G5580A BenchCel Microplate Handler

Quick Guide

This guide contains the following topics:

Original Instructions

About this guide

This guide summarizes the operator instructions in the *BenchCel Microplate Handler User Guide*.

This guide assumes the following:

- The BenchCel Microplate Handler is installed correctly. For details, see the *BenchCel Microplate Handler User Guide*.
- The device profile for the specific BenchCel Microplate Handler configuration is already created and the teachpoints are already set. For setup instructions, see the *BenchCel Microplate Handler User Guide*.
- You are familiar with the VWorks Automation Control software. See the *VWorks Automation Control Quick Start*. For detailed instructions, see the *VWorks Automation Control User Guide*.

Where to find the user documentation

To access the user guides for Agilent Automation Solutions products, do one of the following:

- From within VWorks software, select **Help** > **Knowledge Base** or press F1.
- From the Windows desktop, select **Start** > **Agilent Technologies** > **VWorks Knowledge Base.**
- Go to the online VWorks Knowledge Base at www.agilent.com/chem/askb.

Contacting Agilent Technologies

Web: https://www.agilent.com

Contact page: https://www.agilent.com/en/contact-us/page

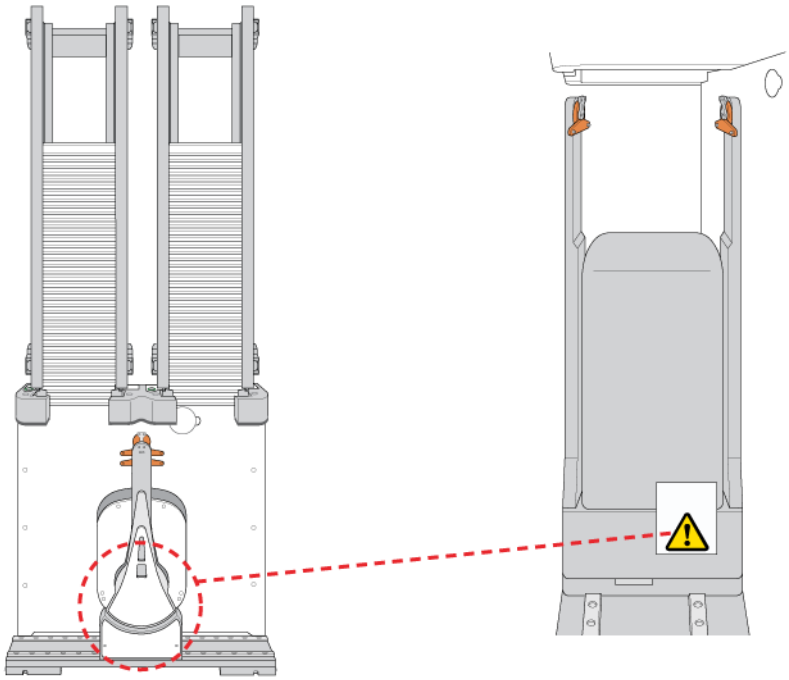
Documentation feedback: documentation.automation@agilent.com

Safety guidelines

WARNING **Using controls, making adjustments, or performing procedures other than those specified in the user documentation can expose you to moving-parts hazards and hazardous voltage. Before using the BenchCel Microplate Handler, make sure you are aware of the potential hazards and understand how to avoid being exposed to them.**

Ensure that you are trained in the safe operation of the device and that you have read the Agilent *Automation Solutions Products General Safety Guide* and the safety section of the *BenchCel Microplate Handler User Guide*.

Figure Safety label location on BenchCel Microplate Handler (front and side view)



For a description of the moving parts, see "Hardware components and axes of motion" on page 7.

For the emergency-stop procedure, see "Emergency stops" on page 4.

WARNING **If you touch any of the moving parts or attempt to move labware while the BenchCel Microplate Handler is in operation, the device could pinch, pierce, or bruise you. Keep your fingers, hair, clothing, and jewelry away from the device while it is in motion.**

Emergency stops

The BenchCel Microplate Handler is equipped with an interlock circuit and emergency-stop pendant. When the BenchCel Microplate Handler is integrated with other devices in a third-party system, Agilent Technologies recommends that you install a main emergency-stop button to safely stop the robot and all devices simultaneously.

CAUTION **You might not be able to resume a protocol after an emergency stop. Do not use an emergency stop to pause a run. To pause and continue a run, use the appropriate commands in the automation software.**

Stopping in an emergency

WARNING **After pressing the emergency-stop button, the robot arm might have momentum and continue to move until it comes to the end of its travel in the x-axis, z-axis, or theta-axis or until it bumps into an obstacle. Stay clear of the robot until it stops moving.**

To perform an emergency stop:

Press the red button on the pendant. The safety interlock circuit is interrupted, disabling the robot motors. The BenchCel Microplate Handler operation stops.

Recovering from an emergency stop

After you press the button on the emergency-stop pendant, the robot stops. One of the following occurs:

- If you stopped a protocol run, a dialog box opens in the VWorks software.
- If you stopped the robot while diagnosing problems in BenchCel Diagnostics, a motor-disable message opens.

Use the following procedure to recover in either case.

To recover the BenchCel device after an emergency stop:

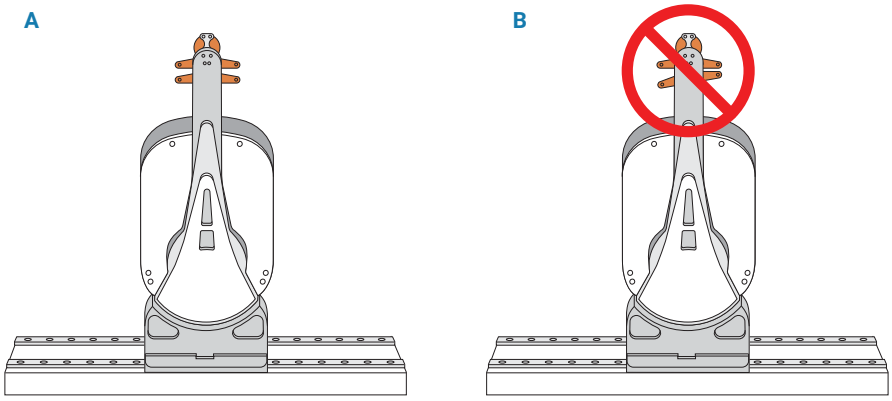
1 If the robot dropped labware before or during the emergency stop, remove the labware that was dropped. Also remove labware at teachpoints or other locations.

2 If the BenchCel robot attempted to place labware at a location that was not free, a collision might have occurred resulting in misalignment of the robot gripper. Check the robot gripper alignment:

   a Move the robot arms so that they are perpendicular to the *x*-axis.

   b Make sure the bottom of the robot gripper pads are perpendicular to the robot arms. If they are not, contact Agilent Technical Support.

Figure Gripper alignment: (A) Correct, (B) Incorrect



3 At the emergency-stop pendant, turn the button clockwise to restore power to the motors.

4 If you stopped a protocol run in an emergency, select one of the following in the VWorks message dialog box:

Selection	Description
Diagnostics	Opens the BenchCel Diagnostics dialog box. See step 5. *Note:* This selection is available only when you are in the middle of a protocol run and not while you are in BenchCel Diagnostics.
Retry	Attempts to restart the current command or task in the run.
Ignore and continue	Ignores the current command or task and continues to the next command or task in the protocol sequence.
Abort	Aborts the current command or task in the run. Select Abort if you have determined that the protocol run is not recoverable.

For a full description of the selections, see the *VWorks Automation Control User Guide*.

5 *Optional*. In BenchCel Diagnostics, use the available commands to manually move the robot or other components, including:

- Release the microplate that the robot is currently holding.
- Upstack the microplate that the robot is currently holding.
- Replace the lid on the microplate.
- Home the robot.
- Verify teachpoints.

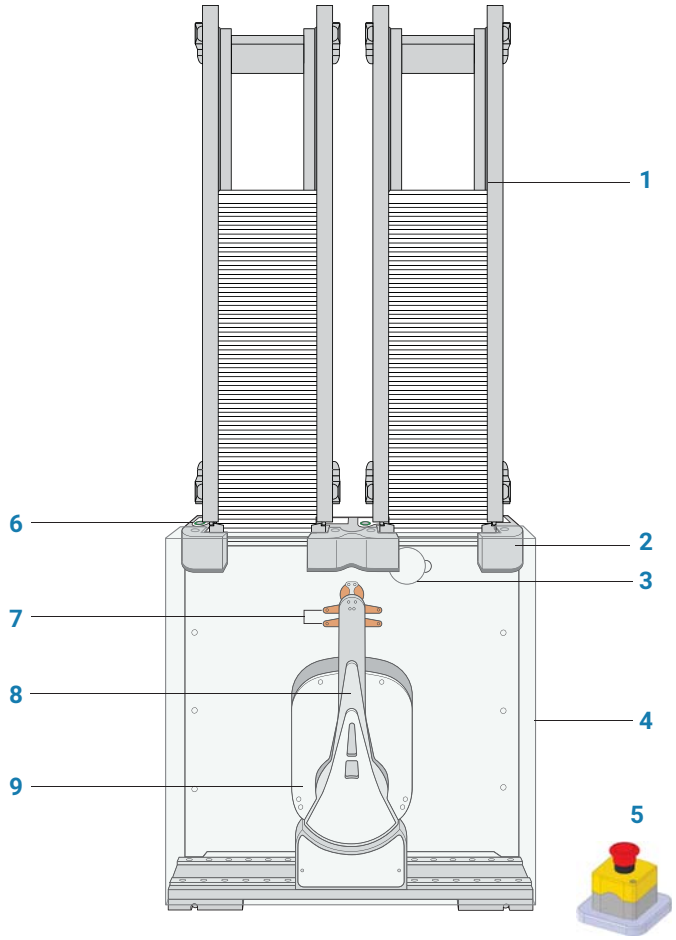
If a physical crash occurred, always start BenchCel Diagnostics to home the robot and verify teachpoints.

Hardware components and axes of motion

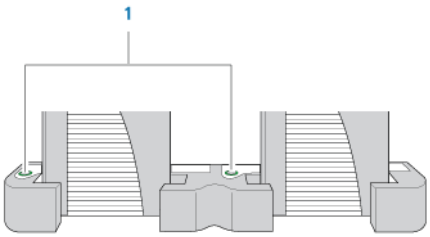
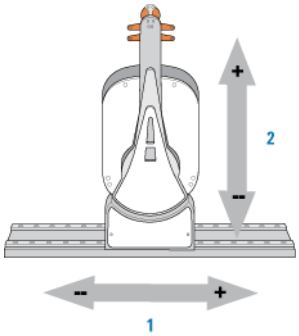
Front view

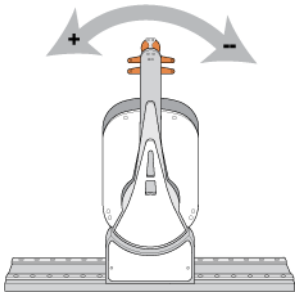
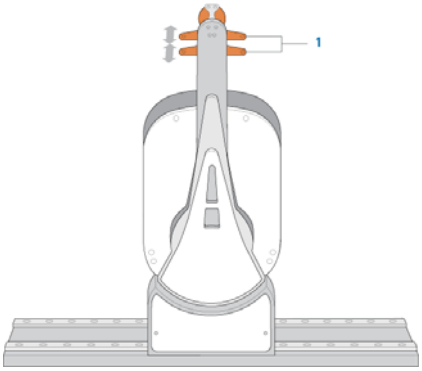
The following figure and table describe the primary hardware components and axes of motion.

Figure BenchCel Microplate Handler components (front view)



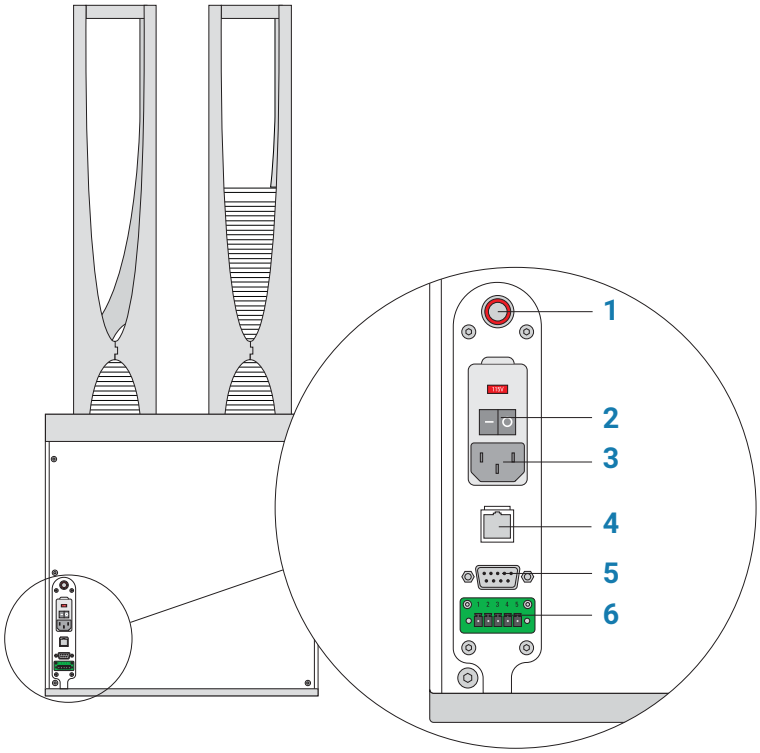
Item	Feature	Description
1	Labware rack (with labware)	The accessory that stores labware to be processed in a run.
2	Stacker head	The structure at which: • A labware rack is loaded. Two sensors inside of each stacker head detect the presence of the racks. • A microplate is checked for type and orientation using a plate-presence sensor and four plate-orientation sensors. • A microplate is lowered into the stacker grippers to begin a run.

Item	Feature	Description
3	Air pressure regulator	The knob that adjusts the air pressure inside the device. Compressed air is used to move the components inside the stacker heads. Each regulator controls the air pressure to the two adjacent stacker heads. For details, see the *BenchCel Microplate Handler User Guide*.
4	Safety shield	The clear panel that is installed on the front of the BenchCel device to prevent access while it is in operation.
5	Pendant	The component that is part of the safety interlock circuit, which must be closed for the BenchCel device to operate. Pressing the raised button on the pendant interrupts the interlock circuit and stops the robot motors. Use this method of stopping the robot for emergencies only.
6	Rack release button	The button that unlocks the rack for removal. The rack-release button (1) at the top of each stacker head displays different colors to indicate the state of the stacker head.  • *Green*. The labware rack is installed correctly on the BenchCel device and the microplates are unloaded. The stack of microplates are ready for processing or you can unlock and remove the labware rack. • *Flashing green*. The labware rack is unlocked and can be removed. • *Blue*. The stack of microplates is loaded. You cannot unlock and remove the labware rack. • *Red*. The clamps are open without a rack installed. Do not install a rack until the clamps are closed.
7	Robot head	The component that moves (1) horizontally along the *x*-axis and (2) vertically along the *z*-axis. 

Item	Feature	Description
8	Robot arms	The two parallel structures that are attached to and rotate about the robot head along the *theta*-axis. 
9	Robot grippers	The structures inside the robot arms that close and open to hold and release a microplate. Using the provided software, you can adjust the distance between the grippers (1) to hold a microplate loosely or tightly. 

Back view

Figure BenchCel connection panel (Back view)



Item	Part	Description
1	Air-input fitting	Connects the air tubing to the BenchCel device. Compressed air is used to actuate components inside the stacker head.
2	Power switch	Turns on or off the power to the BenchCel device.
3	AC power entry	Connects the power cord to the BenchCel device.
4	Ethernet port	Connects the Ethernet cable from the controlling computer to the BenchCel device to allow communication between the computer and the device. Use this port as an alternative to the serial connection.
5	Serial port	Connects the serial cable from the controlling computer to the BenchCel device to allow communication between the computer and the device. Use this port as an alternative to the Ethernet connection.
6	Pendant port	Connects the pendant to the safety interlock circuit.

Labware considerations

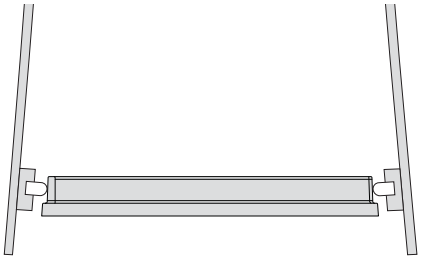
Acceptable microplates

The BenchCel device is designed to handle labware that comply with the standards ANSI/SLAS 1-2004 (R2012) through ANSI/SLAS 4-2004 (R2012). For use of nonconforming labware, contact Agilent Technical Support.

The BenchCel device uses gripping mechanisms to hold microplates securely and repeatably in the labware rack and in the robot arms. The BenchCel device typically holds the microplates halfway between the top of the microplate and the top of the microplate skirt (5 to 10 mm above the bottom of the microplate).

In the following figure, notice the gripper-microplate contact point

Figure Labware rack detail with microplate held by the stacker grippers (front view)

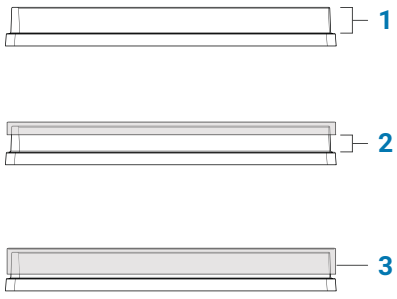


Lidded microplates

Microplates that do not have lids or have shallow lids (lids that do not reach the microplate skirt) provide enough clearance to allow secure and repeatable gripping. Microplates with deeper lids can be more challenging, because the microplate must be held by the skirt. If the skirt is too flexible, the stacker grippers will bend the skirt. The bent skirt can grip the microplate lid stacked beneath, inadvertently removing the lid.

Some labware vendors might offer alternative lids that are shallower. Contact the vendor for details.

Figure Lidded microplate examples



Item	Description
1	No lid: excellent gripper clearance
2	Shallow lid: good gripper clearance
3	Deep lid: no gripper clearance, must be held by skirt

Challenging microplate characteristics

Microplates that have the following characteristics might require additional setup time to ensure repeatable performance for the BenchCel device:

- *Microplate material*. Although you can adjust the robot grip distance to compensate for microplate flexibility, some microplates are too soft and tend to bend in the robot grippers or become warped after thermal cycling. (for example, low-profile polypropylene PCR microplates).
- *Manufacturing variance*. Gross variations in microplate dimensions can reduce repeatability of secure gripping. In addition, because the BenchCel device uses reflected light to sense microplate presence and orientation, variations in the reflective properties of the microplates can affect optimal operation.
- *Microplate design*. Some microplates have special features specifically designed for particular instruments but are not optimized for the BenchCel device.
- *Thermal cycling effects*. Microplates that have been through thermal cycling might become warped.
- *Tall labware*. Especially tall tube racks and tip boxes that are taller than 65 mm might pose challenges in the BenchCel device. Contact Agilent Technical Support about acceptable tall labware.
- *Extra long lid*. Some microplates that have lids that extend past the microplate skirt tend to pose challenges for the BenchCel device. Contact Technical Support for guidance.

Starting up and shutting down

The following procedures describe how to start up and shut down the BenchCel Microplate Handler when you are operating it as a standalone device. For instructions on how to turn on and turn off the BenchCel Microplate Handler when it is integrated into a workstation or system, see the workstation or system user documentation.

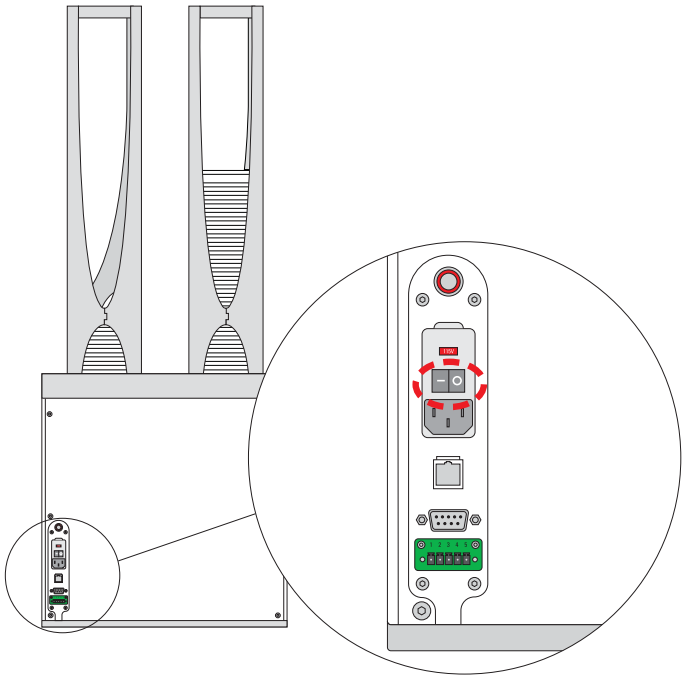
Starting up the device

WARNING **Do not touch the BenchCel Microplate Handler as you start the software. The robot head moves when the device moves to home position.**

To start up the BenchCel Microplate Handler:

1 On the back side of the BenchCel Microplate Handler, press the power switch to the **on** (I) position.

Every time you turn on the BenchCel Microplate Handler, the robot homes (the robot is sent to the factory-defined home position for each axis of motion).



2 Turn on the compressed air supply to the BenchCel Microplate Handler.

3 Turn on the controlling computer. See the user documentation from the computer manufacturer.

4 Start the VWorks software. To do this, on the Windows desktop, double-click the VWorks shortcut icon.

For instructions on using BenchCel Diagnostics to operate the BenchCel Microplate Handler, see "Using BenchCel Diagnostics" on page 20. For instructions on running protocols in BenchCel workstations, see the *VWorks Automation Control User Guide*.

Shutting down the BenchCel Microplate Handler

Shut down the BenchCel Microplate Handler if you intend to:

- Leave it unused for a long period of time.
- Service the device.
- Move it to another location.

To shut down the BenchCel Microplate Handler:

1 Exit the VWorks software.

2 Turn off the compressed air to the BenchCel Microplate Handler.

3 On the back of the device, press the power switch to the **off** (o) position.

Handling labware racks safely

Carrying the labware racks

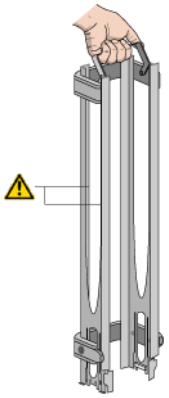
The labware racks store the stacks of labware (microplates, tip boxes, and tube racks) that are processed during a protocol run. This topic describes how to carry labware racks safely.

WARNING **Do not hold a rack by the interior edges. The interior edges can have sharp surfaces that can cause cuts if handled improperly.**

CAUTION **A rack that is fully loaded with labware can be heavy. Grasp the rack handle firmly to prevent the rack from slipping or tilting.**

To carry a rack, firmly grasp the rack by the handle as shown in the following figure.

Figure Carrying a front-load rack



Filling and emptying the labware racks

Before you start

WARNING **Make sure you understand how to handle the racks safely.**

CAUTION **Before you place labware into a rack that is installed on the BenchCel device, the clamps in the BenchCel stacker head must be closed (extended). If the clamps are open the stacker grippers will not prevent the stack of labware from dropping.**

Before filling or emptying a rack:

- Position the rack so that the opening is facing you.
- Determine how the microplates should be oriented in the rack.

For example, if the BenchCel orientation-sensing feature is enabled, make sure the A1 wells are oriented in the rack as specified.

- Depending on the rack model, the procedure can vary:
  - *Front-load racks*. The rack can be installed on the BenchCel device or placed on a flat, level surface.
  - *Standard or top-load racks*. Place the rack on a flat, level surface.

  For details on how to install or uninstall the racks, see "Installing and uninstalling labware racks" on page 17.

Filling a front-load rack

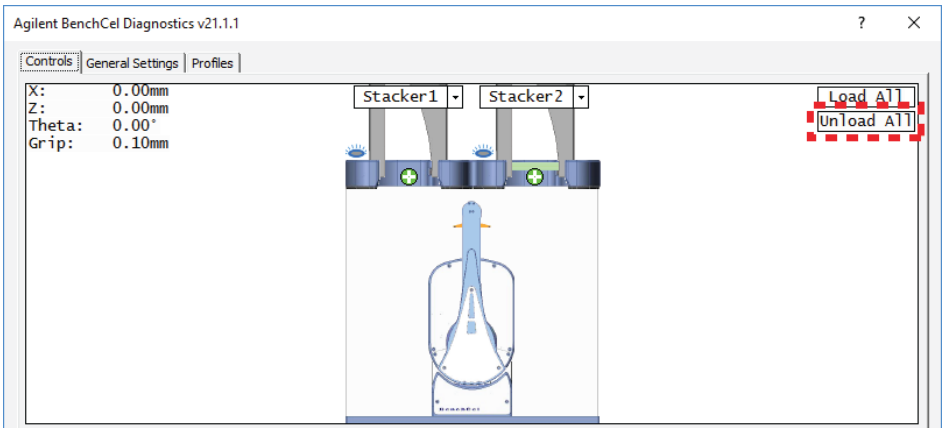
The doors on the front-load rack provide easy access for placing labware into the front of a rack that is installed on a device.

Before you start:

If the rack is already installed on the BenchCel device, verify that the stack is in the unloaded state, as follows:

To verify the stack is in the unloaded state:

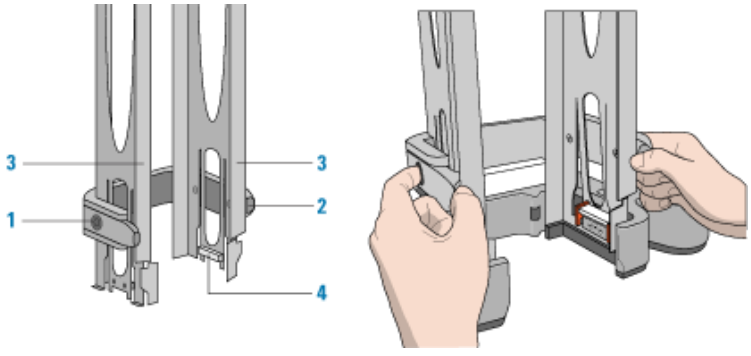
1. In **BenchCel Diagnostics**, initialize the profile. See "Initializing the BenchCel Microplate Handler in Diagnostics" on page 21.
2. In the **Controls** tab, click **Unload All** to unload all the stackers.



To place labware into a front-load rack:

1. On each side of the rack, slide the (1) door-release (black) buttons forward, while pushing outward on the (2) thumb tabs. The (3) rack doors open.

Figure Door mechanism on the front-load rack and opening the front-load rack



2 Place the labware directly through the open rack doors so that the bottom labware rests on the rack stacker grippers (4). Ensure the labware is level in the rack.

3 Close the doors, press the thumb tabs inward until the doors snap shut.

To remove labware from a front-load rack:

1 If the rack is installed on the BenchCel device, verify that the stack is in the unloaded state. See "To verify the stack is in the unloaded state:" on page 15.

2 To open the rack doors, slide the black door-release buttons forward on each side of the rack, while pressing outward on the thumb tabs.

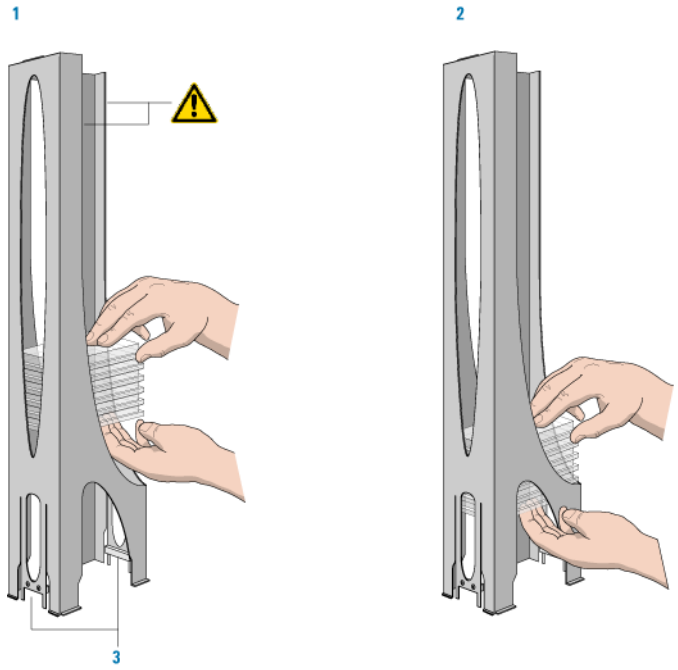
3 Carefully, lift the labware out through the front of the rack.

Filling the standard and top-load racks

WARNING **Use care to avoid sliding your hand on the interior edges in the rack. The edges can have sharp surfaces.**

The following figure shows how to slide a stack of labware into a standard rack.

Figure Filling a standard rack: (1) Sliding the stack down through the top, (2) Supporting the stack through the bottom slot, and (3) Ensuring stack rests on the rack stacker grippers



To put labware into a standard or top-load rack:

1 Place the rack on a flat, level surface.

2 Using both hands, carefully slide a small stack of labware down through the top of the rack.

You can use one hand to support underneath the labware stack, while the other hand holds the top of the labware to keep it level. See figure.

3 Standard racks only. When you reach the bottom of the open slot, transfer your hand positions so that you continue supporting the labware through the bottom slot.

4 Ensure that the bottom labware in the stack rests on the rack stacker grippers.

To remove the labware from a standard or top-load rack:

1 If possible, remove the rack from the device, and place the rack on a flat, level surface.

IMPORTANT If you are removing labware from an installed rack, ensure that the stack is unloaded. See "To verify the stack is in the unloaded state:" on page 15.

2 Carefully slide the labware in small stacks, up and out of the top of the rack.

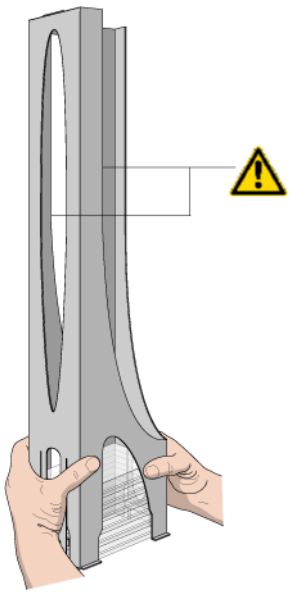
Installing and uninstalling labware racks

Before you start

IMPORTANT Make sure the BenchCel Microplate Handler power and compressed air are turned on before you install or uninstall a labware rack.

When lifting the labware rack onto and off of the stacker head, use both hands to grasp the rack securely around the four corners near the base.

WARNING **Avoid touching the interior edges of a rack when lifting the rack. The interior edges can have sharp surfaces.**



Installing labware racks on the BenchCel Microplate Handler

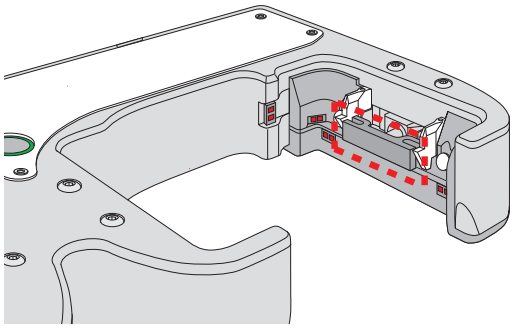
To install a labware rack:

1 At the BenchCel Microplate Handler, verify that the clamps are closed (extended) in the stacker head.

Note: To close the clamps, open **BenchCel Diagnostics**. In the **Controls** tab, click **Stacker** at the top of the rack that you want to remove, and then click **Close Stacker grippers**.

When you install the rack, the prongs in the labware rack tabs will be inserted into the slots in the clamps. If the clamps are open, the slots will be hidden, and you cannot install the rack.

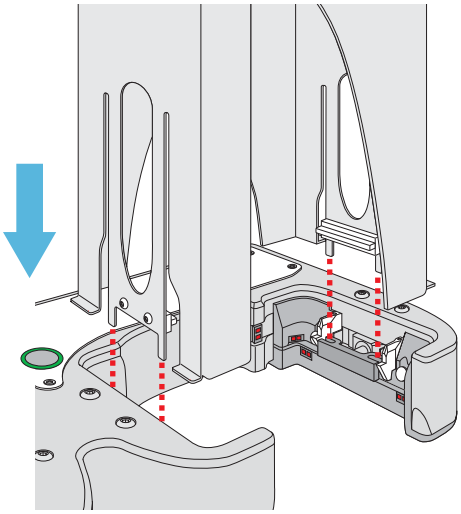
Figure Stacker head with closed (extended) clamps



2 With the rack's open side facing the front, lower the rack onto the stacker head.

The rack is automatically locked into position.

Figure Installing a labware rack on the stacker head (closeup view)



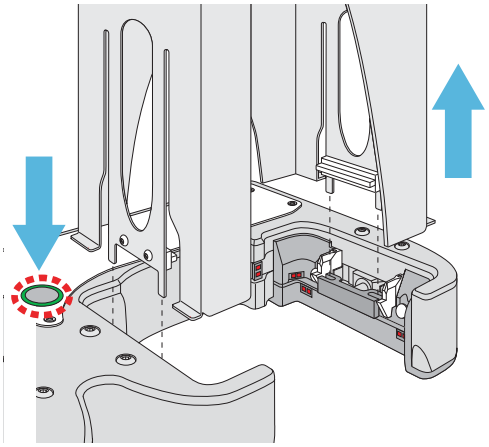
IMPORTANT Make sure the prongs at the bottom of the rack tabs insert into the slots in the extended clamps.

Uninstalling labware racks

To uninstall a rack when rack-release button is green:

1 Verify that the rack-release button on the stacker head is lit green, and then press it. A click sounds as the locks retract.

2 While the green light is flashing, lift the labware rack up and out of the stacker head.

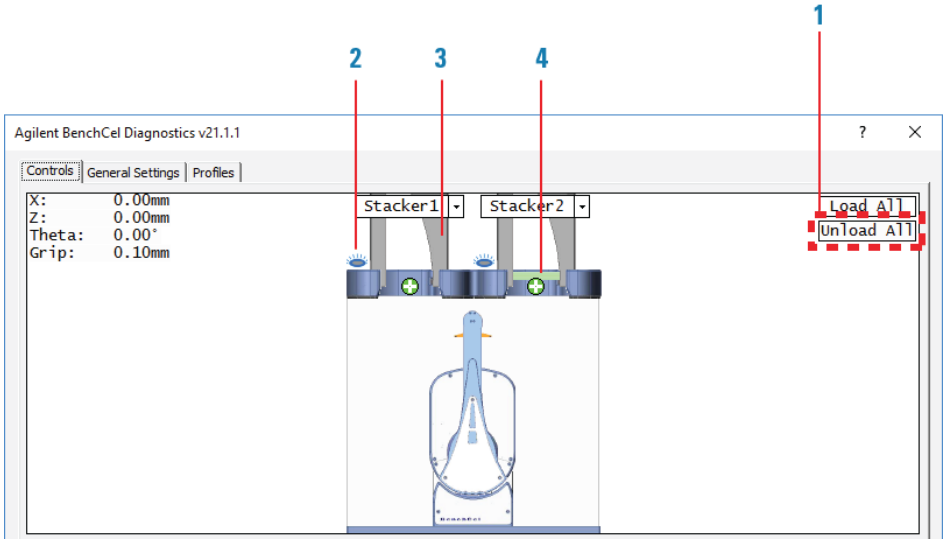


Note: If the green light stops flashing, press the rack-release button again.

To uninstall a rack when rack-release button is blue:

1 In **BenchCel Diagnostics**, initialize the profile.

2 In the **Controls** tab, click **Unload All** to unload all the stackers. See figure, item 1.



In the Controls tab image: (2) A blue rack-release button indicates that the stack is loaded. (3) A rack image appears on the stacker if the sensors detect a rack. (4) A green labware image indicates that the sensors detect a plate.

3 To unlock the rack, press the green rack-release button at the top of the stacker head. Wait for the click to sound as the locks retract. While the green light is flashing, lift the labware rack up and out of the stacker head.

Using BenchCel Diagnostics

BenchCel Diagnostics has three tabbed pages: Controls, General Settings, and Profiles. You use the commands in the Profiles tab to establish communication with the BenchCel Microplate Handler. You use the commands and parameters in the Controls tab to control or move the device components.

IMPORTANT Some of the BenchCel Diagnostics features are available only if you have VWorks administrator- or technician-level privileges. For details, see your lab administrator.

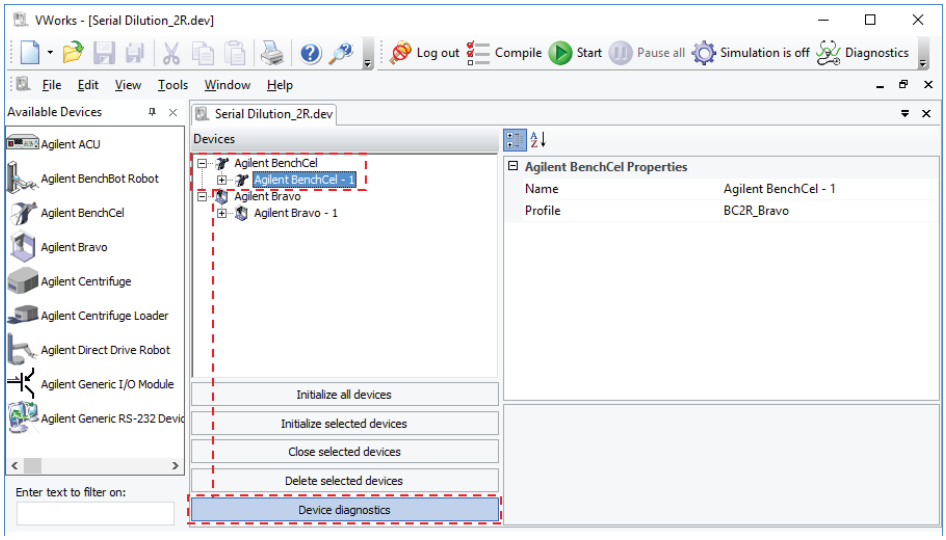
This topic describes the following:

For more details, see the *BenchCel Microplate Handler User Guide*.

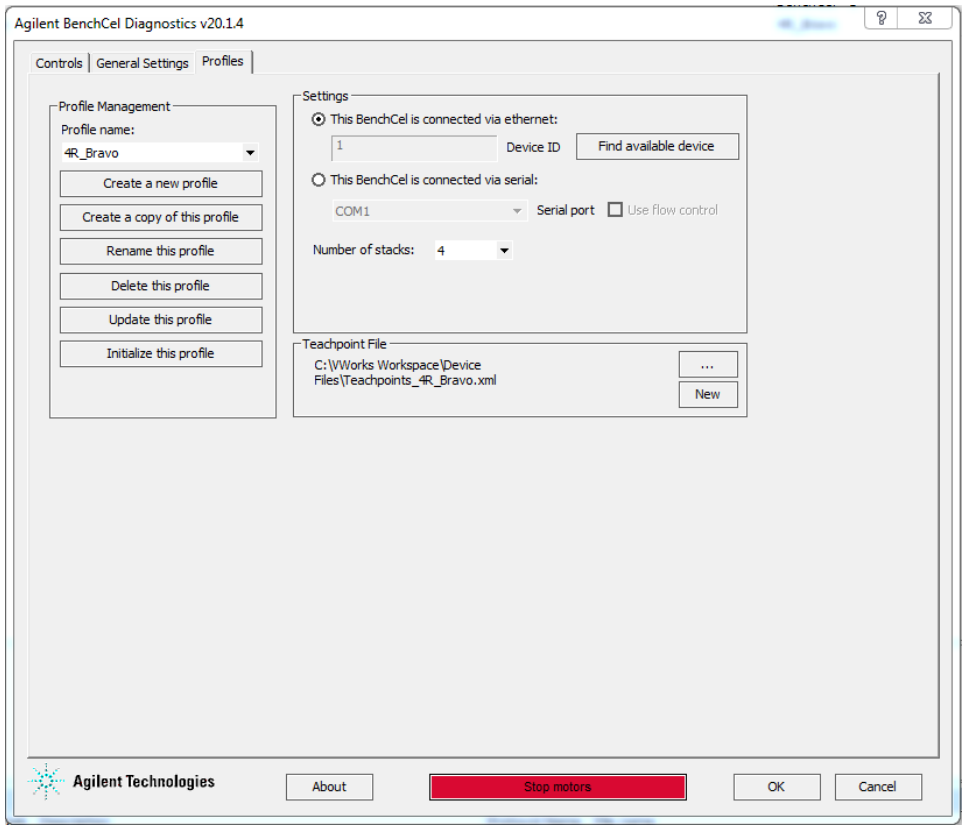
Opening BenchCel Diagnostics

To open BenchCel Diagnostics:

1. In the **VWorks** window, ensure that simulation is off and the correct device file (*.dev) is open.
2. In the **Devices** area, select the BenchCel Microplate Handler device, and then click **Device Diagnostics**.



The BenchCel Diagnostics dialog box opens. By default, the Profiles tab is displayed.



Initializing the BenchCel Microplate Handler in Diagnostics

Before you use BenchCel Diagnostics to operate the BenchCel Microplate Handler, you must initialize an appropriate BenchCel profile to:

- Establish communication with the BenchCel Microplate Handler.
- Load the profile information.

WARNING **When you initialize the BenchCel device, the robot head can move. To prevent potential injury, keep clear of the device while it is in motion.**

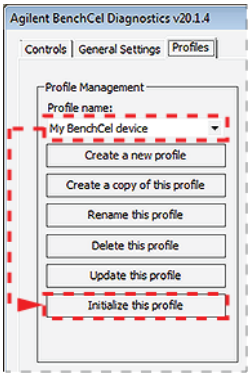
CAUTION **To prevent potential equipment damage, remove objects in the path of the robot head, arms, and grippers before operating the BenchCel Microplate Handler.**

CAUTION **Using an incorrect device profile can cause an error or damage the BenchCel Microplate Handler. Ensure that the correct device profile is initialized before operating the BenchCel Microplate Handler.**

To initialize a profile in BenchCel Diagnostics:

1 In the **Profiles** tab, select the desired profile in the **Profile name** list.

2 Click **Initialize this profile** to establish communication with the BenchCel Microplate Handler and load the profile information.



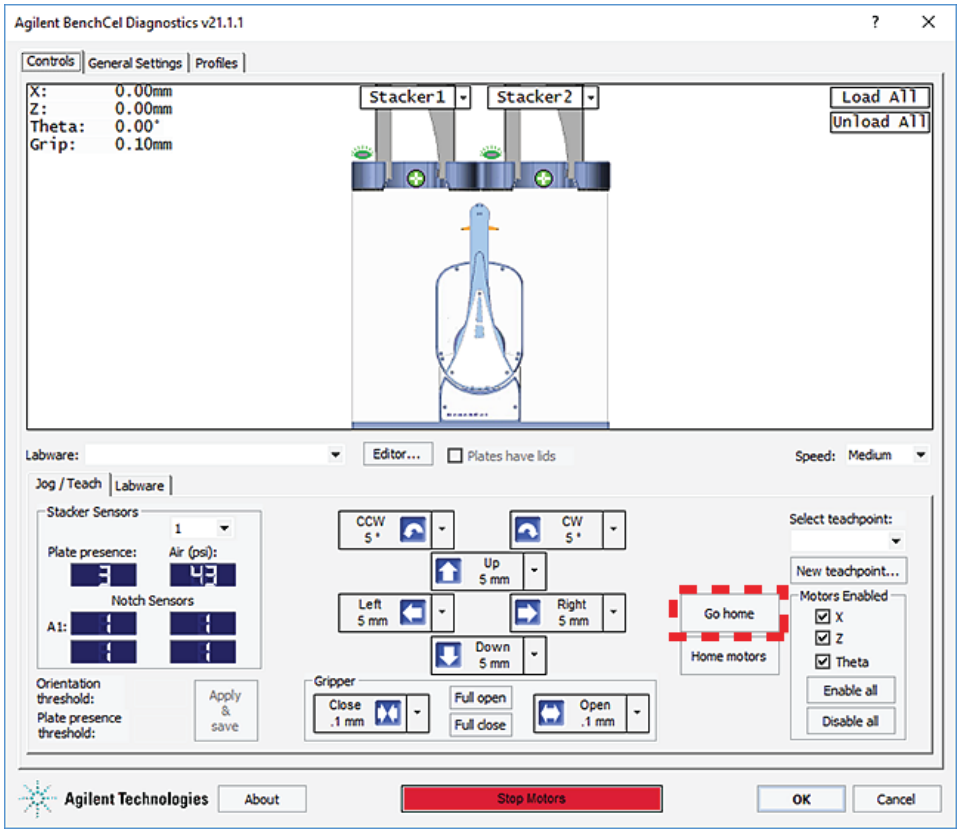
Sending the robot to the home position

The home position is where the robot head is at the center of the BenchCel Microplate Handler and the robot arms are perpendicular to the *x*-axis. You send the robot to the home position if you want the robot out of the way in a safe position.

To send the robot to the home position:

1 In the **Controls** tab, click the **Jog/Teach** tab.

2 Click **Go Home**.



Homing the robot

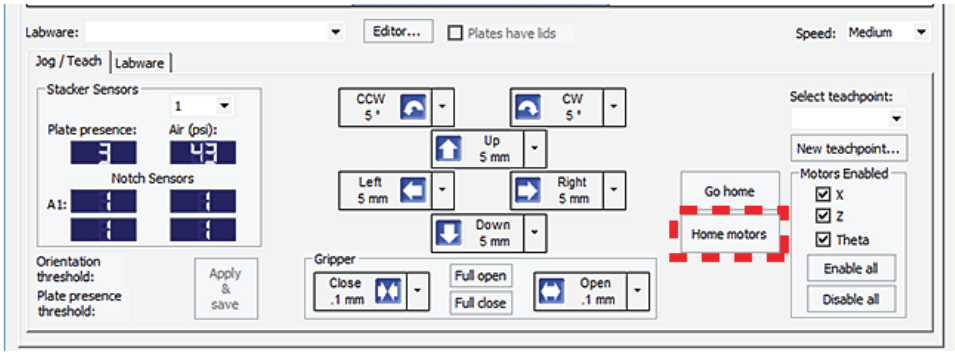
Homing the robot sends the robot to the factory-defined home position for each axis of motion. The homing process recalibrates the robot position along each axis. Home the robot if you notice that the robot is not accurately picking up or placing plates. You might also want to home the robot after recovering from an emergency stop.

Note: If a labware definition is selected when you click Home motors, the robot grippers return to the Gripper open position defined for the selected labware.

To home the robot:

1 In the **Controls** tab, click the **Jog/Teach** tab.

2 Click **Home Motors**.



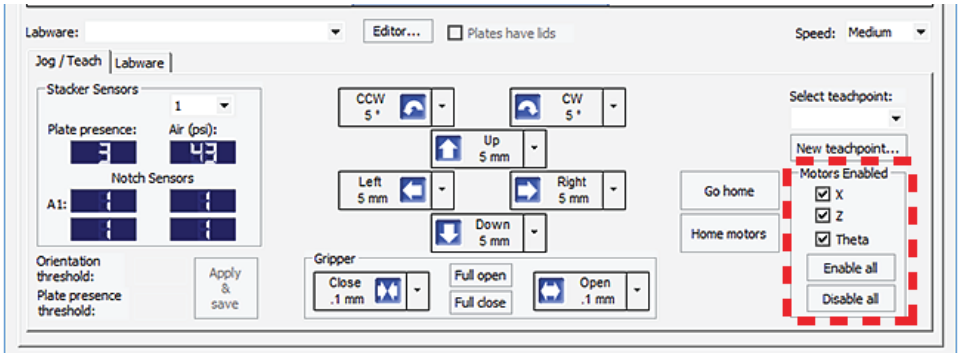
Disabling and enabling the robot motors

Disabling the robot motors allows you to move the robot by hand, making it easier to set and edit teachpoints.

To disable or enable the robot motors:

1 In the **Controls** tab, click the **Jog/Teach** tab.

2 In the **Motors Enabled** area, select or click the following:



Option or command	Description
X	Select the option to enable the *x*-axis motor. Clear the check box to disable the *x*-axis motor.
Z	Select the option to enable the *z*-axis motor. Clear the check box to disable the *z*-axis motor.

Option or command	Description
Theta	Select the option to enable the *theta*-axis motor. Clear the check box to disable the *theta*-axis motor.
Enable All	Click to turn on all the motors.
Disable All	Click to turn off all the motors.

Jogging the robot

Jogging the robot moves the robot and robot grippers in small, precise increments along one of the axes. You can jog the robot to fine-tune its position when creating and editing teachpoints.

To jog the robot:

1 In the **Controls** tab, click the **Jog/Teach** tab.

2 Enable the robot motors. See "Disabling and enabling the robot motors" on page 23.

3 In the robot movement area, click  to select the jog distance from the corresponding increment list, if applicable.

CAUTION **Use smaller jog increments than you think you need to ensure that the robot does not bump into obstacles in its path (such as the stacker heads and plate stages).**

4 Click the directional button:

Command	Description
	Jogs the robot arm counterclockwise from the current position by the specified *theta*-axis increment.
	Jogs the robot arm clockwise from the current position by the specified *theta*-axis increment.
	Jogs the robot head left from the current position by the specified *x*-axis increment.
	Jogs the robot head right from the current position by the specified *x*-axis increment.
	Jogs the robot head up from the current position by the specified *z*-axis increment.
	Jogs the robot head down from the current position by the specified *z*-axis increment.
	Opens the robot grippers by the specified grip increment.
	Closes the robot grippers by the specified grip increment.

Command	Description
Full Open	Opens the robot grippers to the Robot Gripper Open Position value set in the Labware tab.
Full Close	Closes the robot grippers to the Robot Gripper Holding Stack value set in the Labware tab.

Changing the robot speed

The speed you select in Diagnostics applies only to the robot commands in Diagnostics (Jog, Move, Transfer, and so on). If the robot is holding a microplate, the slower of the following will be applied: the speed you selected in the Labware Editor or the speed you selected in Diagnostics.

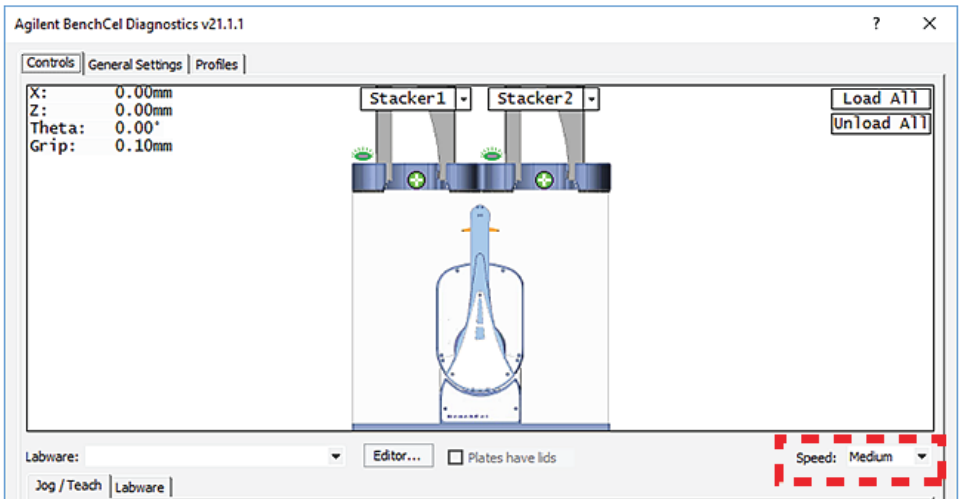
You can select the robot speed to accommodate the task you are performing. For example, you can select the Slow speed when you are creating new teachpoints, creating and testing protocols, or diagnosing problems with the system.

You can adjust the speed setting for the *x*-axis, *z*-axis, and *theta*-axis for each speed (high, medium, or slow) as a percentage of the factory-set maximum speed.

To select the robot speed:

1 In **Diagnostics**, click the **Controls** tab.

2 In the **Speed** list, select **Fast**, **Medium**, or **Slow**.



Note: During a protocol run, the robot uses the speed selection in the VWorks Tools > Options dialog box. If the robot is holding a microplate, the slower of the following will be applied: the speed in the Labware Editor or the speed in the Tools > Options dialog box. For more information, see the *VWorks Automation Control User Guide*.

Moving plates between teachpoints

You can move a microplate between teachpoints when you are verifying a teachpoint or to determine whether to home the motors.

CAUTION

To prevent collision, remove obstacles in the path of the robot.

To move plates between teachpoints:

1 Manually place a microplate at one of the two teachpoints.

2 In **Diagnostics**, click the **Controls** tab, and then select the **Slow** speed.

3 In the graphical display area, click the plus sign ( ) at either of the following:

- The teachpoint you want to move to
- Two teachpoints between which you want to move a plate

The selected teachpoints should be highlighted in red circles ( ).

4 Rest the pointer on a selected teachpoint. In the command menu that appears, select one of the following:

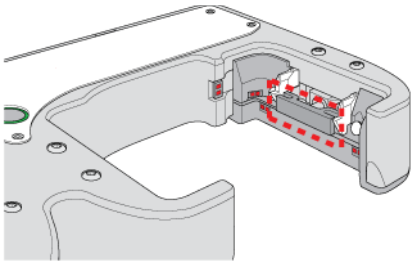
Command	Description
Move to <teachpoint>	Moves the robot from its current position to the selected teachpoint. The robot stays at the teachpoint.
Pick from <teachpoint>	Picks up the microplate from the selected teachpoint and moves the plate to the ready-for-upstack position under the stacker head.
Place at <teachpoint>	Moves the robot from its current position and places the microplate at the selected teachpoint. After placing the microplate, the robot backs away from the teachpoint into the safe zone.
Transfer to <teachpoint>	Moves a microplate from the currently selected teachpoint to the other selected teachpoint. To transfer a microplate from a stack, you must first click **Load Stacker**. During the transfer, the robot downloads the plate, places it at the other selected teachpoint, and then backs into the safe zone. If the robot is transferring a plate from one teachpoint to another, the robot picks up the microplate from the currently selected teachpoint, places the microplate at the other selected teachpoint, and then backs into the safe zone.
Delid from <teachpoint>	*Lidded labware only*. Removes the lid from the labware that is at the selected teachpoint.
Relid to <teachpoint>	*Lidded labware only*. Replaces the lid on the labware that is at the selected teachpoint.

Opening and closing clamps

The clamps in the stacker head close and open the grippers at the bottom of the labware rack to hold and release the first plate in position for the robot grippers. Compressed air is used to move the clamps.

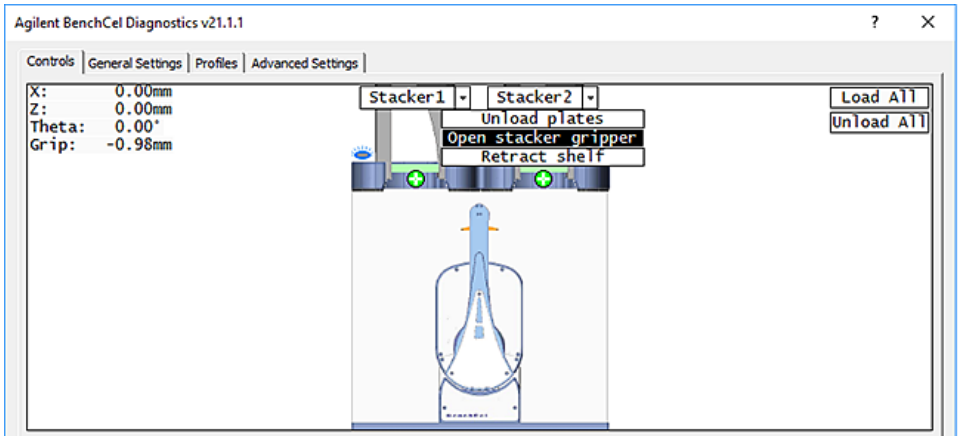
The clamps close and open the stacker grippers automatically during the loading, unloading, downstacking, and stacking procedures. When diagnosing problems or after an aborted run, you can use the commands in Diagnostics to open or close the clamps (stacker grippers). For example, you might want to open the clamps (stacker grippers) to remove a microplate.

CAUTION **Opening the clamps (stacker grippers) might cause the microplate or stack of microplates to drop.**



To open or close the clamps (stacker grippers):

1. In **Diagnostics**, click the **Controls** tab.
2. In the graphical display area at the top of the rack, click **Stacker**, and then choose **Open Stacker gripper** or **Close stacker gripper**. A click sounds as the clamps (stacker grippers) open or close.



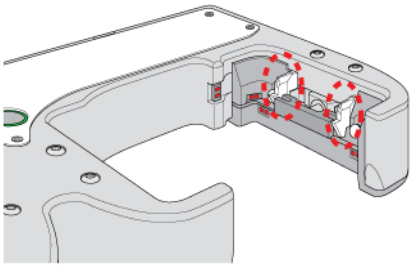
Extending and retracting shelves

The shelves in the stacker head are used to hold the stack of labware temporarily during the downstacking and upstacking processes. Resting the microplates on the shelves levels the microplates, allowing the robot grippers to accurately hold the microplate at the specified offset position. Compressed air is used to move the shelves.

The shelves extend and retract automatically during the downstacking and upstacking processes. When diagnosing problems or after an aborted run, you can use the commands in Diagnostics to extend or retract the shelves.

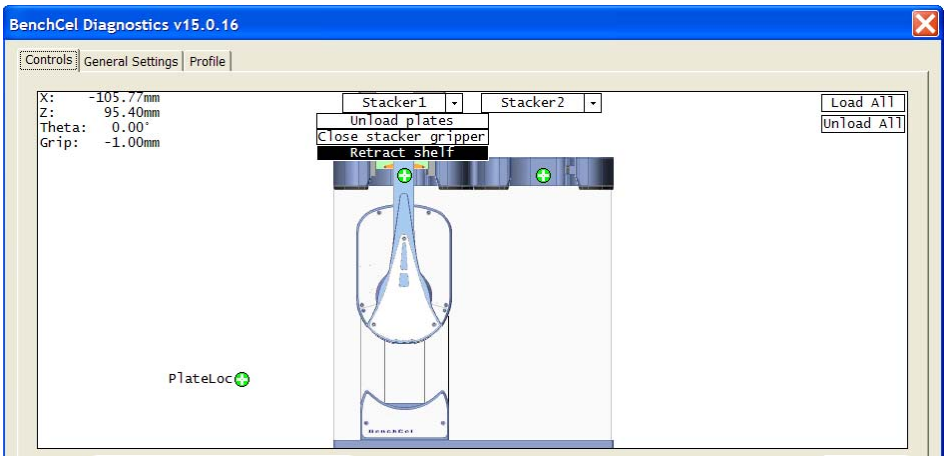
CAUTION

Retracting the shelves might cause the microplate or stack of microplates to drop.



To extend or retract the shelves:

1. In **BenchCel Diagnostics**, click the **Controls** tab.
2. In the graphical display area at the top of the desired rack, click **Stacker**, and then choose **Extend Shelf** or **Retract Shelf**. A click sounds as the shelves extend or retract.



Cleaning up after use

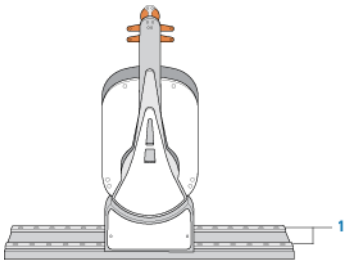
CAUTION **Make sure you clean up spilled liquids immediately. Use only the recommended cleaning materials. Using other cleaning solutions and materials can cause damage to the device. Do not use abrasive, corrosive cleaning agents. Do not use metal brushes.**

To clean up the BenchCel Microplate Handler after use:

1. If applicable, remove the labware that remains in the robot grippers. You might need to use BenchCel Diagnostics to move the robot head to a convenient position, and then open the robot grippers. For instructions see "Jogging the robot" on page 24.
2. Unload used labware from the labware racks. See "Filling and emptying the labware racks" on page 14.
3. Uninstall the labware racks from the BenchCel Microplate Handler. See "Installing and uninstalling labware racks" on page 17.

IMPORTANT Make sure the power and compressed air are turned on when removing the racks.

4. Make sure the *x*-axis tracks (1) are free of debris.



5. Use standard laboratory wipes and a mild detergent or ethanol alcohol to clean the exterior painted white surfaces and the metal surfaces of dust, grime, chemical deposits, and other debris on the BenchCel Microplate Handler.

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