CFR — code of federal regulations

COM — communication port

CSV — comma-separated values

cm — centimeter

ESD — electro-static discharge

ETC — estimated time of completion

FBBCR — fly-by bar code reader

Hz — hertz

HTS — high-throughput screening

MC — multichannel

PCR — polymerase chain reaction

PN — part number

ID — identification

IFU — instructions for use

I/O — input/output

JIT — just In time

LED — light emitting diode

LIMS — laboratory information management system

LLS — liquid level sensing

MC — multichannel

MSDS — material safety data sheet

MTP — microtiter plate

MVS — multichannel verification system

OS — operating system

PCR — polymerase chain reaction

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

TEU — thermal exchange unit

UI — user interface

USPTO — United States patent and trademark office

WEEE — waste electrical and electronic equipment

Glossary

21 CFR Part 11
Outlines the technical and procedural FDA requirements to implement electronic records and/or electronic signatures for computer systems.

384-Channel Pod [384 MC, MC-384]
A Multichannel pod with 384-channel head that pipettes liquid volumes from 384 wells in one transfer.

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.

Absolute Moves
Low level, position-to-position motions along one or more axes.

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.

Address Switch
Address switches are manually set on active ALPs to allow Biomek Software to identify the device being used. (Uses hexadecimal numbering, for CAN devices.)

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]*

Alternating Current
AC.

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"

Arm

The arm is the structure that moves along the rear and front rails. The arm holds the pod and enables movement of the pod in the X-Axis (left and right). The Biomek i5 instruments support only one arm. The Biomek i7 instruments support two arms. Note that an arm may consist of just a pod (such as the Span-8 pod) or a bridge and a pod (such as the Multichannel pod, which needs the bridge to provide Y-Axis movement).

Artel Multichannel Verification Systems [Artel MVS]

Measurement system that verifies liquid transfer precision and accuracy.

Assay

An investigative (analytic) procedure in laboratory medicine, pharmacology, environmental biology, and molecular biology for qualitatively assessing or quantitatively measuring the presence or amount or the functional activity of a target entity (the analyte), which can be a drug or biochemical substance or a cell in an organism or organic sample. [Wikipedia, s.v. "Assay," accessed December 10, 2013, http://www.Wikipedia.org/wiki/assay]

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.

Axis

Direction along which motion occurs. Biomek instruments have at least X, Y, and Z axes, with additional axes available on a per-pod basis (e.g., D-axis for dispense axis).

Beckman Coulter Accounts and Permissions [BCAP]

Beckman Coulter Accounts and Permissions. An integrated set of features built into Beckman Coulter software that assists users in complying with 21 CFR Part 11 requirements for closed systems. With Biomek Software, support is extended only for the instrument; devices integrated with the instrument are not supported unless specified in separate documentation.

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 Deck [Deck]

The work surface of the instrument. Provides positions for ALPs via predrilled location holes.

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.

Blowout
Process in which extra air is aspirated into tips before aspirating liquid and then dispensed after dispensing liquid to ensure all liquid has been dispensed from the tips.

Bridge
Some Biomek pods (such as the Multichannel pod) are supported by a bridge as part of an arm. In these cases, the bridge is the structure that moves along the X-Axis. The bridge holds the pod and enables movement of the pod in the Y-Axis (front to back). Note that the Span-8 Arm does not have a bridge.

Chassis
Base platform of the instrument. Includes the base structure, indicator lights, power supply, controller boards, and safety system. The chassis supports the deck, arm(s), and gripper(s) that comprise a Biomek Instrument.

Clot Detection
On Span-8 pods this feature can determine if a (blood) clot exists through a difference in capacitance from a specific height after aspiration to a height measured in the well.

Combine Step
Biomek Software step that aspirates from multiple sources and dispenses to a single destination.

Comma-Separated Values [CSV]
File that stores tabular data in plain text form. Data items are separated by commas. May or may not contain a header row with labels for columns.

Communications Cable
Cable used to link the instrument or other devices to the host computer.

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)

Conic Length
Distance along the length of a tip from its narrow end to where it stops tapering (where the cylindrical section begins).

Connections
In reference to electrical power and communication interfaces with the Biomek Instrument.

Consumables
Disposable items used in a method. Can include items like pipette tips, microplates, lids, tubes, and reservoirs.

Consumer Modules
SILAS Modules used to collect and act on data in the system. **Consumer Modules** include **Logger**, **Run Program**, and **Verify Disk Space**.

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.

Data Set [Dataset]
Stores specific information about wells or tubes in Biomek Software. Using data sets, information about a sample in an individual well or tube is tracked along with the sample when it is moved to another well or tube.

D-Axis
Dispense axis; used for aspirate and dispense operations (actuates the head for Multichannel pods and syringe pumps for Span-8 pod).

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.

Define Procedure
Step used to create a series of steps that may be used multiple times in a method. A procedure is created by adding and configuring steps within a **Define Procedure** step.

Delta
Used in **Manual Control** to specify the amount of change that will be applied to the movement vector of a pod.

Device Controller
Integrated CAN device used to control other devices (for example, a peristaltic pump for wash station).

Device Editor
Editor in Biomek Software that allows the user to edit device configurations and to control actions on devices.

DMSO
Dimethyl Sulfoxide, an organic solvent used to solubilize compounds in drug discovery.

Diluent
Solvent used for sample dilution.

Enclosure
Part of a Biomek instrument that surrounds its operating area.

Encoder
Tracks the absolute position of an axis.

Enqueue
Internal component of software and firmware used to establish the order of operations of the instrument.

Estimated Time to Completion [ETC]
The simulated duration for all or part of a Biomek method (except for the time required for human intervention, if applicable). When the **Finish** step is highlighted in the method view, the software estimates the real time required to complete the entire method. When any other step is highlighted in the method view, the length of time displayed represents the time required to complete the method up to the selected step.

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).

Follow Liquid
Option to have tips follow the liquid level during aspirate or dispense operations.

Framing
Process of providing exact coordinates of positions on the deck or exact offsets for the gripper. Also called teaching.

Framing Fixture
Also known as "Multichannel Framing Probe". A framing tool that is attached to a multichannel pod for use in framing.

Framing Shaft
Also known as "Span-8 Framing Probe". A framing tool that is attached to a Span-8 pod for use in framing. The framing shaft is attached to different Span-8 probes, depending on the deck position being framed.

Framing Tools
Tools used in the process of framing the deck or grippers.

Global Variable
A named value that has global scope, meaning it can be used anywhere variables are allowed. The **Set Global** step allows method authors to create and change the values of global variables without using script. The **Finish** step clears all global variables by default with option to not clear.

Gripper
A mechanism for grasping labware, allowing them to be moved from one location to another.

Halo
With Biomek i-Series enclosed instruments, the structure that sits on top of the chassis providing protection of samples and reagents on-deck from laboratory particulates, as well as housing the status indicator light with 360 degree viewing.

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

Home (noun)
Where labware starts in a method. Can be changed via a **Change Home** node.

Home Position
The known location where an axis moves when it is homed. For a single-pod system, the home position is located toward the upper back left corner of the instrument. For a dual-pod system, home position for the first (left) pod is left, back; and for the second (right) pod is right, back.

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.

Import File
Project items or instrument data exported from Biomek Software for subsequent use. This can be used for archiving or sharing project items (such as labware definitions or pipetting techniques and templates) or for instrument settings (such as deck configurations or pod settings).

Import/Export Utility
Biomek Software tool that allows settings from an instrument file to be archived or shared via an import file.

Initialization
Process of setting or verifying a starting position or state of one or more items in a system (instruments, devices, software, etc.) when a method run is started. This process sets items to starting configurations and confirms communications channels are available at the very beginning of a run.

Input/Output [I/O]
Any signal or data that goes to or comes from a device. Usually in reference to electronic signals or data passed into or read out of a device.

Instrument File
Stores information about the hardware configuration, including the deck layout of the instrument. Instrument files can represent different Biomek instruments or different hardware configurations for the same instrument.

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.

Just in Time [JIT]
Biomek step that synchronizes the execution of its sub-steps. Steps within the **Just In Time** block are enqueued in the order in which they appear in the method view, but it may be possible to simultaneously execute two or more steps.

Laboratory Information Management System [LIMS]
Software used to support a laboratory's operations. Usually employs database technology with various data input and output capabilities.

Labware
Microplates (titerplates), lids, tubes, tube racks, reservoirs, or custom defined consumables. Does not include pipette tips, but does include their tip boxes.

Labware Category
Group of similar consumables (labware, such as microplates, reservoirs, etc.) that are available for use in Biomek Software.

Labware Offset
The coordinate 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.

Light Emitting Diode
LED

Liquid Level Sensing [LLS]
The Span-8 pod uses conductive tips to determine the liquid level in labware for each probe. When the tip contacts liquid, a change in capacitance is detected. The liquid level is sensed by determining the height at which this change in capacitance occurs.

Liquid Type
A named group of fluid characteristics and properties in Biomek Software. Used in conjunction with pipetting templates and techniques to control pipetting performance. Edited in the **Liquid Type Editor** in Biomek Software.

Locating Holes
Predrilled holes in the deck that are used to position ALPs on a Biomek deck or an off-deck position.

Logs
Files that provide records of a method run. Biomek Software offers five standard types of text logs: **Details**, **Errors**, **Pipetting**, **UnifiedPipetting**, and **UnifiedTransfer**.

Loop
A Biomek step that repeats a sequence of sub-steps a specified number of times during a method in Biomek Software. May incorporate use of a loop variable.

Loop Variable
A named value that has limited scope, meaning it can only be used within sub-steps of the **Loop** step. The **Loop** step allows method authors to repeatedly execute the contained sub-steps. The loop variable has a set starting value. For each iteration of the loop, the loop variable's value is incremented by a given amount.

Mandrel
Hardware interface for a disposable tip used in pipetting functions.

Manual Control
Software user interface to allow direct user interaction of hardware functionality.

Marks
Marks are a method of keeping track of pipetting operations in Biomek Software that extend over multiple steps. A single mark is used to identify only the last well accessed in a given pipetting operation. If "**Set marks**" is enabled, future operations may continue from the marked wells.

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*.

Min Safe Height
Reserved distance (minimum) above a Biomek deck position needed to avoid collisions (for example, between carried labware in the gripper and the deck position).

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 96 Wash Station
Active ALP used to clean disposable tips loaded on a 96-channel head.

Multichannel Arm [MC Arm]
A part of a Biomek Instrument where a Multichannel pod can be installed.

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.

Nested Steps
Also known as "sub-steps". Software operations that are contained within one or more other operations in a Biomek method. Steps such as **Loop**, **If**, **Worklist**, and **Let** can hold nested steps.

Offset
The difference (vector) from one coordinate to another coordinate.

Operating System [OS]
Primary software used to run a computer (for example, Microsoft Windows 10).

Orbital Shaker ALP
Active ALP that enables rotational mixing of labware contents.

Parameters
Configuration values that are part of a method or step. Also, specific values passed to a defined procedure.

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.

Pipette (verb)
Actions that result in aspirating and dispensing liquid.

Pipette Tips [Tips]
A laboratory tool used to enable liquid handling in conjunction with installed mandrels on a Biomek instrument.

Pipetting Template
Biomek Software feature that controls the actions and movements of a pod during liquid handling operations. Edited in the **Pipetting Template Editor** in Biomek Software.

Pod
The structure on a Biomek instrument that provides liquid handling capabilities. There are two types of pods available for instruments: Multichannel pod, which incorporates interchangeable heads to perform a variety of operations, and Span-8 pod, which performs liquid transfers via independent probes. In Biomek Software, a pod is referred to as Pod1 or Pod2 (or alternatively as LeftPod or RightPod). If there is only one pod, it is Pod1 (or LeftPod).

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.

Preferences
Software dialog allowing for changes in the look of the main editor and sets method viewing options.

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.

Record
Any item stored in a project that has been saved. Examples include labware types, method revisions, and deleted items.

Relative Moves
Low level motions along one or more axes, as measured from current coordinates. These are used in the **Advanced Manual Control** dialog.

Restriction of Hazardous Substances Directive 2011/65/EU [RoHS]
Directive that restricts that use of hazardous materials found in electrical and electronic products.

Run Method Step
A software operation that executes a method within the current Biomek method.

Run Procedure Step
A software operation that executes a defined procedure within the current method.

Run Program
A software consumer module that executes a preconfigured program during a method.

Run Time
Any period when a method is executing.

Safe Height
Distance (minimum) above an item on the deck needed to avoid collisions (for example, between a loaded pipette tip and a Trash ALP).

Sample Tracking
Capabilities built into the functionality of Biomek Software that allow per-well and per-tube sample information to move with the transport (labware) during the method run. Information is attached to the transport and travels from the source labware to the destination well/tube. The desired data output is defined and set before the method run begins, and is reported as desired at the completion of the run.

Secure Stacking
The ability of one labware item to be placed on another item in a manner that prevents them from unintentionally separating.

Serial Dilution
Laboratory process that creates a sequence of concentrations of a sample.

Shaking Peltier ALP
Active ALP that enables mixing and temperature-control functionality of labware contents.

Shuck Plate
A part of a head on a multichannel pod that is used by the system to push tips off mandrels during tip removal (shucking).

SILAS
Open-standard protocol for inter-process messaging. Allows independent development and modification of software modules used to control devices.

SILAS Consumer Module [Consumer]
SILAS Module that acts on (consumes) data as part of a method. Does not control a device.

SILAS Device Module
SILAS Module that controls a device.

Single Step
Biomek Software feature that allows the user to step through method execution one action at a time. **Single Step** pauses the instrument between actions, allowing visual verification that the operation is correct.

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 Arm [S8 Arm]
A hardware module (arm) on the instrument where a Span-8 pod is installed.

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 Probe
Also known as **Probe**. The Span-8 pod uses eight probes that can move independently in the Z-axis and pipette independently in the D-axis with the assistance of syringe pumps. Movement in the Span-axis (S-Axis) provides a uniform spacing between the probes. The pipetting action of the Span-8 pod is accomplished using either fixed or disposable tips attached to the tip interface of the probes.

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.

Speed Limit
Percentage of maximum velocity at which an instrument move can occur.

Start Step Variable
A named value defined in the **Start** step of a method. Use the **Start** step to define variables used throughout the entire method, as opposed to variables defined within individual steps (such as the **Let** step). Variables created in the **Start** step can also give a prompt at the start of a method run, allowing new values to be entered for each variable.

Static Peltier ALP
Active ALP that enables temperature-control functionality of labware contents.

Status Bar
A portion of the main editor that shows the current method, project file, instrument file, estimated method time, and error messages.

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.

String
Series of contiguous characters used as the value of a variable or step parameter.

Sub-step
See *Nested Steps*.

Teaching
See *Framing*.

Technique
Biomek Software feature that provides contextual input to a pipetting template to control the actions and movements of a pod during liquid handling operations. Edited in the **Technique Editor** in Biomek Software. Can be automatically selected based upon properties and values.

Technique Properties
Specific items, such as labware type and liquid type, associated with a technique. The number of properties that match the current configuration determine the technique that is automatically selected if auto-select is enabled in a step.

Thermal Exchange Unit [TEU]
Heats or cools a reservoir or microplate on the deck. The temperature is controlled by a user-supplied circulating bath.

Timed Resource
Allows a method to be paused at a specified deck position for a specified period of time. Configured in a **Pause** step.

Tip Interface
Part of a Span-8 probe where either a disposable tip mandrel or a fixed tip can be attached. Also where the framing shaft is attached when framing a position with the Span-8 pod.

Tip Touch
Movement of the pod to remove residual drops of pipetted liquid from a tip before the tip leaves the well.

Tips
See *Pipette Tips [Tips]*.

TiterPlate
See *Microplate*.

Tower
The vertical support structures that comprise the four corners of the chassis.

Trailing Air Gap
User-specified amount of air aspirated into tips after fluid is aspirated.

Transfer Step
Software operation in Biomek Software that aspirates from a single source and dispenses to single or multiple destinations. Includes tip handling options (**load**, **wash**, **unload**, etc.).

Transport (noun)
Moveable labware such as microplates, tip boxes, and deep well microplates that can be manipulated by a transporter in the system and moved between positions.

Transporter
A device that is capable of gripping or moving a transport from one location to another. Transporters are generally recognized as Biomek pods with grippers, Cytomat / Conveyor ALPs, and some custom devices such as robotic arms and shuttles.

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. For the tutorials located in this manual, the slide option is used, which is designated as **TrashLeftSlide** or **TrashRightSlide**.

Upper front horizontal beam
The upper front structural component of the chassis that attaches to the towers and upper side support components of the chassis.

Validate (the current method before running it)
Option which signals the software to simulate the method prior to a run in order to allow errors to be detected before a method starts. Note that this is different from validating a method (see *Validated Method*).

Validated Method
Revision of a method that is saved, approved with an electronic signature, and protected from further modification. Revisions of project items required to run the validated method are also saved and protected from further modification. This ensures that validated method runs are reproducible. When Beckman Coulter Accounts & Permissions is enabled, methods may be validated. Only users with **Validate Methods** permission can validate methods.

Variable
A named value that is allowed to change within a method. Can be a **Global** step variable, a **Let** step variable, a **Loop** step variable, a **Script** step variable, a **Start** step variable, or a **Worklist** step variable.

Vector
Quantity specified by direction and magnitude.

Wash Pump
A peristaltic pump used to control active washing. It is configured through Biomek Software and controlled (on/off) through a Device Controller.

Well Depth
Distance (in centimeters) from the top of a well to the bottommost point of that well.

Worklist
External tabular file containing names as column headers and related values in subsequent rows. The names are symbolic identifiers (variables) used to represent the values.

Worklist Variable

A named value defined in a **Worklist** step. The **Worklist** step allows several variables to be set, based on contents of a file. The file specifies the names of the variables as column headers and all of the values that each variable will contain during execution of the worklist in subsequent rows. For each line in the worklist file, each of the variables will be configured with the appropriate value read from the file and the sub-steps of the **Worklist** step will be executed. In this manner, using expressions on the sub-steps inside the **Worklist** step allows them to have different behavior depending on which iteration is currently executing.

X-Axis

Horizontal axis oriented left-to-right. Smaller X coordinates are to the left and larger ones are to the right.

Y-Axis

Horizontal axis oriented back-to-front. Smaller Y coordinates are to the back and larger ones are to the front.

Z-Axis

Vertical axis oriented bottom-to-top. Smaller Z coordinates are downward and larger ones are upward.

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:

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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

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