

Centrifuge with Loader

Quick Guide

Original Instructions

Notices

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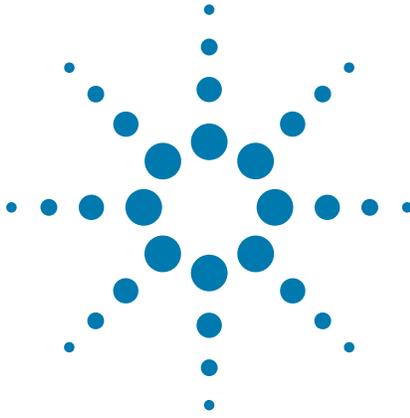
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Safety Notices

 **A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.**

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Centrifuge with Loader Quick Guide

This guide contains the following topics:

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- “Workflows” on page 5
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- “Setting the load and unload parameters” on page 10
- “Loading and unloading microplates and counterweights” on page 12
- “Setting the spin parameters” on page 13
- “Spinning the labware” on page 14
- “Centrifuge Loader Diagnostics – Control tab reference” on page 16

About this guide

This guide summarizes the Centrifuge with Loader operator instructions.

This guide assumes the following:

- The Centrifuge with Loader is installed correctly. For installation instructions, see the *Automated Centrifuge Loader User Guide*.
- The device profiles for the Centrifuge and the Loader are already created and the teachpoints for both devices are already set. For setup instructions, see the *Microplate Centrifuge User Guide* and the *Automated Centrifuge Loader User Guide*.
- You are familiar with the VWorks Automation Control software. See the *VWorks Automation Control User Guide*.

If you are using another lab automation system software, see the user documentation for the software.

For user information about related products, you can search the product knowledge base or download the latest version of a PDF file from the Agilent Technologies website at:

www.agilent.com/chem/askb

Safety information

Before using the Centrifuge with Loader

Before using the Centrifuge with Loader, your organization should make sure that you are properly trained in:

- General laboratory safety
- The correct and safe operation of the Centrifuge with Loader
- The correct and safe operation of lab automation systems or components used in combination with the Centrifuge with Loader

The Centrifuge with Loader has a safety interlock circuit that must be closed for it to operate. The Machinery Directive requires that you always connect the safety interlock to a safety guard, light curtain, or enclosure.



WARNING Operating the Centrifuge with Loader without safety guards or an enclosure connected to the safety interlock circuit increases the risk of injury.

General safety precautions

For general safety precautions, intended product use statement, and the list of safety labels, see the *Automation Solutions Products General Safety Guide*. If the Centrifuge with Loader is installed in a BioCel System, see the *BioCel System Safety Guide*.

Moving-parts hazards

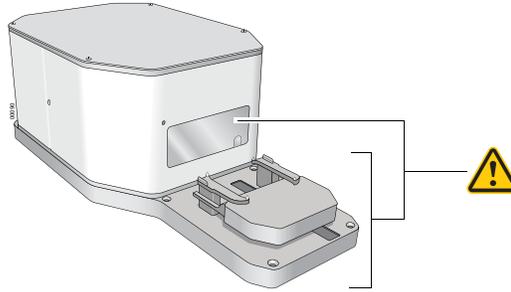


WARNING The Loader has many moving parts that can cause possible pinching, piercing, or bruising. Keep away from the Centrifuge with Loader while it is in motion.



WARNING The Centrifuge door closes automatically when you load labware or start a spin. Keep away from the Centrifuge door while it is opening or closing. The door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.

Figure Centrifuge with Loader moving parts



The Centrifuge will not spin unless:

- The door is closed and locked.
- The buckets are unlocked.
- The bucket payloads are balanced.
- The appropriate software command is sent.

The Centrifuge automatically closes and locks the door whenever you start a spin or spin cycle. The Centrifuge door will not unlock or open if the rotor is moving.



WARNING Do not attempt to manually unlock the door while the rotor is moving. Although no longer powered, the buckets might still be rotating at a dangerous speed.



WARNING Keep away from the Centrifuge while it is in motion. Not all circumstances can be foreseen and serious injury is possible. It is the responsibility of every operator to follow warnings and safety labels.



WARNING Do not operate the Centrifuge if any of its components or accessories are damaged or have been modified in any manner not authorized by Agilent Technologies. Do not operate the Centrifuge if objects or liquids are trapped within the chamber. Discontinue use if the Centrifuge vibrates or emits noise above normal levels.

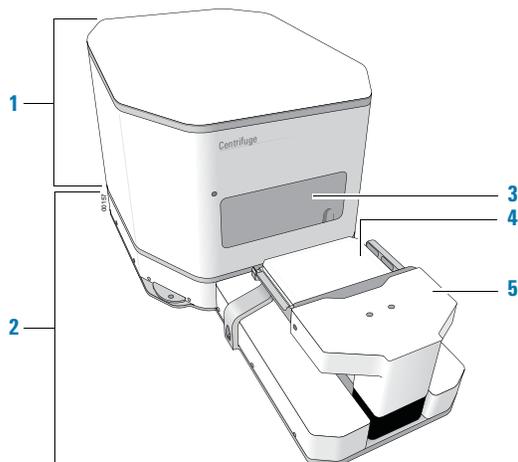


WARNING Each Centrifuge bucket can hold a microplate or counterweight that weighs up to 250 g (8.82 oz). Placing heavier microplates or counterweights in the Centrifuge can cause the device to malfunction during operation, damaging the device and causing severe injury.

Hardware overview

The following figure shows the primary hardware components. For detailed information about these components, see the *Automated Centrifuge Loader User Guide*.

Figure Centrifuge with Loader components

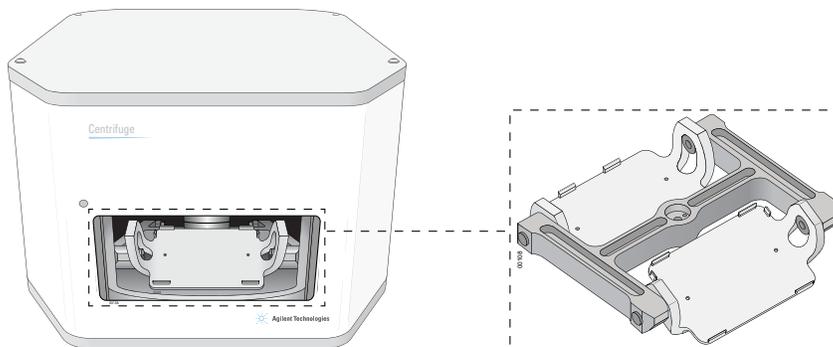


- 1 Centrifuge
- 2 Loader
- 3 Centrifuge door
- 4 Loader plate stage (shown with a microplate)
- 5 Gripper head with gripper fingers

Inside the Centrifuge are two buckets that can host microplates. The following figure shows a close-up view of the buckets.

Note: Only one bucket is visible from the doorway.

Figure Centrifuge buckets



Workflows

About the workflows

There are two ways you can use the Centrifuge with Loader to spin microplates:

- In a lab automation system, where you run a protocol containing Centrifuge tasks to spin multiple microplates in one or more spin cycles. See [“Workflow for running a protocol”](#) on page 5.
- As a standalone device, where you use commands in Centrifuge Loader Diagnostics to spin an individual microplate. See [“Workflow for using Centrifuge Loader Diagnostics”](#) on page 6.

Workflow for running a protocol

You can start one or more spin cycles when you run a protocol containing Centrifuge tasks. During the run, the lab automation system robot will place sample microplates on the Loader stage, the Loader will load and unload the microplates in the Centrifuge, and the Centrifuge will spin the microplates based on the parameters specified in the Centrifuge tasks.

The workflow for starting a run is as follows:

Step	For this task...	See...
1	Start up the lab automation system.	Lab automation system user guide, such as the <i>BioCel System User Guide</i>
2	Open the form or protocol that contains the Centrifuge tasks.	<i>VWorks Automation Control User Guide</i>
3	Make sure the spin parameters are set correctly.	<i>VWorks Automation Control User Guide</i>
4	Determine whether you need to load the counterweight in bucket 2 before the run.	<i>VWorks Automation Control User Guide</i>
5	Load the counterweight in the Centrifuge if required.	“Setting the load and unload parameters” on page 10 “Loading and unloading microplates and counterweights” on page 12
6	Start the protocol run.	<i>VWorks Automation Control User Guide</i>

Workflow for using Centrifuge Loader Diagnostics

You can use parameters and commands in Centrifuge Loader Diagnostics to spin an individual microplate. Doing so allows you to spin a microplate without having to run a protocol.

In Centrifuge Loader Diagnostics, you can spin microplates in one of two ways:

- *Complete cycle.* Performs a cycle that consists of the load step, the spin step, and the unload step.
- *Spin only.* Performs the spin only and assumes that the labware and counterweight are already loaded.

Complete cycle workflow

Step	For this task...	See...
1	Start up the Centrifuge with Loader.	“Starting up and shutting down” on page 7
2	Place the counterweight on the Loader stage.	–
3	Open Centrifuge Loader Diagnostics.	“Opening Centrifuge Loader Diagnostics” on page 9
4	Set the load and unload parameters.	“Setting the load and unload parameters” on page 10
5	Set the spin parameters.	“Setting the spin parameters” on page 13
6	Start the spin cycle, which consists of the load, spin, and unload steps.	“Spinning the labware” on page 14

Spin only workflow

Step	For this task...	See...
1	Start up the Centrifuge with Loader.	“Starting up and shutting down” on page 7
2	Place the counterweight on the Loader stage.	–
3	Open Centrifuge Loader Diagnostics.	“Opening Centrifuge Loader Diagnostics” on page 9
4	Set the load and unload parameters.	“Setting the load and unload parameters” on page 10
5	Load the counterweight, place the sample microplate on the Loader stage, and then load the microplate.	“Loading and unloading microplates and counterweights” on page 12
6	Set the spin parameters.	“Setting the spin parameters” on page 13

Step	For this task...	See...
7	Start the spin.	“Spinning the labware” on page 14
8	Unload the microplate and counterweight.	“Loading and unloading microplates and counterweights” on page 12

Starting up and shutting down

Starting up the Centrifuge with Loader



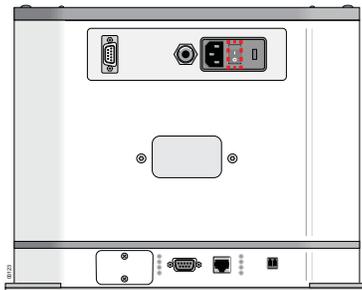
WARNING Components of the Loader move when you initialize the device. The moving parts can cause possible pinching, piercing, or bruising. Keep away from the Loader while it is initializing.

The Centrifuge feeds power to the Loader. Turning on the Centrifuge turns on the Loader. In addition, initializing the Loader automatically initializes the Centrifuge.

To start up the Centrifuge with Loader:

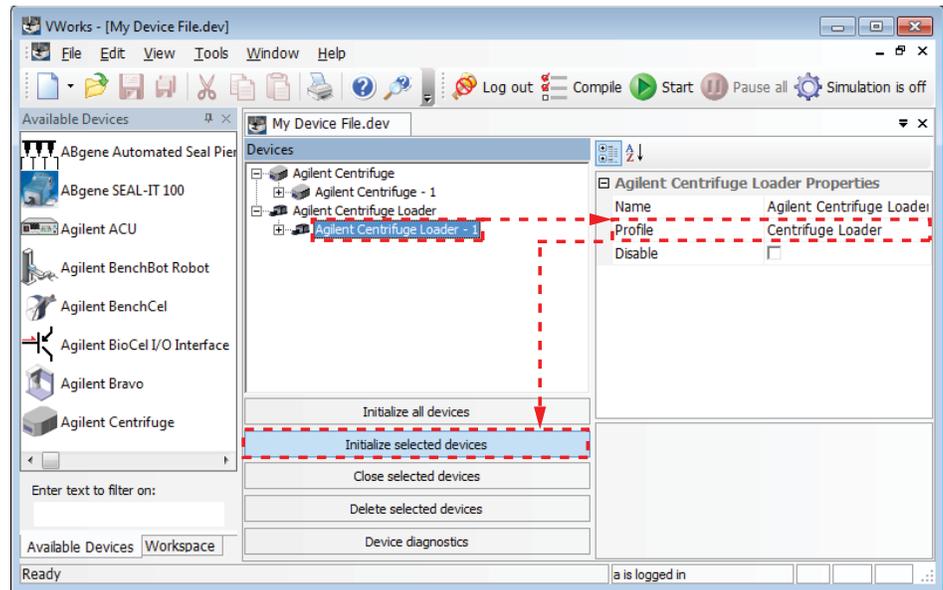
- 1 Verify that the air supply is turned on.
- 2 On the back of the Centrifuge, press the power switch to the on position (I).

Figure Power switch on the back of the Centrifuge with Loader



- 3 Turn on the computer and the monitor. The Microsoft Windows operating system starts.
- 4 Start the VWorks software.
- 5 Open the device file.
- 6 Turn off the simulation mode.
- 7 In the **Devices** area, select the **Centrifuge Loader** device.
- 8 In the **Centrifuge Loader Properties** area, make sure the correct profile is selected.

9 Click Initialize selected devices.



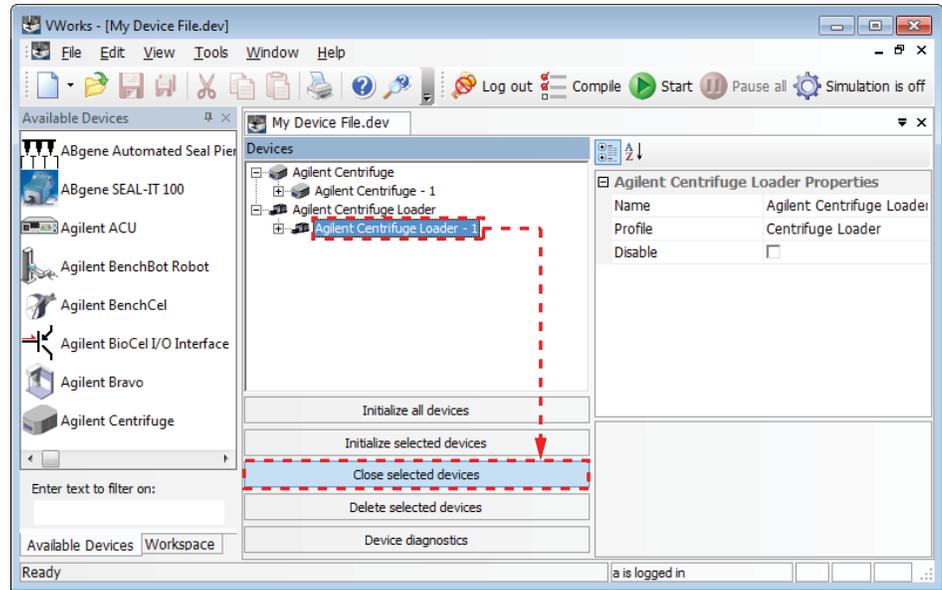
The Loader components move to their home positions. The Centrifuge opens its door.

Shutting down the Centrifuge with Loader

Shut down the Centrifuge with Loader before you perform any routine maintenance or service the device.

To shut down the Centrifuge with Loader:

- 1** Remove any labware or counterweight that is in the Centrifuge. For unloading instructions, see [“Setting the load and unload parameters”](#) on page 10 and [“Loading and unloading microplates and counterweights”](#) on page 12.
- 2** Close the **Centrifuge Loader Diagnostics** dialog box.
- 3** In the device file, select the Loader you want to shut down, and then click **Close selected devices**.

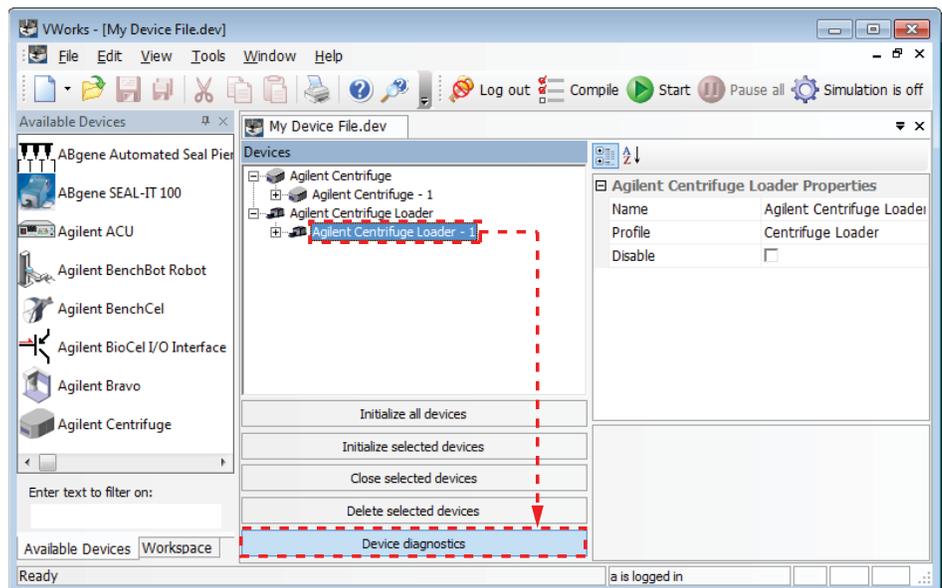


- 4 Exit the VWorks software.
- 5 Turn off the computer and monitor.
- 6 On the back of the Centrifuge, press the power switch to the off position (O).
- 7 Turn off the air supply to the Centrifuge with Loader.

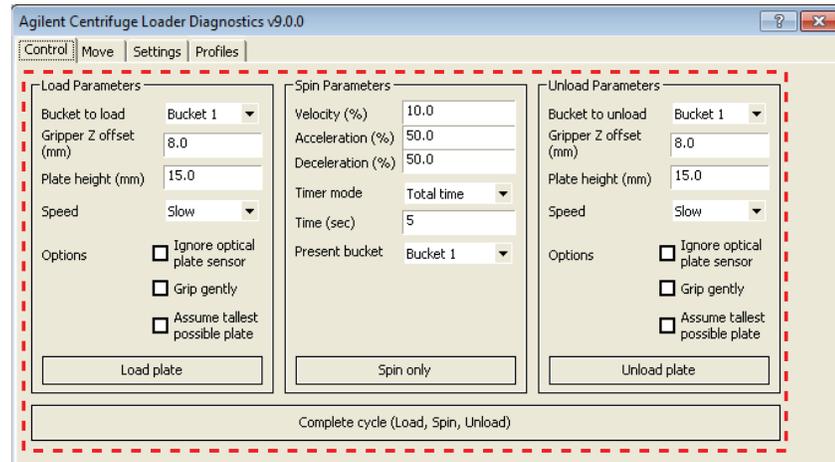
Opening Centrifuge Loader Diagnostics

To open Centrifuge Loader Diagnostics:

- 1 In the device file, select the **Centrifuge Loader** device, and then click **Device diagnostics**.



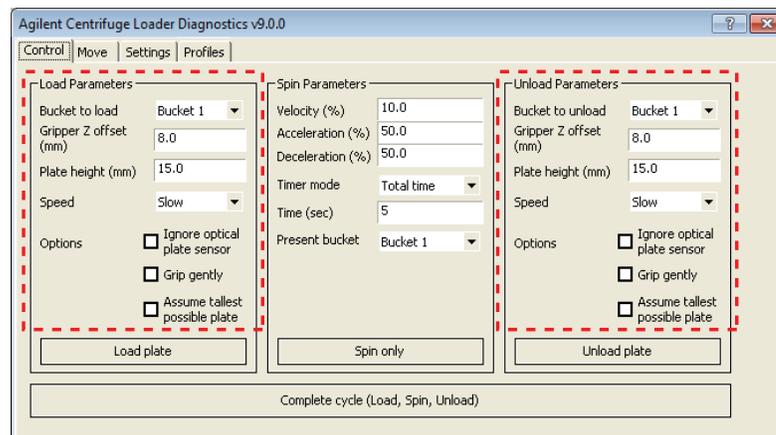
- In the **Centrifuge Loader Diagnostics** dialog box, click the **Control** tab. Notice that the loading, unloading, and spin parameters and commands are in the Control tab.



For a description of the status information at the bottom half of the Centrifuge Loader Diagnostics dialog box, see [“Centrifuge Loader Diagnostics – Control tab reference”](#) on page 16.

Setting the load and unload parameters

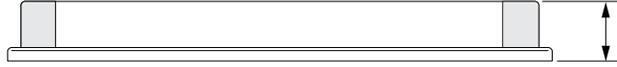
To set the load or unload parameters:



- In the **Bucket to load** or **Bucket to unload** list, select the bucket you want to use for loading or unloading.
If you are preloading a counterweight for a protocol run, be sure to load the counterweight in bucket 2.
- In the **Gripper Z offset** box, type the distance, in millimeters, from the bottom of the microplate to where the Loader can grip the microplate.



- 3** In the **Plate height** box, type the distance, in millimeters, from the bottom of the microplate to the top of the microplate.



IMPORTANT The Plate height value and the Gripper Z offset value are used together to determine whether the microplate or counterweight can successfully enter and exit the Centrifuge.

- 4** Select the **Speed** at which the Loader will load or unload the microplate or counterweight. The speed is defined as a percent of the factory-set maximum speed:

Speed selection	% of factory-set maximum speed
Slow	20%
Medium	50%
Fast	90%

Note: If the system is in the BYPASS safety interlock mode, the Loader will move at a reduced speed. For more information about the BYPASS mode, see the [BioCel System Safety Guide](#).

- 5** Select one or more of the following options:

Option	Description
Ignore optical plate sensor	Uses only the grip resistance method to determine the presence of microplates during the loading or unloading process. The plate sensor on the gripper head is not used. Select this option if you are loading and unloading dark matte-finish microplates.
Grip gently	Uses only the optical plate sensor to determine the presence of microplates during the loading or unloading process. The grip resistance method is not used. Select this option if you are loading and unloading soft or highly flexible microplates, such as PCR microplates.
Assume tallest possible plate	Ignores the Plate height value in step 3 and assumes the microplate or counterweight is 48.3 mm tall.

Loading and unloading microplates and counterweights

Before you start

Make sure:

- You understand the Centrifuge balance requirements. The contents of the Centrifuge buckets must be within 10 g of each other. For details, see the [Microplate Centrifuge User Guide](#).
- You place the microplate or counterweight on the Loader stage. You can place it onto the stage manually or using the lab automation system robot. For instructions on how to use the robot to place the microplate or counterweight, see the robot user documentation.
- You set the load or unload parameters. See “[Setting the load and unload parameters](#)” on page 10.



WARNING The Loader has many moving parts that can cause possible pinching, piercing, or bruising. Keep away from the Loader while it is in motion.

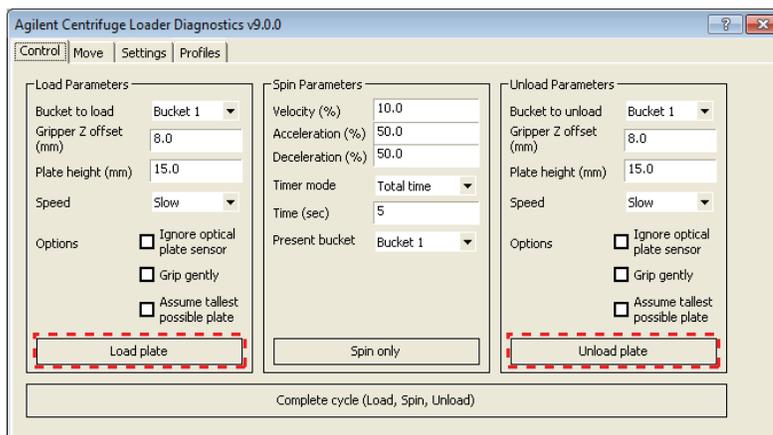


WARNING The Centrifuge door closes automatically when you load labware or start a spin. Keep away from the Centrifuge door while it is opening or closing. The door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.

Procedure

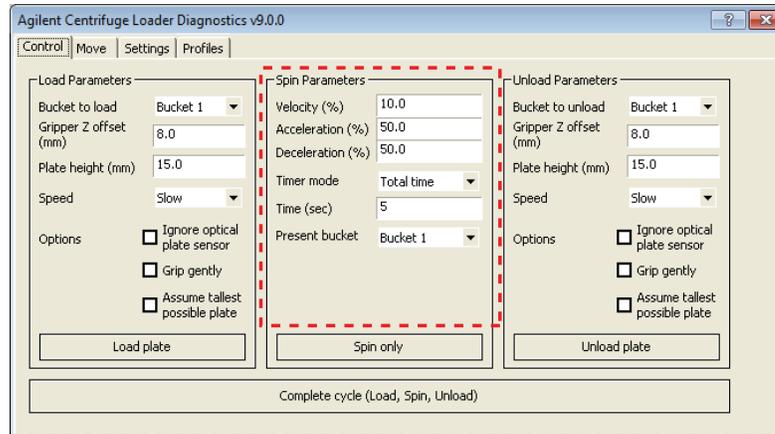
To load or unload a microplate or counterweight:

Click **Load plate** or **Unload plate**.



Setting the spin parameters

To set the spin parameters:



- 1 In the **Velocity** box, type the rotor speed, as a percent of factory-set maximum speed.
- 2 In the **Acceleration** box, type the rate of centrifugation, as a percent of the factory-set maximum acceleration.
- 3 In the **Deceleration** box, type the deceleration of the centrifuge, as a percent of the factory-set maximum deceleration.
- 4 In the **Timer mode** list, select one of the following to specify how the software should count the spin time:

Timer mode selection	Description
Total time	The total spin time, including acceleration and deceleration.
Time at speed	The length of time during which the Centrifuge is spinning at the target speed. The time does not include acceleration and deceleration.

- 5 In the **Time** box, type the length of total time or time at speed in seconds.
- 6 *Spin only.* In the **Present bucket** list, select the bucket that should be moved to the door when the Centrifuge stops spinning.
This parameter is applicable only if you use the Spin only command. It is ignored if you use the Complete cycle command.

Spinning the labware

Before you start

If you are running a spin only, make sure you preload both the labware and counterweight in the Centrifuge. See “Setting the load and unload parameters” on page 10 and “Loading and unloading microplates and counterweights” on page 12.

If you are running a complete spin cycle, make sure you do the following:

- Load the counterweight in the Centrifuge. See “Setting the load and unload parameters” on page 10 and “Loading and unloading microplates and counterweights” on page 12.
- Place the sample microplate on the Loader stage. You can place it onto the stage manually or using the lab automation system robot. For instructions on how to use the robot to place the microplate or counterweight, see the robot user documentation.
- Set the spin parameters. See “Setting the spin parameters” on page 13.



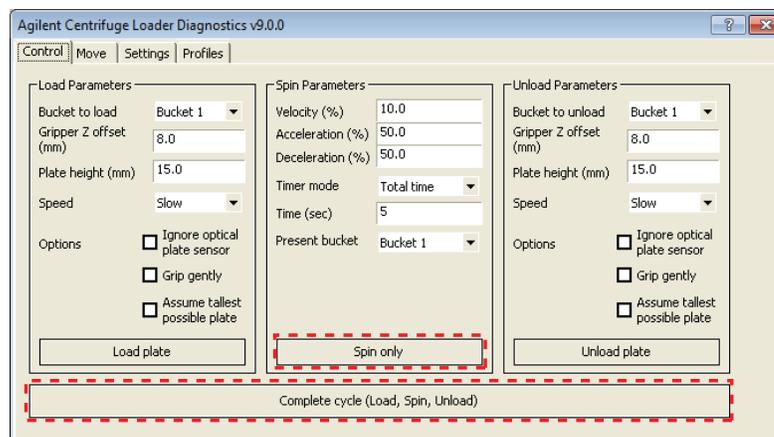
WARNING The Loader has many moving parts that can cause possible pinching, piercing, or bruising. Keep away from the Loader while it is in motion.



WARNING The Centrifuge door closes automatically when you load labware or start a spin. Keep away from the Centrifuge door while it is opening or closing. The door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.

Procedure

Two spin commands are available in the Centrifuge Loader Diagnostics Control tab:



Spin command	Description
Spin only	The Centrifuge performs the spin using the spin parameters you specified and assumes that the labware and counterweight are already loaded. (The Loader does not move.)
Complete cycle	The Centrifuge with Loader performs a spin cycle using the load, unload, and spin parameters you specified. The complete spin cycle consists of the load step, the spin step, and the unload step.

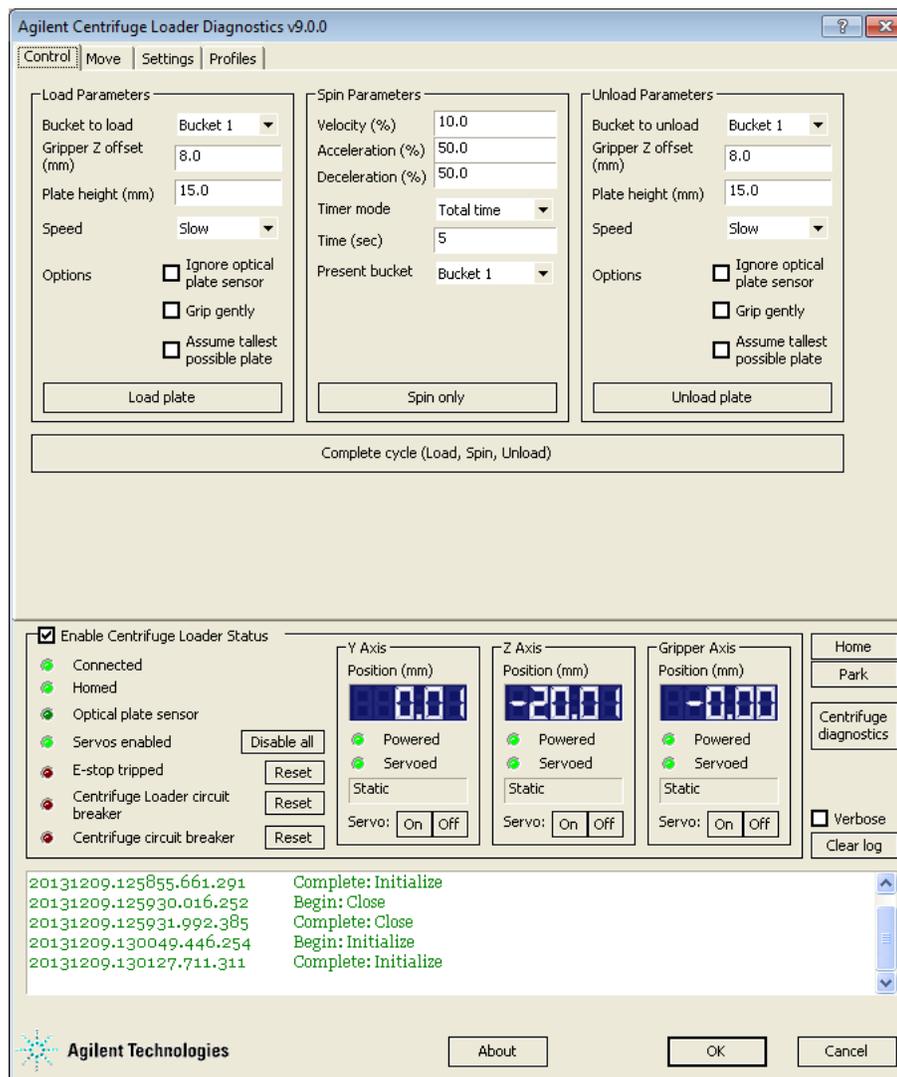
To spin preloaded labware and counterweight:

- 1 Click **Spin only**. The Centrifuge closes and locks the door, and then starts to spin. When it is finished, the Centrifuge unlocks and opens the door. The bucket selected in the **Spin Parameters Present bucket** list is visible in the doorway.
- 2 To unload the microplate and counterweight, see “[Setting the load and unload parameters](#)” on page 10 and “[Loading and unloading microplates and counterweights](#)” on page 12.

To start a spin cycle where the counterweight is already loaded:

- 1 Click **Complete cycle**. The Loader moves the microplate on its stage into the Centrifuge. The Centrifuge spins the microplate. When it is finished, the Loader moves the microplate from the Centrifuge to the Loader stage.
- 2 To spin another microplate, place it on the Loader stage and repeat step 1.
- 3 After you are finished, unload the counterweight. See “[Setting the load and unload parameters](#)” on page 10 and “[Loading and unloading microplates and counterweights](#)” on page 12.

Centrifuge Loader Diagnostics — Control tab reference



Load Parameters and Unload Parameters areas

Parameter or command	Description
Bucket to load/unload	The bucket to use to load or unload a microplate or counterweight.
Gripper Z offset	The distance, in millimeters, from the bottom of the microplate to where the Loader can grip the microplate.
Plate height	The distance, in millimeters, from the bottom of the microplate to the top of the microplate.

Parameter or command	Description
Speed	The speed at which the Loader will load or unload the microplate or counterweight. The speed is defined as a percent of the factory-set maximum speed: Slow, Medium, and High.
Ignore optical plate sensor	The option to use only the grip resistance method to determine the presence of microplates during the loading or unloading process. The plate sensor on the gripper head is not used.
Grip gently	The option to use only the optical plate sensor to determine the presence of microplates during the loading or unloading process. The grip resistance method is not used.
Assume tallest possible plate	The option to ignore the Plate height value and assume the microplate or counterweight is 48.3 mm tall.
Load/Unload plate	The command to load or unload a microplate or counterweight in the Centrifuge.

Spin Parameters area

Parameter or command	Description
Velocity	The rotor speed, as a percent of maximum factory-set maximum speed.
Acceleration	The rate of centrifugation, as a percent of the factory-set maximum acceleration.
Deceleration	The deceleration of the centrifuge, as a percent of the factory-set maximum deceleration.
Timer mode	How the software should count the spin time: <ul style="list-style-type: none"> • Total time. The total spin time, including acceleration and braking. • Time at speed. The length of time during which the Centrifuge is spinning at the target speed. The time does not include acceleration and braking.
Time	The length of total time or time at speed, in seconds.
Present bucket	The bucket that should be moved to the door when the Centrifuge stops spinning. This selection is applicable only if you use the Spin only command.

Parameter or command	Description
Spin only	The command that starts the spin.

Complete cycle command

Performs a complete spin cycle, which consists of the load, spin, and unload steps.

Enable Centrifuge Loader Status area

Status or command	Description
Enable Centrifuge Loader Status	Activates the Enable Centrifuge Loader Status area. If you clear the check box, the status area grays out, and no status is presented.
Connected	Indicates whether the Loader is connected its power source.
Homed	Indicates whether the Loader components are in their home positions.
Optical plate sensor	Indicates whether the optical sensor is in use.
Servos enabled Enable/Disable all	Indicates whether the gripper head motors are enabled. You can enable or disable the motors by clicking Enable all or Disable all .
E-stop tripped Reset	Indicates whether the emergency-stop button has been pressed. To recover the Centrifuge with Loader from the emergency stop, click Reset .
Centrifuge Loader circuit breaker Reset	Indicates whether the Loader circuit breaker has been tripped. To reset the circuit breaker, click Reset .
Centrifuge circuit breaker Reset	Indicates whether the Centrifuge circuit breaker has been tripped. To reset the circuit breaker, click Reset .

Y, Z, and Gripper Axis areas

Status or command	Description
Position	The current position of the Loader along the y -, z -, or gripper axis.
Powered	The indicator that shows whether the motor power is on.
Servoed	The indicator that shows whether the motor is in error state.

Status or command	Description
Servo	The power switch to the axis motor. To turn on or turn off a motor, click On or Off .

Commands

Command	Description
Home	Sends the Loader components to their home positions.
Park	Sends the Loader to the park position.
Centrifuge Diagnostics	Opens the Centrifuge Diagnostics dialog box. For information about Centrifuge Diagnostics, see the <i>Microplate Centrifuge Quick Guide</i> or the <i>Microplate Centrifuge User Guide</i> .

Log area

Displays the events and errors that occurred.

Option or command	Description
Verbose	Displays detailed log information.
Clear log	Removes existing log information from the log area.



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