Microplate Centrifuge

User Guide

Original Instructions

Agilent Technologies

Notices

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Safety Notices

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A **CAUTION** 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 damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

Contents

Preface

This preface contains the following topics:

About this guide

Who should read this guide

This user guide is for people with the following job roles:

Job role	Responsibilities
Installer	Unpacks, installs, and tests the Centrifuge before it is used.
Integrator	Configures hardware and writes software.
Lab manager, administrator, or technician	• Manages the automation system that contains the Centrifuge • Develops the applications that are run on the system • Develops training materials and standard operating procedures for operators
Operator	Performs the daily production work on the Centrifuge and solves routine problems.

What this guide covers

This guide contains the safety guidelines and the installation, setup, operation, and maintenance procedures for the Microplate Centrifuge.

This guide does not provide instructions for the VWorks software or third-party software. See the relevant user guides for these products.

What is new in this revision

Feature and description	See...
Updated the compliance topic to include the South Korean Class A EMC declaration. Moved the general safety precautions, intended product use statement, and the list of safety labels.	"Safety and regulatory compliance" on page 3 *Automation Solutions Products General Safety Guide*
Updated the hardware overview to include the connection panel description.	"Connection panel" on page 10
Simplified and updated the software overview to reflect the latest versions.	"Software overview" on page 11
Updated laboratory requirements to include the labware specifications.	"Laboratory requirements" on page 15
Moved the unpacking procedures to a separate guide that is attached to the shipping container.	*Microplate Centrifuge Unpacking Guide*

Feature and description	See...
Included a description of how to add the Centrifuge device to a VWorks device file.	"Creating and editing device files" on page 34
Updated all diagnostics procedures based on Centrifuge Diagnostics version 8.0.	"Creating and editing profiles" on page 40 "Setting the bucket home position" on page 45 "Performing a spin" on page 57
Added a procedure for changing the fuse.	"Replacing the fuse" on page 79
Updated the troubleshooting topic	"Troubleshooting hardware problems" on page 81

Software version

This guide documents Centrifuge Diagnostics version 8.0.

Related guides

Use this guide in conjunction with the following:

- *Automation Solutions Products General Safety Guide*. Provides general safety information and describes potential safety hazards that you might encounter when using Automation Solutions products. A copy of this safety guide is included with your shipment.
- *Microplate Centrifuge Unpacking Guide*. Provides unpacking instructions for the Centrifuge.
- *Microplate Centrifuge Quick Guide*. Provides a brief hardware overview and instructions on how to start up, shut down, set spin parameters, load and unload microplates, and spin the labware.
- *Centrifuge Diagnostics Version 8 Quick Reference*. Provides a reference to the controls and indicators in Centrifuge Diagnostics.
- *Microplate Centrifuge ActiveX v8 User Guide*. Describes the ActiveX controls for the Microplate Centrifuge.
- *VWorks Automation Control Setup Guide*. Explains how to define labware and labware classes, liquid classes, and pipetting techniques, and how to track and manage labware in storage.
- *VWorks Automation Control User Guide*. Explains how to create protocols, and set task parameters for each device in the system.

For devices in a third-party system, see the relevant third-party system guides.

Related information

For more information about...	See...
Accessing product user guides	"Accessing Agilent Automation Solutions user information" on page viii
Reporting problems	"Reporting problems" on page 84

Accessing Agilent Automation Solutions user information

About this topic

This topic describes the different formats of user information and explains how to access it for the Agilent Automation Solutions products.

Where to find user information

The Automation Solutions user information is available in the following locations:

- *Knowledge base*. The help system that contains information about all the Automation Solutions products is available from the Help menu within the VWorks software.
- *PDF files*. The PDF files of the user guides are installed with the VWorks software and are on the software CD that is supplied with the product. A PDF viewer is required to open a user guide in PDF format. You can download a free PDF viewer from the internet. For information about using PDF documents, see the user documentation for the PDF viewer.
- *Agilent website*. You can search the online knowledge base or download the latest version of any PDF file from the Agilent website at www.agilent.com/chem/askb.

Accessing safety information

Safety information for the Automation Solutions devices appears in the corresponding device safety guide or user guide.

You can also search the knowledge base or the PDF files for safety information.

Using the knowledge base

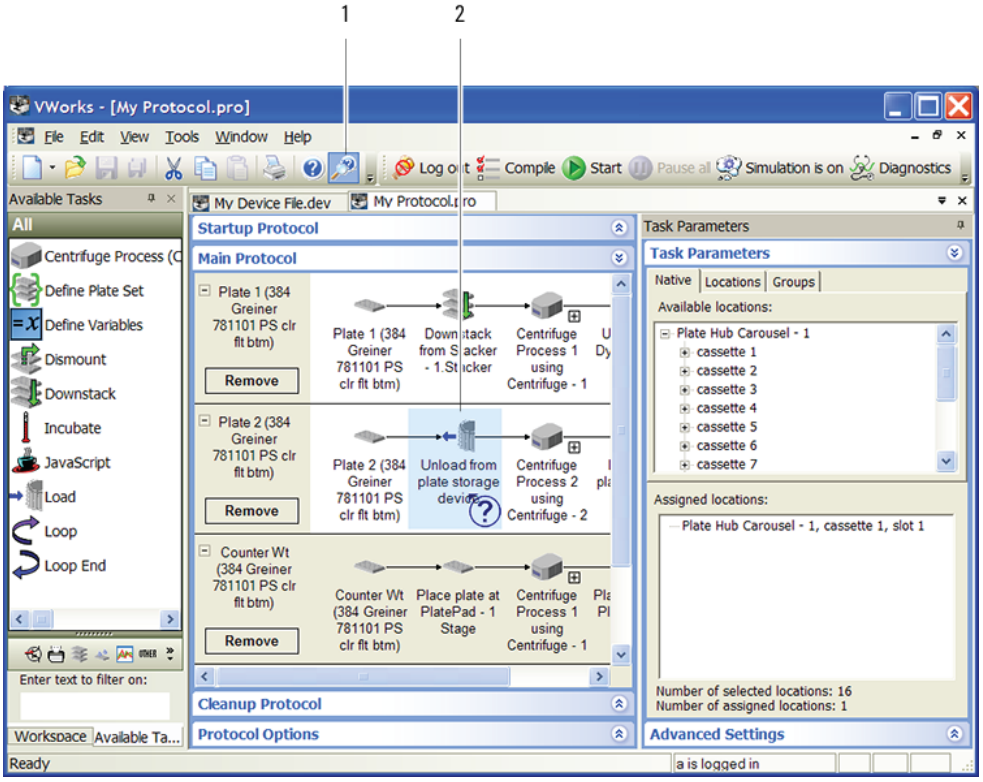
Knowledge base topics are displayed using web browser software such as Microsoft Internet Explorer and Mozilla Firefox.

Note: If you want to use Internet Explorer to display the topics, you might have to allow local files to run active content (scripts and ActiveX controls). To do this, in Internet Explorer, open the **Internet Options** dialog box. Click the **Advanced** tab, locate the **Security** section, and select **Allow active content to run in files on my computer.**

To open the knowledge base, do one of the following:

- From within VWorks software, select **Help** > **Knowledge Base** or press F1.
- From the Windows desktop, select **Start** > **All Programs > Agilent Technologies > VWorks** > **User Guides** > **Knowledge Base.**

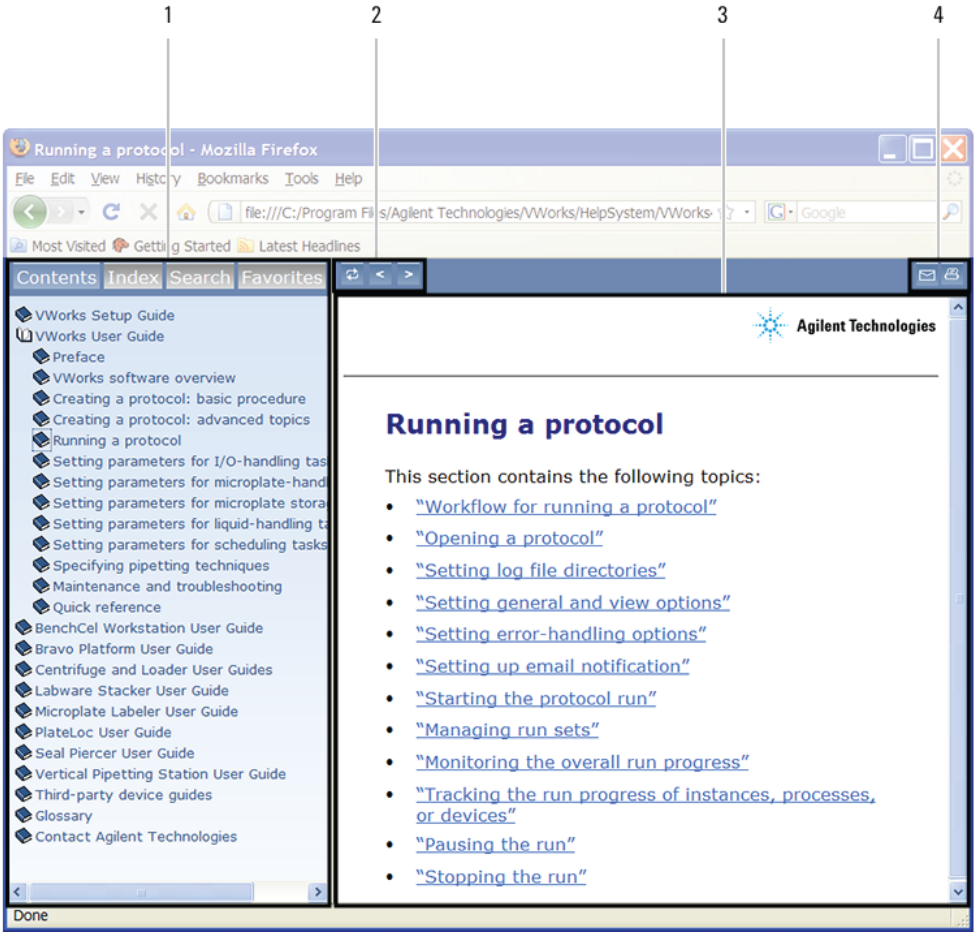
Opening the help topic for an area in the VWorks window



To access the context-sensitive help feature:

1. In the main window of the VWorks software, click the help button  . The pointer changes to  . Notice that the different icons or areas are highlighted as you move the pointer over them.
2. Click an icon or area of interest. The relevant topic or document opens.

Features in the Knowledge Base window



Item	Feature
1	*Navigation area.* Consists of four tabs: • *Contents.* Lists all the books and the table of contents of the books. • *Index.* Displays the index entries of all of the books. • *Search.* Allows you to search the Knowledge Base (all products) using keywords. You can narrow the search by product. • *Favorites.* Contains bookmarks you have created.
2	*Navigation buttons.* Enable you to navigate through the next or previous topics listed in the Contents tab.
3	*Content area.* Displays the selected online help topic.
4	*Toolbar buttons.* Enable you to print the topic or send documentation feedback by email.

1 Safety guidelines

This chapter contains the following topics:

General safety information

Before installing and using the Centrifuge

Before using the Centrifuge, make sure that you are properly trained in:

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

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*.

Note: If the Centrifuge is installed in a BioCel System, see the *BioCel System Safety Guide.*

Related information

For information about...	See...
Safety and regulatory compliance	“Safety and regulatory compliance” on page 3
Mechanical hazards	“Mechanical hazards” on page 5
Cautions about potential equipment damage	“Potential equipment damage” on page 6

Safety and regulatory compliance

The Centrifuge complies with the applicable EU Directives and bears the CE mark. See the Declaration of Conformity or Declaration of Incorporation, as applicable, for details. The Centrifuge is designed to comply with the regulations and standards listed in the following table.

Regulatory Compliance	Standard
EMC	
European Union	EMC Directive 2004/108/EC
	IEC 61326-1:2005 / EN 61326-1:2006
Canada	ICES/NMB-001:2004
Australia/New Zealand	AS/NZS CISPR 11:2004
Safety	
European Union	Machinery Directive 2006/42/EC
	Low Voltage Directive 2006/95/EC
	IEC 61010-1:2001 / EN61010-1:2001 IEC 61010-2-081:2001+A1:2003 / EN 61010-2-081:2002+A1:2003
Canada	CAN/CSA-C22.2 No. 61010-1-04 CAN/CSA-C22.2 No. 61010-2-081-04
USA	ANSI/UL 61010-1:2004

Electromagnetic compatibility

If the Centrifuge causes interference with radio or television reception, which can be determined by turning the device off and on, try one or more of the following measures:

- Relocate the radio or television antenna.
- Move the device away from the radio or television.
- Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- Make sure that all peripheral devices are also certified.
- Make sure that appropriate cables are used to connect the device to peripheral equipment.
- Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound emission declaration

Sound pressure: Lp < 70 dB according to EN ISO 779:2010.

Schalldruckpegel: Lp < 70 dB nach EN ISO 779:2010.

South Korean Class A EMC declaration

A 급 기기 (업무용 방송통신기자재)

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다 .

Related information

For information about...	See...
General precautions, intended product use statement, and list of safety labels	*Automation Solutions Products General Safety Guide*
Mechanical hazards	“Mechanical hazards” on page 5
Cautions about potential equipment damage	“Potential equipment damage” on page 6

Mechanical hazards

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.

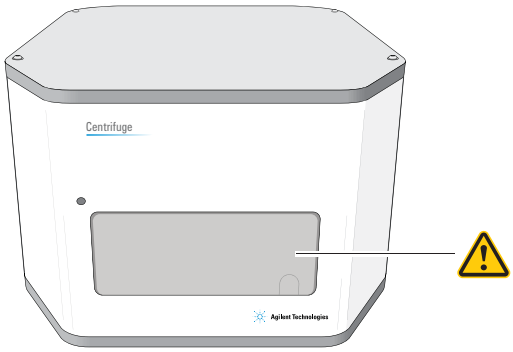
The Centrifuge automatically closes and locks the door whenever you start a spin cycle. The Centrifuge door will not unlock or open if the rotor is moving.

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 **Keep away from the Centrifuge door while it is opening or closing. The Centrifuge door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.**

Figure Centrifuge door



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.**

WARNING **Do not operate the Centrifuge above speeds of 1500 RPM unless it is securely mounted to a structure approved by Agilent Technologies.**

Related information

For information about...	See...
General precautions, intended product use statement, and list of safety labels	*Automation Solutions Products General Safety Guide*
Safety and regulatory compliance	"Safety and regulatory compliance" on page 3
Cautions about potential equipment damage	"Potential equipment damage" on page 6

Potential equipment damage

CAUTION Dirt in unfiltered air can build up in the Centrifuge air valves and can eventually cause a malfunction. Ensure that the air supply is properly filtered for moisture and aerosol impurities.

CAUTION Trapped liquids in the Centrifuge may cause corrosion inside the device.

CAUTION 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.

CAUTION If labware breaks apart inside the Centrifuge, ensure that all the fragments are removed. Labware fragments can interfere with moving parts and potentially damage the Centrifuge.

CAUTION The Centrifuge has a permanently attached rotor. Tampering with or adjusting the rotor mounting screw, which fastens the rotor to the central motor axle, can result in equipment damage. If you think the rotor mounting screw requires maintenance, contact Agilent Automation Solutions Technical Support.

Related information

For information about...	See...
General precautions, intended product use statement, and list of safety labels	*Automation Solutions Products General Safety Guide*
Mechanical hazards	"Mechanical hazards" on page 5
Safety and regulatory compliance	"Safety and regulatory compliance" on page 3

2 Introduction

This chapter provides an overview of the Centrifuge. The topics are:

About the Centrifuge

Introduction

The Agilent Microplate Centrifuge is a robot-accessible automated centrifuge that is intended to be integrated with a robotic lab automation system, such as the BioCel Automation System.

The Centrifuge has two buckets, each capable of carrying a single microplate, filter plate, or lidded microplate.

The microplates in the two buckets must be balanced to within 10 grams of each other. You can pair one sample plate with another of equal weight, or you can pair a sample plate with a balance plate that has been equally weighted with water.

About the Automated Centrifuge Loader

Not all robots can access the Centrifuge directly. For example, a crane-style robot can pick and place plates vertically, but cannot move a plate horizontally through the Centrifuge door.

To enable plate placement by these robots, the Centrifuge can be paired with the Agilent Centrifuge Loader. The Centrifuge Loader has a plate stage and a gripper. After the robot places a plate onto the plate stage, the gripper picks up the plate and moves it into the Centrifuge.

Related information

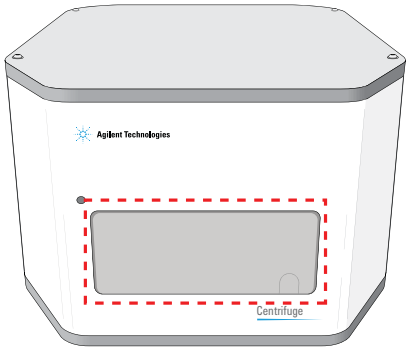
For information about...	See...
Safety guidelines	“Safety guidelines” on page 1
Centrifuge hardware components	“Hardware overview” on page 9
Initializing the Centrifuge	“Initializing the device profile and checking status” on page 42
Spinning microplates	“Workflows for performing spins” on page 58
Automated Centrifuge Loader	*Microplate Centrifuge with Loader User Guide*

Hardware overview

Front features

The Centrifuge door is at the front of the device. The door opens to permit you to load and unload microplates. The door closes and locks before a spin cycle starts.

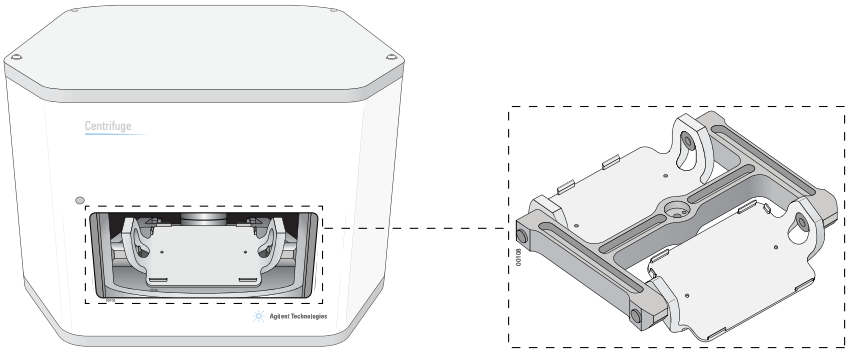
Figure Door at the front of the Centrifuge



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

Note: Only one bucket is visible from the doorway.

Figure Buckets inside the Centrifuge



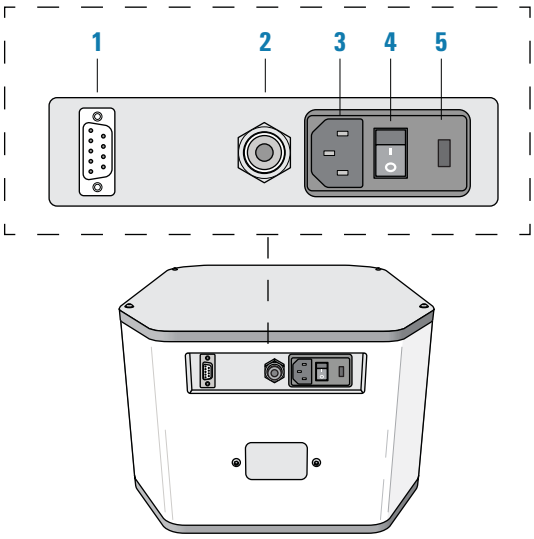
Related information

For information about...	See...
Safety guidelines	“Safety guidelines” on page 1
Initializing the Centrifuge	“Initializing the device profile and checking status” on page 42
Spinning microplates	“Workflows for performing spins” on page 58

Connection panel

The following figure and table describe the connection panel on the rear of the Centrifuge.

Figure Centrifuge connection panel



Item	Part	Comment
1	Serial port (DB-9 RS-232 9-pin)	Connects a serial cable from the controlling computer to the Centrifuge to provide communication.
2	Air supply port	Connects to a compressed-air source. The Centrifuge uses compressed air to move components, such as opening and closing the Centrifuge door.
3	AC power entry	Connects the power cord.
4	Power switch	Turns on (**I**) and off (**O**) the device power.
5	Fuse panel	Houses the AC inlet fuse.

Related information

For information about...	See...
Specifications for air supply, power, and fuse	"Laboratory requirements" on page 15
Connecting the communication cable, air line, and power cord	"Connecting the device" on page 27
Initializing the Centrifuge	"Initializing the device profile and checking status" on page 42

For information about...	See...
Safety guidelines	“Safety guidelines” on page 1

Software overview

About this topic

This topic describes the software that you use to operate the Centrifuge.

- “Centrifuge Diagnostics software” on page 11
- “About labware automation software” on page 11
- “VWorks software” on page 12
- “Centrifuge ActiveX control” on page 12

Centrifuge Diagnostics software

The Centrifuge Diagnostics software enable you to:

- Set up the Centrifuge device for automated operation. The setup requires a device profile. A Centrifuge device profile specifies the:
  - Serial communication connection (COM port) with the controlling computer.
  - The bucket home positions. The home position is the location to which the rotor turns to line up a bucket with the door.
- Spin individual microplates without running a protocol.
- Diagnose problems. You can view status information and move Centrifuge components to diagnose and troubleshoot problems.

About labware automation software

You can use either the VWorks software or third-party automation software to operate the Centrifuge in protocol runs. If you plan to use third-party automation software, you use the Centrifuge ActiveX control to permit the software to interface with the device.

VWorks software

The VWorks software enables you to:

- Set up the Centrifuge. You create a device file for the Centrifuge, and then you open Centrifuge Diagnostics to complete the device setup.
- Set up user accounts and privileges. You can set up different user accounts to enforce access policies.
- Define labware. Labware definitions describe the labware you will use during protocol runs.
- Create protocols. Protocols determine the sequence of tasks you want to automate in a run.
- Run, pause, monitor, and stop protocols. You can start, pause, monitor, and stop a protocol run from the controlling computer.

Centrifuge ActiveX control

Instead of using the VWorks software, you can use another automation control software to operate the Centrifuge in protocol runs. The Centrifuge ActiveX control allows automation software to interface with the device.

Related information

For information about...	See...
Setting up the VWorks software, including defining labware	*VWorks Automation Control Setup Guide*
Setting up in the Centrifuge	"Setup workflow" on page 32
Centrifuge Diagnostics	• "Using Centrifuge Diagnostics to perform a spin" on page 65 • *Centrifuge Diagnostics v8 Quick Reference*
How to use the VWorks software to run a protocol	• "Workflow for running a protocol" on page 58 • *VWorks Automation Control User Guide*
Centrifuge ActiveX controls	*Microplate Centrifuge ActiveX v8 User Guide*

3 Installing the Centrifuge

This chapter describes how to install and set up the Centrifuge.

IMPORTANT The procedures in this chapter are intended for personnel properly trained in the installation of such hardware.

Installation workflow

To install the Centrifuge, perform the following procedures in the order listed.

Step	Procedure	See...
1	Verify that the installation site meets the requirements.	"Laboratory requirements" on page 15
2	Unpack the Centrifuge.	*Microplate Centrifuge Unpacking Guide*
3	Install the buckets.	"Installing the buckets" on page 25
4	Mount the Centrifuge on the laboratory table.	"Mounting the Centrifuge" on page 22
5	Connect the air and power sources and the computer to the Centrifuge.	"Connecting the device" on page 27
6	Install the automation control software.	*VWorks Automation Control Setup Guide* or the software release notes

Laboratory requirements

About this topic

This topic describes the requirements for the site where you plan to install the Centrifuge.

Laboratory space requirements

Ensure that the installation location meets the following requirements:

- Provides proximity to the power outlet and air source.
- Allows sufficient space to accommodate the device and provide clearance at the back of the device to access power, communication, and air tubing connections.

Lab bench or table requirements

Make sure the lab bench of table meets the following requirements:

- Sufficient space to accommodate the device and provide clearance at the back of the device to access power, communication, and air tubing connections.
- Proximity to power outlet and air source.
- A fixed table (without wheels or with locking casters) that can support the weight of the device without excessive shaking or movement:
  - For centrifuge speeds above 1500 RPM, or when an immovable position is required, use a table that meets the following specifications at a minimum:

    Table surface thickness: 1.3 cm (0.5 in)

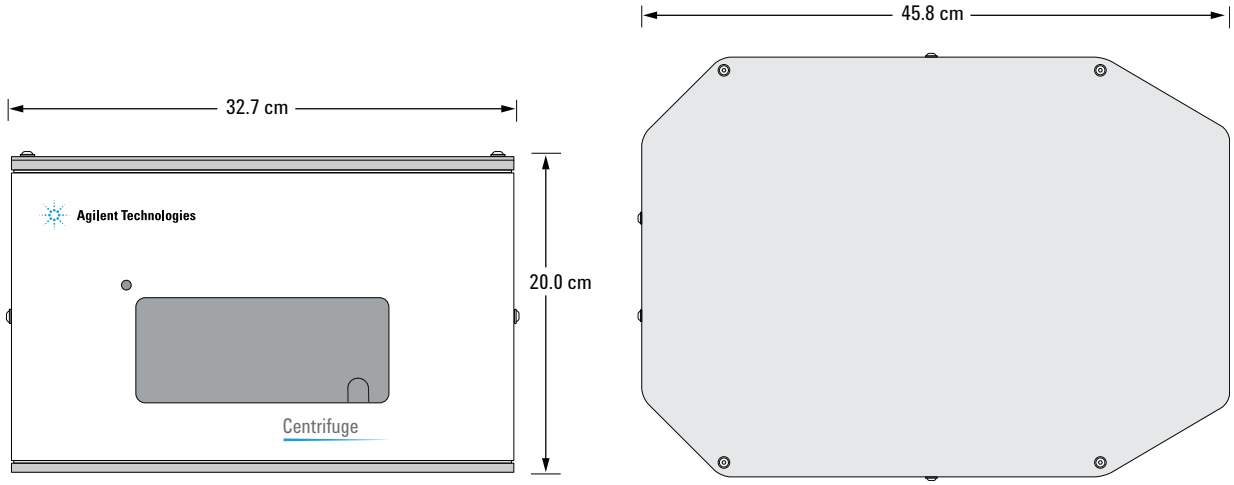
    Table weight: 45.5 kg (100 lb)
  - For centrifuge speeds below 1500 RPM and when a consistent location is not required, use a table that meets the following specification for free-standing operation:

    Table with non-skid stable surface: 36 x 49 cm (14 x 19 in)
- Proper height for any operator to comfortably operate the device.

Physical dimensions

The following figure and table provide the Centrifuge dimensions.

Figure Centrifuge dimensions: front view and top view



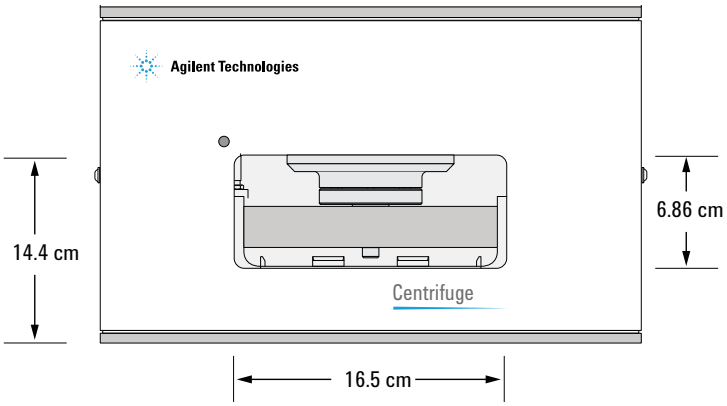
Dimension	Value
Height	20.0 cm (8.09 in)
Width	32.7 cm (12.9 in)
Depth	45.8 cm (18.1 in)
Weight	26.1 kg (57.5 lb)

Device orientation considerations

The following figures and table provide the dimensions of the Centrifuge door and the position of the buckets so that you can set up your robot to access the Centrifuge buckets properly.

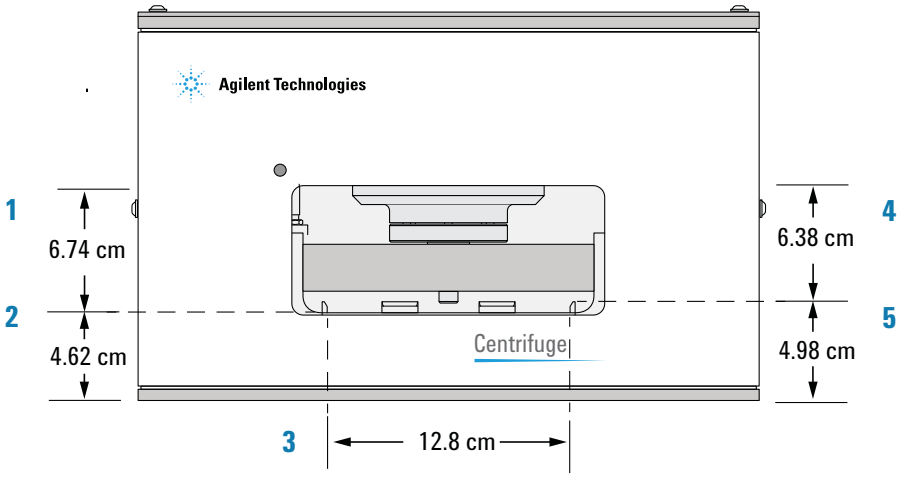
For an illustration of the mounting holes, see "Preparing the mounting surface for installation" on page 22.

Figure Centrifuge front door dimensions (front view with door open)



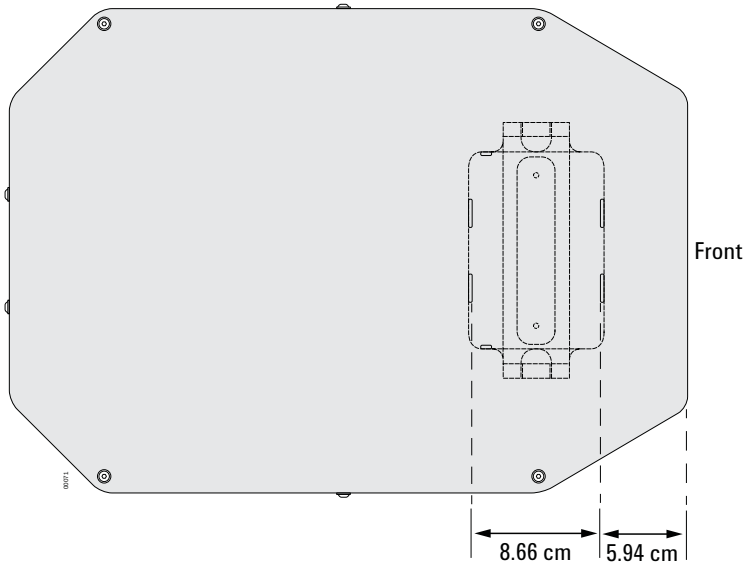
The following figure and table provide labware entry dimensions

Figure Centrifuge labware entry dimensions (front view)



Item	Dimension	Value
1	Distance from front door top edge to bucket surface	6.74 cm (2.65 in)
2	Distance from bucket surface to Centrifuge bottom mounting surface	4.62 cm (1.82 in)
3	Bucket width	12.8 cm (5.04 in)
4	Distance from front door top edge to top of front bucket tabs	6.38 cm (2.51 in)
5	Distance from Centrifuge bottom mounting surface to top of bucket tabs	4.98 cm (4.98 in)

Figure Centrifuge bucket in the load/unload position (top view)



Electrical requirements

The Centrifuge has the following power requirements.

Requirement	Value
Electrical	100~ to 240~, 50/60 Hz
Fuse	7 A, 250 V, 3 AG

Compressed air requirements

The Centrifuge requires the use of clean, dry, compressed air to move the pneumatic components. The compressed air can be from the following sources:

- Centralized source (laboratory)
- Compressed-air cylinders
- Portable pumps

CAUTION Ensure that the air coming into the device is properly filtered from moisture or aerosolized impurities. Significant moisture or impurities in the air line can adversely affect the performance and life of the device. Using oil compressors can cause oil to leak into the device and void your warranty.

The minimum compressed-air requirements are:

Requirement	Value
Quality	Clean, dry, compressed
Flow rate and pressure	0.5 Lps at 550 kPa (1 cfm at 80 psi)

Environmental requirements

Ambient environment

The Centrifuge is for indoor use only. The following table lists the operating specifications.

Requirement	Value
Pollution degree	2
Installation category	II
Temperature	5 to 40 °C
Humidity condition	10-90% RH, non-condensing
Elevation	1–2000 m

Computer requirements

The Centrifuge has a DB-9 RS-232 9-pin serial port for serial communication with the controlling computer.

Additional requirements depend on the lab automation software you are using:

- For VWorks software computer requirements, see the VWorks software release notes or the VWorks Knowledge Base at www.agilent.com/chem/askb
- For third-party automation software requirements, see the user documentation supplied with the product.

Related information

For more information about...	See...
Installation workflow	"Installation workflow" on page 14
Performance specifications	"Performance specifications" on page 19
Labware requirements	"Labware specifications" on page 20
Safety guidelines	"Safety guidelines" on page 1

Performance specifications

The following table provides the Centrifuge performance specifications.

Property	Value
Spindle speed	0–3000 RPM
Maximum centrifugal force on plate	1000 x*g*
Maximum imbalance	10 grams If you require a higher balance tolerance, contact Agilent Automation Solutions Technical Support.
Maximum mass of each plate	250 grams
Acceleration	0–2000 RPM in 5.0 seconds 0–3000 RPM in 7.5 seconds
Deceleration	2000–0 RPM in 5.0 seconds 3000–0 RPM in 7.5 seconds

Related information

For more information about...	See...
Laboratory requirements	“Laboratory requirements” on page 15
Installation workflow	“Installation workflow” on page 14
Labware specifications	“Labware specifications” on page 20
Safety guidelines	“Safety guidelines” on page 1

Labware specifications

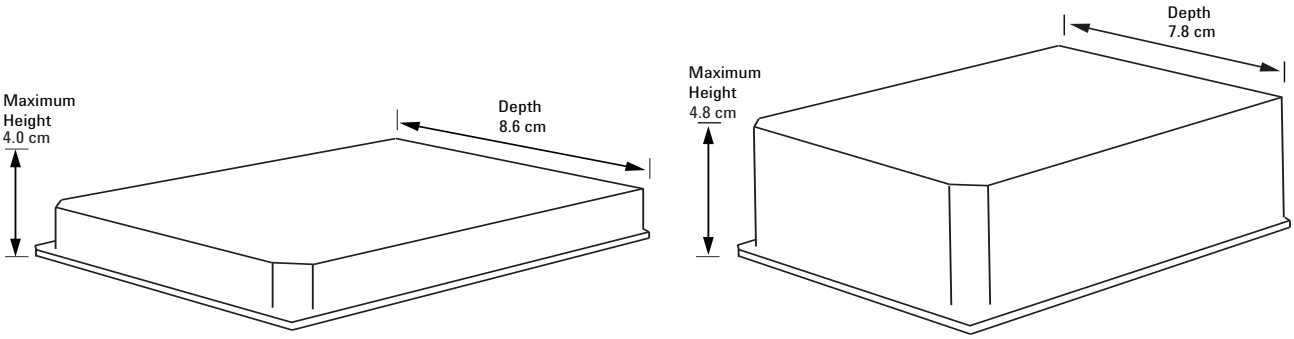
The Centrifuge is designed for labware that comply with the standards ANSI/SLAS 1-2004 (R2012) through ANSI/SLAS 4-2004 (R2012). Carefully evaluate any labware before use. If you have questions, contact your Agilent representative for evaluation.

The overall labware dimensions, including a lid, must fit within the following values.

- Width: 12.8 cm (5.03 in)
- Depth at base: 8.6 cm (3.38 in)
- Depth above base and height:
  - 8.6 cm (3.38 in) up to 4.0 cm (1.57 in)
  - 7.8 cm (3.07 in) up to 4.8 cm (1.89 in)

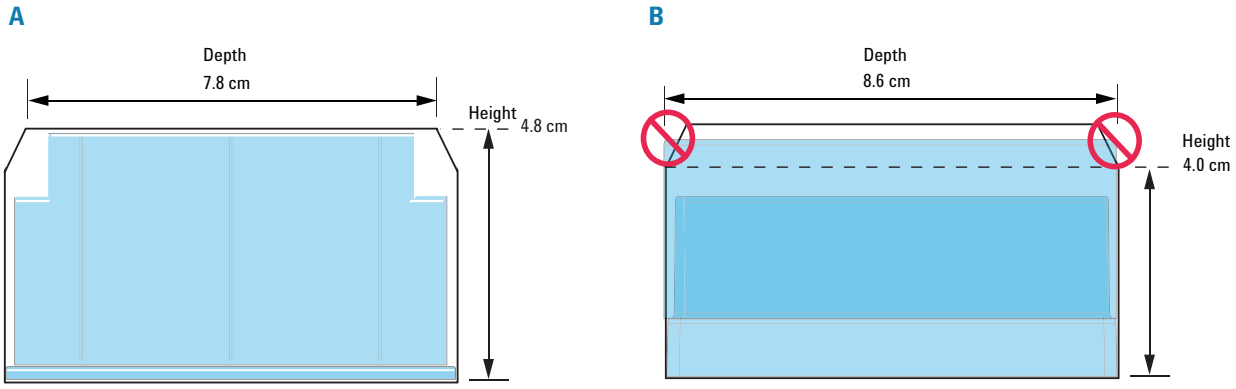
  The maximum height specification varies based on the depth measurement above a height of 4.0 cm, as the following figure shows.

Figure Labware maximum height based on depth



CAUTION Even if a microplate will fit through the Centrifuge door, an oversized microplate can cause a collision during a spin cycle when the buckets are tilted. Ensure that the microplate and lid, if applicable, fit within the specified depth profile.

Figure Depth profile (**A**) labware that fits within the profile and (**B**) labware that does not fit the profile



In example **A**, the microplate is 4.8-cm tall and has a 8.6-cm skirt depth, but the upper portion of the microplate fits within the 7.8-cm specification.

In example **B**, the microplate has a lid. The depth of the top of the lid (8.6 cm) exceeds the 4.0 cm maximum height. This microplate with lid might fit through the Centrifuge door and into the bucket. However, during a spin cycle when the buckets are tilted, the top corners of the lid would collide with the Centrifuge rotor, potentially resulting in equipment damage.

Related information

For more information about...	See...
Installation workflow	“Installation workflow” on page 14
Laboratory requirements	“Laboratory requirements” on page 15
Performance specifications	“Performance specifications” on page 19
Safety guidelines	“Safety guidelines” on page 1

Mounting the Centrifuge

Before you start

The procedures in this topic assume that you have experience in working on mechanical equipment that includes components sensitive to electrostatic discharge (ESD).

WARNING **Touching the circuit board when the power is on could give you an electrical shock. Ensure that the Centrifuge is not connected to a power source for this procedure.**

CAUTION The electronic components inside the Centrifuge are sensitive to static electricity. To prevent potential damage, wear a grounded wrist strap and avoid contact with the electronic components.

CAUTION Dropping or bumping the Centrifuge or the buckets can damage the device and result in further damage during a Centrifuge spin cycle. If the Centrifuge is subjected to a forceful impact, do not use the device until it is safe to operate. If you have questions about potential equipment damage, contact Automation Solutions Technical Support.

Ensure that you have a Hex wrench, 2.5 mm.

Note: The Centrifuge includes four M6 X 30 flathead screws for mounting the device. You may need to obtain screws that are a more suitable length for your particular laboratory setup.

About installing the Centrifuge

In order for your robot to move plates to and from the Centrifuge buckets, the three-dimensional position of the buckets must be fixed and known to the controlling software of the lab automation system. To accomplish this, the Centrifuge must be mounted on a stable base that does not move in relation to the robot.

You can mount the Centrifuge directly on a tabletop or on a mounting plate that also holds other components of your system. You should have the surface accurately drilled and tapped to create screw holes, according to the dimensions given in this topic.

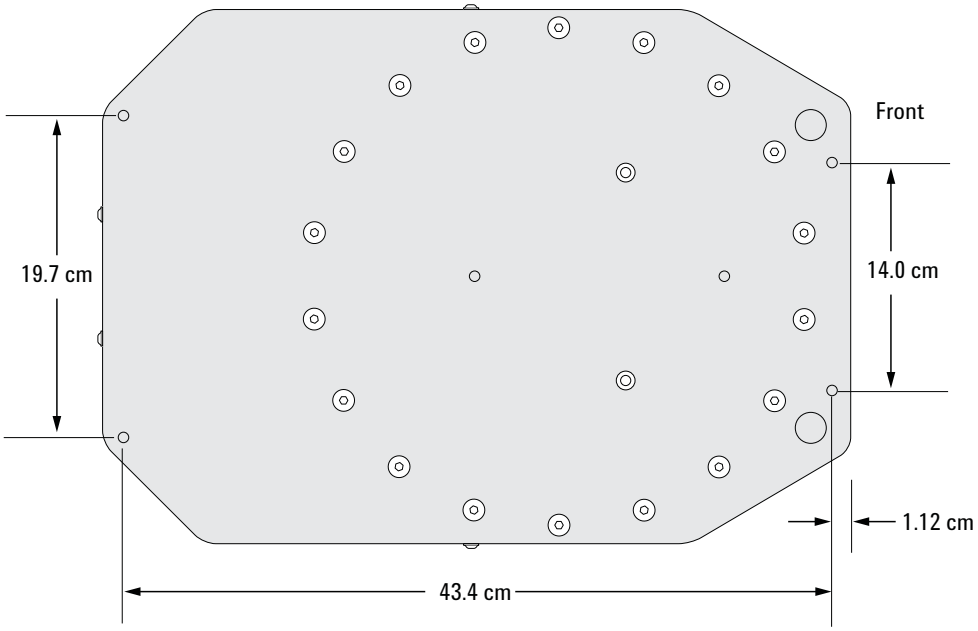
Preparing the mounting surface for installation

To prepare your mounting surface for installation:

Prepare the mounting holes to accommodate the Centrifuge using the following figures for reference.

Use a #9 drill bit with an M6 tap to prepare the holes.

Figure Centrifuge mounting holes (bottom view)



Mounting the Centrifuge to a stable surface

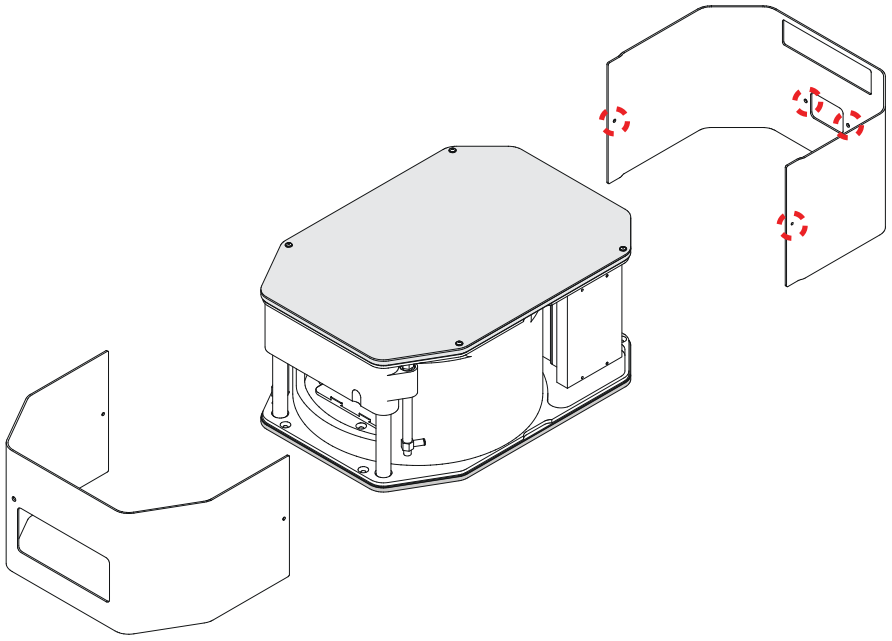
Ensure that you have prepared the Centrifuge mounting surface.

To mount the Centrifuge to a stable surface:

1 Remove the front and back Centrifuge covers, using the following figure for reference.

Four retention screws and washers attach the front and back covers. Use a 2.5-mm hex wrench to remove the screws.

Figure Locations of attachment screws for front and back cover removal



2 Carefully, lift the Centrifuge and place it on the bench so that the screw holes in the Centrifuge base align with the screw holes in your tabletop.

   All holes accommodate M6 flathead cap screws.

3 Screw one M6 flathead screw into a front screw hole, and another into the diagonally opposed screw hole on the rear, making sure that both screw completely into the base.

   Gently nudge the Centrifuge back and forth as you install the screws to ensure that the Centrifuge screw holes are seated squarely over the screw holes in the mounting surface.

   Tighten the front screw before tightening the rear screw.

4 Install the other two screws into the screw holes, making sure they screw completely into the base.

5 Verify that the Centrifuge is firmly seated to your mounting surface.

   If the Centrifuge moves, loosen the screws and repeat step 3 and step 4 to retighten the screws.

6 To re-install the covers:

   a Position the rear cover, aligning the side screw holes.

   b Position the front cover on the front of the Centrifuge.

   c Install the four retention screws and washers: two screws and washers at the rear, and one screw and washer on each side, as the preceding figure shows.

      IMPORTANT Ensure that the round surface of each washer is facing the cover.

Related information

For more information about...	See...
Site requirements	“Laboratory requirements” on page 15
Installation workflow	“Installation workflow” on page 14
Safety guidelines	“Safety guidelines” on page 1

Installing the buckets

About this topic

The buckets are packaged in their own box to minimize damage to the Centrifuge during shipment. This topic describes how to install the buckets in the Centrifuge.

Before you start

Manually open the Centrifuge door. For instructions, see "Unlocking and opening the door manually" on page 73.

Procedure

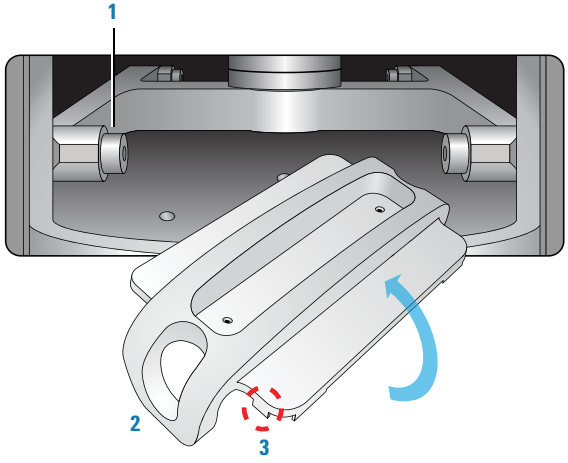
To install or replace a bucket:

1. Ensure that the rotor is positioned so that the bucket pins are centered in the open doorway.

   If necessary, manually rotate the rotor to align it as the following figure shows.

2. Pass the bucket through the open door as the following figure shows.

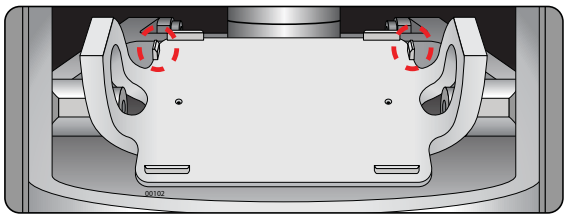
Figure Open door showing (1) rotor pin, (2) bucket hanger, and (3) rear tab



3. Roll the bucket right-side-up so that the bucket hangers are seated onto the rotor pins.

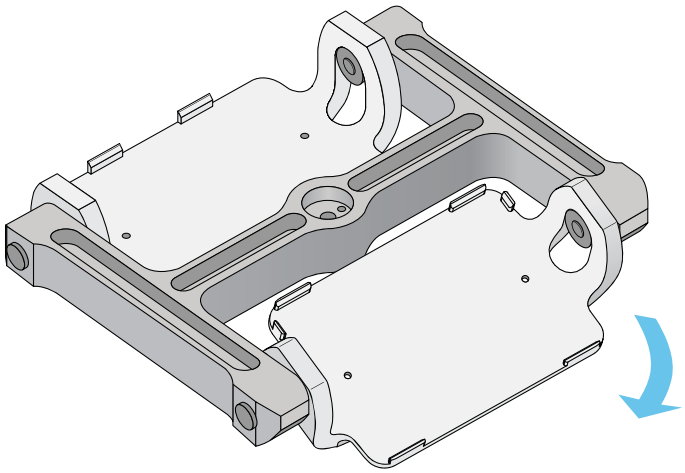
   You may need to align one hanger on a rotor pin, and then adjust the position before you can align the second hanger onto the other rotor pin.

4. Ensure that the bucket tabs are facing up, and that the rear tabs are towards the rotor, as the following figure shows.



5 Push the bucket onto the pins until the bucket seats snugly and can pivot freely.

Figure Detail of buckets seated on rotor pins



Related information

For more information about...	See...
Site requirements	“Laboratory requirements” on page 15
Installation workflow	“Installation workflow” on page 14
Safety guidelines	“Safety guidelines” on page 1

Connecting the device

Before you start

- Make sure the laboratory setup requirements have been met. See “Laboratory requirements” on page 15.
- Ensure that the computer and Centrifuge are turned off.
- Make sure you have the supplied serial cable, power cord, and air connection kit, including tubing and fittings.

Connecting to the air source

This section includes procedures for both:

- Non-metric-based installations, such as those in the US
- Metric-based installations

WARNING **Working with open, charged air lines can result in injury. Turn off the compressed air line when disconnecting or reconnecting devices that use compressed air. Contact your facilities department or Agilent Automation Solutions Technical Support with questions about setting up the air line.**

CAUTION Dirt in unfiltered air can build up in the Centrifuge air valves and can eventually cause a malfunction. Ensure that the air supply is properly filtered for moisture and aerosol impurities.

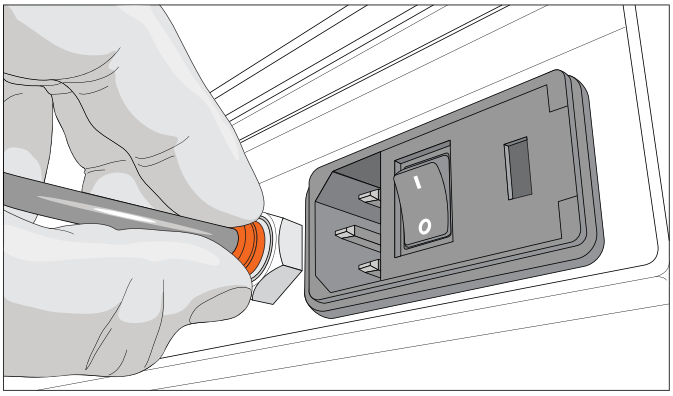
The following procedure is for a direct connection. If you have another instrument connected to the house air supply, you can use the supplied T-connector to connect into the existing air tubing.

To install the compressed air line (non-metric):

1. Turn off the air supply before connecting the air tubing to the Centrifuge.
2. Cut the supplied tubing to the required length.
3. Connect one end of the tubing to the air source.
4. If your air line uses a threaded port, attach the 0.25-in NPT fitting to the port. Attach the 0.25-in one-touch hose fitting into the 0.25-in tubing.
5. Plug the other end of the 0.25-in tubing into the one-touch air-supply port on the back of the Centrifuge.
6. Test the installation by gently tugging the air tubing.

   If you feel resistance, the line has been properly installed. If the tubing comes free, it needs to be inserted with more force.

Figure Air line connection



To install the compressed air line (metric)

1. Push one end of the nipple (white plastic tube) into the 0.25-in side (red side) of the adapter.
2. Push the other end of the nipple into the air input port on the Centrifuge.
3. Push the 6-mm tubing into the blue side of the adapter.

CAUTION Attempting to use tubing that has a different diameter can damage the adapter.

4. Gently pull on the air tubing to ensure that the assembly is connected properly.

Connecting the power cord

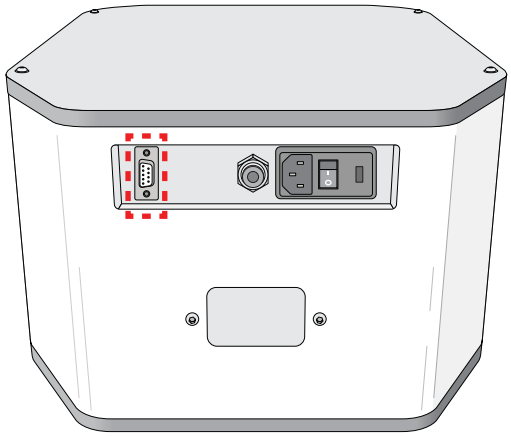
To connect the power cord to the Centrifuge:

1. On the back of the Centrifuge, ensure that the power switch is set to **off** (**0**).
2. Connect one end of the power cord to the AC power entry on the back of the Centrifuge.
3. Connect the other end of the power cord to an AC outlet with a grounded circuit.

Connecting the computer

To connect the Centrifuge to the computer:

1 Connect one end of the supplied serial communications cable to the serial interface on the back of the Centrifuge.



2 Connect the other end of the serial communications cable to a serial communications port on the controlling computer.

Make a note of the COM port number. You will provide the number when creating a device profile in Centrifuge Diagnostics.

Related information

For more information about...	See...
Site requirements	“Laboratory requirements” on page 15
Installation workflow	“Installation workflow” on page 14
Safety guidelines	“Safety guidelines” on page 1

4
Setting up the Centrifuge

This chapter contains the following topics:

Setup workflow

Perform the following procedures in the order listed to set up the Centrifuge.

Step	Procedure	See...
1	Turn on the Centrifuge.	"Starting up and shutting down" on page 33
2	In the VWorks software, create a device file and add the Centrifuge device.	"Creating and editing device files" on page 34
3	Open Centrifuge Diagnostics.	"Opening Centrifuge Diagnostics" on page 38
4	Create a profile and select the profile in the Centrifuge device.	"Creating and editing profiles" on page 40
5	Set the bucket home position so that it lines up with the door.	"Setting the bucket home position" on page 45
6	Set the teachpoint for your robot to pick and place labware in the Centrifuge.	User documentation for the external robot
7	Verify that you can perform a spin using Centrifuge Diagnostics.	"Performing a spin" on page 57

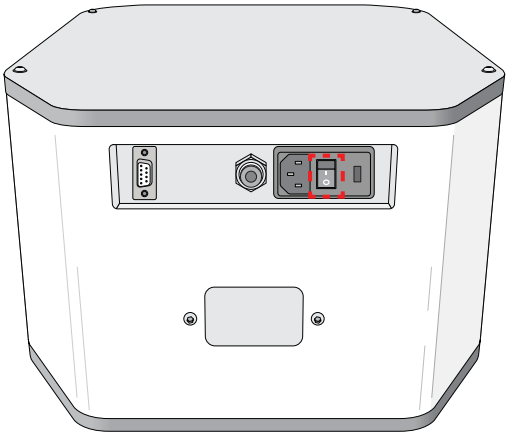
Starting up and shutting down

Starting up the Centrifuge

To start up the Centrifuge:

1. Verify that the air supply is turned on.
2. Turn on the computer and the monitor. Wait for the Microsoft Windows operating system to finish starting up.
3. On the back of the Centrifuge, press the power switch to the on (I) position.

Figure Power switch on the back of the Centrifuge



4. Start the VWorks software.
5. In the VWorks software, turn off the simulation mode.
6. To establish communication with the Centrifuge, initialize the Centrifuge device. For details, see "Initializing the device profile and checking status" on page 42.

   If you have not yet created a device file or configured the device profile for your setup, see "Creating and editing profiles" on page 40.

Shutting down the Centrifuge

To shut down the Centrifuge:

1. Remove any microplates or counterweight from the Centrifuge. For unloading instructions, see "Loading and unloading microplates and counterweights" on page 62.
2. Close the Centrifuge Diagnostics dialog box.
3. In the VWorks window, select the Centrifuge device in the device file, and then click **Close selected devices**.
4. Exit the VWorks software, and then shutdown the computer.
5. On the back of the Centrifuge, press the power switch to the off position (O).

6 Turn off the air supply to the Centrifuge.

Related information

For more information about...	See...
Initializing the Centrifuge	"Initializing the device profile and checking status" on page 42
Creating profiles	"Creating and editing profiles" on page 40
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62
Centrifuge Diagnostics	"Using Centrifuge Diagnostics to perform a spin" on page 65
How to use the VWorks software to run a protocol	"Workflow for running a protocol" on page 58 *VWorks Automation Control User Guide*

Creating and editing device files

About this topic

This topic explains how to create a device file in the VWorks software and how to edit the device properties.

If you already have a device file you want to use, proceed to the following:

- "Adding a Centrifuge to the device file" on page 36
- "Setting the Centrifuge device properties" on page 36.

Devices and device file defined

What is a device?

A device is an item in your lab automation system that has an entry in the VWorks software device file. A device can be a robot, an instrument, or a location in the system that can hold a piece of labware.

What is a device file?

To communicate with and to control the robot and integrated devices, the VWorks software uses a device file that contains the following information:

- List of devices the software will communicate with and control
- Profile of each device (communication method, unique device configuration information)

- System-related configuration information of each device (for example, approach height, barcode access, and so on)

You provide the device information in the VWorks software. The device information is stored in a device (.dev) file that is located in a folder you specify when saving the file.

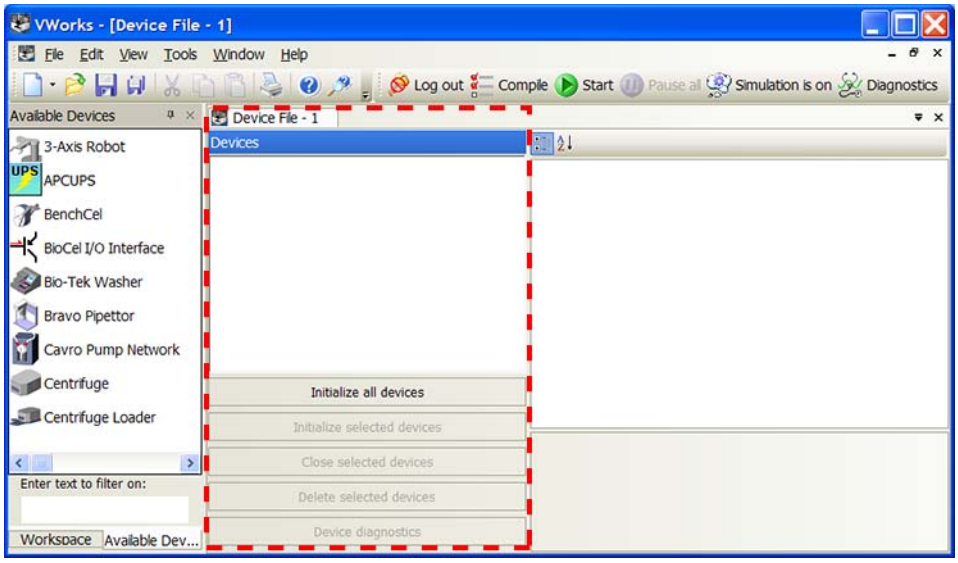
For detailed information about device files and associations with profiles, teachpoint files, and other VWorks components, see the *VWorks Automation Control User Guide*.

Creating a device file

Before you create a device file, start the VWorks software and log in. See the *VWorks Automation Control User Guide* for instructions.

To create a new device file:

1 In the **VWorks** window, select **File > New > Device.** A Device File tab appears.

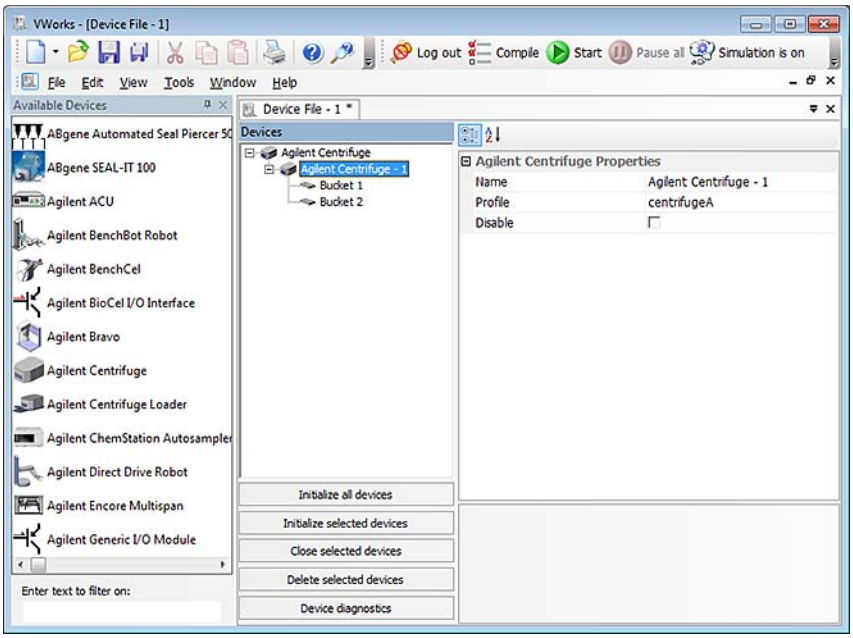


2 Select **File > Save** to save the device file. The file name appears in the Device File tab.

Adding a Centrifuge to the device file

To add a Centrifuge in the device file:

1 In the **Available Devices** area, double-click the **Centrifuge** device icon, or drag the icon from the **Available Devices** area into the **Device File** area.



Notice that in the **Devices** area, the first Centrifuge device is labeled Centrifuge-1. If you add another Centrifuge device, it will appear as Centrifuge-2.

Note: If you do not see the Centrifuge in the Available Devices list, check that the plugin file (AgilentCentrifuge.dll and AgilentCentrifuge Loader.dll, if applicable) is stored in the following folder:

\Agilent Technologies\VWorks\Plugins

If you have added the Centrifuge plugin file in the Plugins folder and started the VWorks software, and still do not see the Centrifuge in the Available Devices list, close any open device files and protocol files, and then select Tools > Reload Plugins.

Setting the Centrifuge device properties

To set the Centrifuge properties:

1 In the **Centrifuge Properties** area of the device file, type or select the following:

Property	Description
Name	The name of the Centrifuge.

Property	Description
Profile	The profile associated with the device. Select the desired profile from the list. If the profile you want does not appear in the list, or if no profile appears in the list, see "Creating and editing profiles" on page 40, and then return to this step to select the profile. **IMPORTANT** Without the profile, you will not be able to establish communication with the device.

2 In the **Devices** area, expand **Centrifuge**, and then select **Bucket 1.**

3 In the **Centrifuge Location Properties** area, set the following parameters:

Parameter	Description
Allow/prohibited labware	Permitted labware class for the selected location. Use this field only if you want to limit the labware types. For details on labware classes, see the *VWorks Automation Control Setup Guide*.
BCR on south/ west/north/east side	The location of the barcode reader and the desired barcode reader device. Use this field only if a barcode reader is installed on the device.
Use for deadlock avoidance	The option to permit the location to be used for deadlock avoidance. Select **Yes** to permit labware to be moved to this location to avoid a deadlock in the system. Select **No** if you do not want to move random labware to this location to avoid deadlock. **IMPORTANT** For typical operation, select **No** for the Centrifuge.
Door	Not applicable

4 Repeat steps 2 and 3 to set the properties for the **Bucket 2**.

5 Select **File > Save** to save the device file.

Related information

For more information about...	See...
Initializing the Centrifuge	"Initializing the device profile and checking status" on page 42
Creating profiles	"Creating and editing profiles" on page 40
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62

For more information about...	See...
Centrifuge Diagnostics	"Using Centrifuge Diagnostics to perform a spin" on page 65
How to use the VWorks software to run a protocol	"Workflow for running a protocol" on page 58 *VWorks Automation Control User Guide*

Opening Centrifuge Diagnostics

Procedure

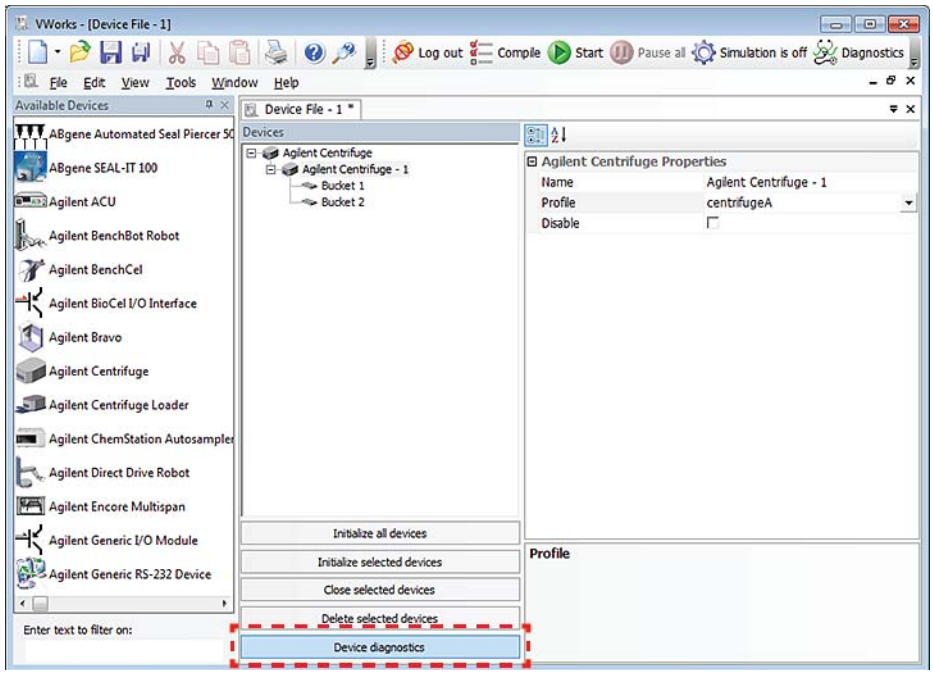
To open Centrifuge diagnostics:

1 In the **VWorks** window, ensure that the device file is open.

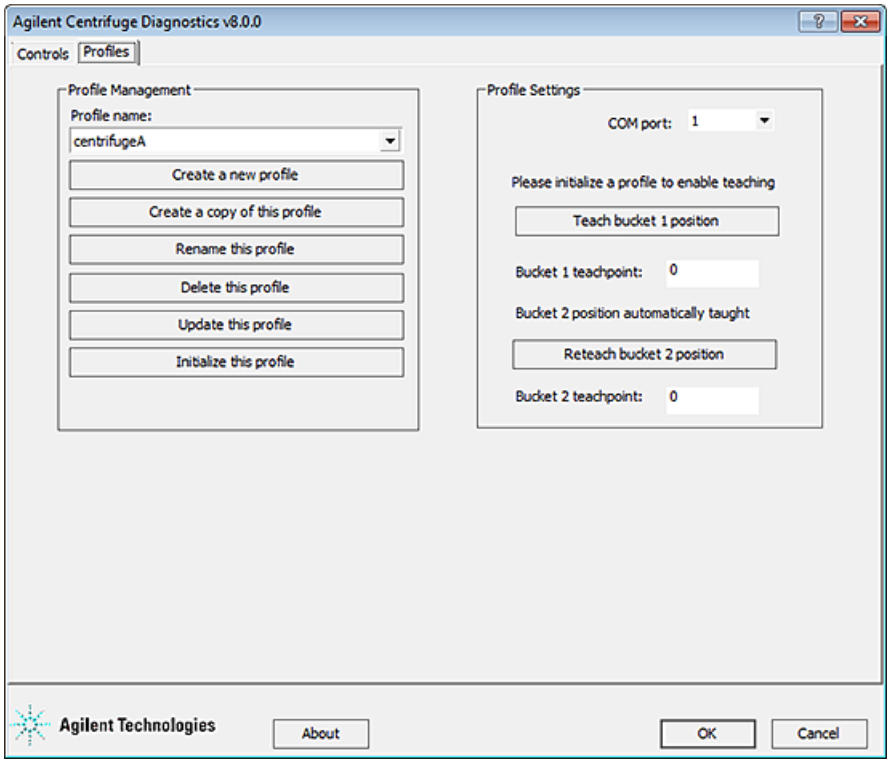
To open the device file, choose **File > Open**. In the **Open** dialog box, select the ***.dev** file type, navigate to the device file, and then click **Open**.

A list of the devices appears in the Device File tab.

2 Select the Centrifuge device, and then click **Device diagnostics**.



The Centrifuge Diagnostics dialog box opens.



Related information

For more information about...	See...
Initializing the Centrifuge	"Initializing the device profile and checking status" on page 42
Creating profiles	"Creating and editing profiles" on page 40
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62
Centrifuge Diagnostics	• "Using Centrifuge Diagnostics to perform a spin" on page 65 • *Centrifuge Diagnostics Version 8 Quick Reference*
How to use the VWorks software to run a protocol	• "Workflow for running a protocol" on page 58 • *VWorks Automation Control User Guide*

Creating and editing profiles

About profiles

A VWorks device profile is a collection of settings that manages how you connect to a device. A Centrifuge profile specifies the following:

- COM port used to establish communication between the device and the controlling computer.
- The bucket 1 and bucket 2 home positions.

You use the Centrifuge Diagnostics software to create and manage Centrifuge profiles.

Note: In the VWorks software, each device in the device file requires a unique profile. For information about device files, see "Creating and editing device files" on page 34. For a detailed description of the relationships between the device file and profile, see the *VWorks Automation Control User Guide*.

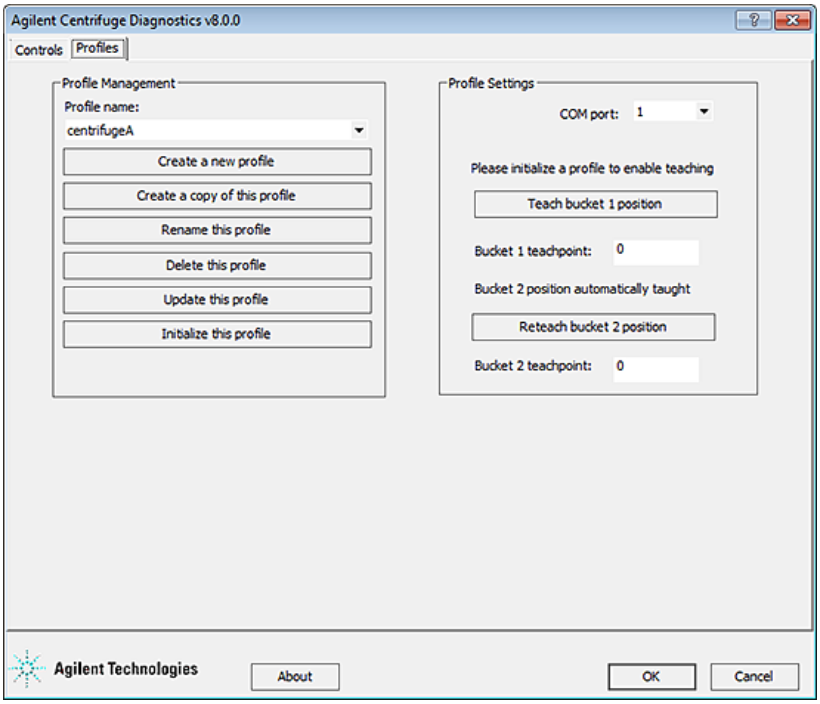
Creating a profile

Before you start, ensure that Simulation is off in the VWorks window, and then open Centrifuge Diagnostics.

To create a profile:

1 In the **Centrifuge Diagnostics** dialog box, click the **Profiles** tab.

The **Profiles** tab appears.



2 Click **Create a new profile**.

The **Create Profile** dialog box opens.

3 Type a profile name, and then click **OK**.

4 Configure the profile settings that you want from the **Profiles** page.

Parameter	Description
COM port	Select the number of the controlling computer COM port that is connected to the Centrifuge. *Note:* If you are using a USB-to-serial connection, you might have to open the Windows Device Manager to identify the COM port number.
Bucket 1 teachpoint, Bucket 2 teachpoint	You will set these home positions after you establish communication with the device. Use the default values until you set the teachpoint.

5 To save the profile settings, click **Update this profile.**

6 To verify that you can establish communication, initialize the profile. For instructions, see "Initializing the device profile and checking status" on page 42.

Editing and managing profiles

Editing profiles

To edit a profile:

1 In the **Centrifuge Diagnostics Profiles** tab, select the profile you want to edit in the **Profile Management** area.

2 Modify the profile information.

3 When you are finished, click **Update this profile** to save the changes.

Managing profiles

In the Centrifuge Diagnostics Profiles tab, you can select an existing profile, and then rename, copy, or delete the profile.

IMPORTANT The bucket home positions (teachpoints) are associated with the Centrifuge profile. A copy of an existing profile references the same bucket teachpoints.

Related information

For more information about...	See...
Initializing the Centrifuge	"Initializing the device profile and checking status" on page 42
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62

For more information about...	See...
Centrifuge Diagnostics	"Using Centrifuge Diagnostics to perform a spin" on page 65 *Centrifuge Diagnostics Version 8 Quick Reference*
How to use the VWorks software to run a protocol	"Workflow for running a protocol" on page 58 *VWorks Automation Control User Guide*

Initializing the device profile and checking status

About this topic

To establish communication between the computer and the Centrifuge, you initialize the Centrifuge device.

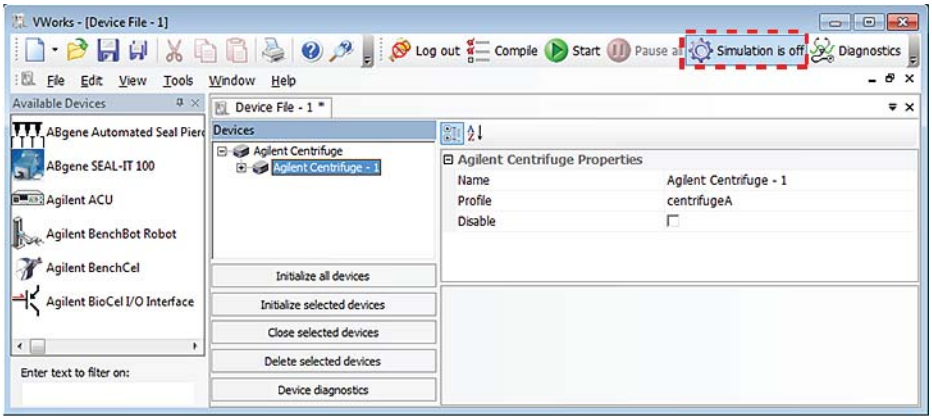
You can initialize the Centrifuge in the following ways:

- *Centrifuge Diagnostics*. To control the Centrifuge using Centrifuge Diagnostics, initialize the profile in Centrifuge Diagnostics.
- *VWorks window*. To control the Centrifuge from the VWorks window, for example, to run a protocol, initialize the device in the VWorks window.

After initializing the device, see "Checking the status" on page 44 to verify that the Centrifuge is turned on and communication is established.

Before you start

In the **VWorks** window, ensure that **Simulation is off**.



WARNING **Keep away from the Centrifuge door while it is opening or closing. The Centrifuge door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.**

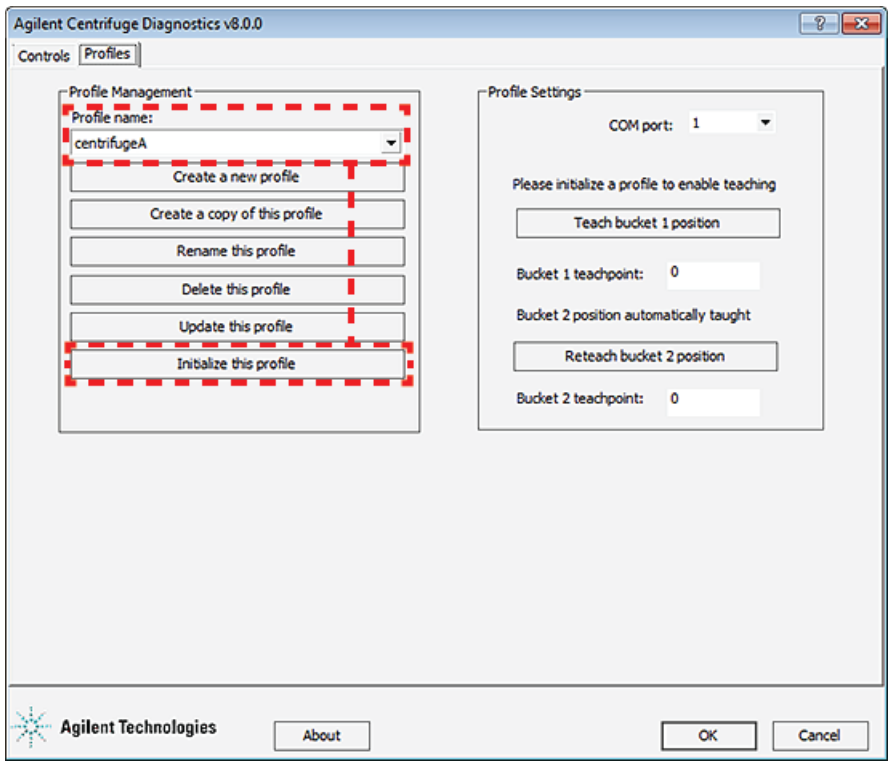
During initialization, the Centrifuge door closes and locks, the bucket unlocks, and the rotor spins to the bucket 1 position. The bucket locks, and the door unlocks and opens.

Initializing the profile in Centrifuge Diagnostics

To initialize a profile in Centrifuge Diagnostics:

1 Open the **Centrifuge Diagnostics** dialog box.

2 In the **Profiles** tab, ensure that the correct profile is selected in the **Profile name** list.



3 Click **Initialize this profile** to start initializing the selected profile.

Note: If the device fails to initialize, verify the COM port number in the profile. If the problem persists, restart the VWorks software, and if necessary, power cycle the device.

Initializing the Centrifuge in the VWorks software

To initialize the device from the VWorks software window:

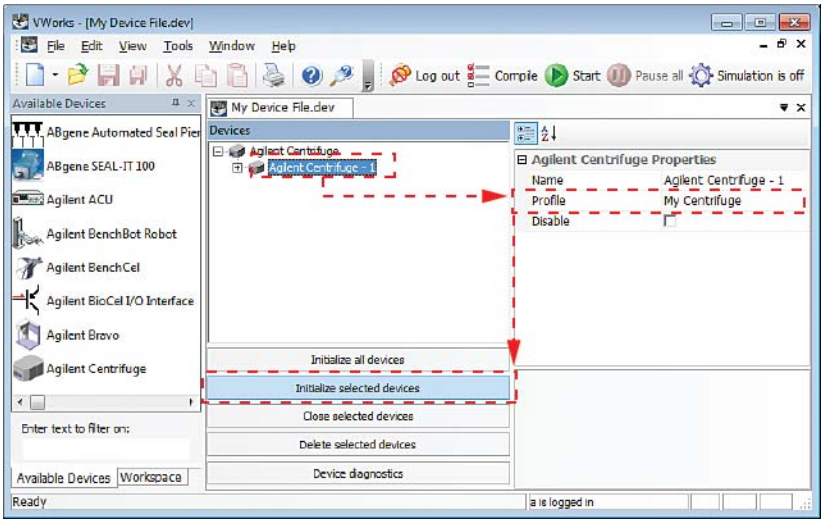
1 In the **VWorks** window, choose **File > Open**. In the **Open** dialog box, select the ***.dev** file type, navigate to the device file, and then click **Open**.

A list of the devices appears in the Device File tab.

2 In the **Devices** area, select the **Centrifuge** device.

3 In the **Centrifuge Properties** area, make sure the correct profile is selected.

4 Click **Initialize selected devices**.



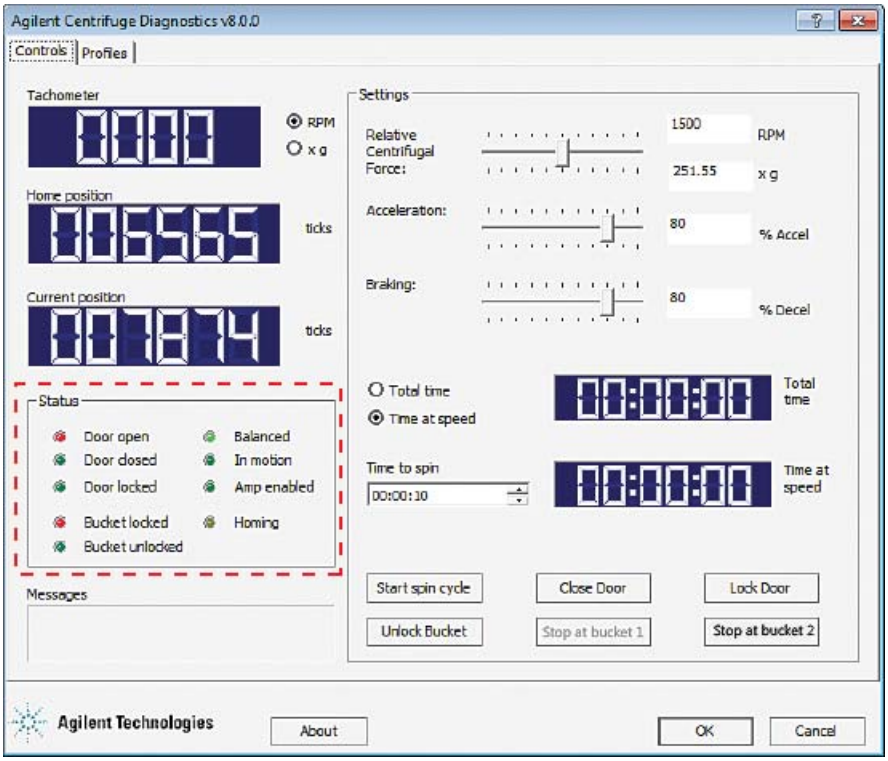
Checking the status

Use the following procedure to check the status indicators in the Centrifuge Diagnostics dialog box to make sure that the Centrifuge is turned on.

To check the Centrifuge status:

1 Open **Centrifuge Diagnostics**.

2 Click the **Controls** tab. In the **Status** area, check that the appropriate indicator lights are turned on.



Related information

For more information about...	See...
Creating profiles	"Creating and editing profiles" on page 40
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62
Centrifuge Diagnostics	• "Using Centrifuge Diagnostics to perform a spin" on page 65 • *Centrifuge Diagnostics Version 8 Quick Reference*
How to use the VWorks software to run a protocol	• "Workflow for running a protocol" on page 58 • *VWorks Automation Control User Guide*

Setting the bucket home position

About this topic

After you have set up and turned on the Centrifuge, you set the bucket home position to align with the door so that your robot gripper can place labware onto the buckets.

Before you start

WARNING **Keep away from the Centrifuge door while it is opening or closing. The Centrifuge door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.**

CAUTION If the bucket lock is extended when a bucket is misaligned, turning the rotor manually could cause the rotor or the bucket to collide with the bucket lock and damage the bucket, rotor or bucket lock. Ensure that the air supply is turned off before manually rotating the rotor.

Perform the following workflow in the order given.

Step	For this task...	See...
1	Start up the Centrifuge.	"Starting up and shutting down" on page 33
2	In Centrifuge Diagnostics, initialize the profile that you want to use.	"Initializing the device profile and checking status" on page 42

Step	For this task...	See...
3	Prepare to teach the bucket positions.	"Preparing to set the bucket teachpoints" on page 46
4	Set the bucket 1 position teachpoint.	"Setting the bucket 1 teachpoint" on page 48
5	Set the bucket 2 position teachpoint.	"Setting the bucket 2 teachpoint" on page 50

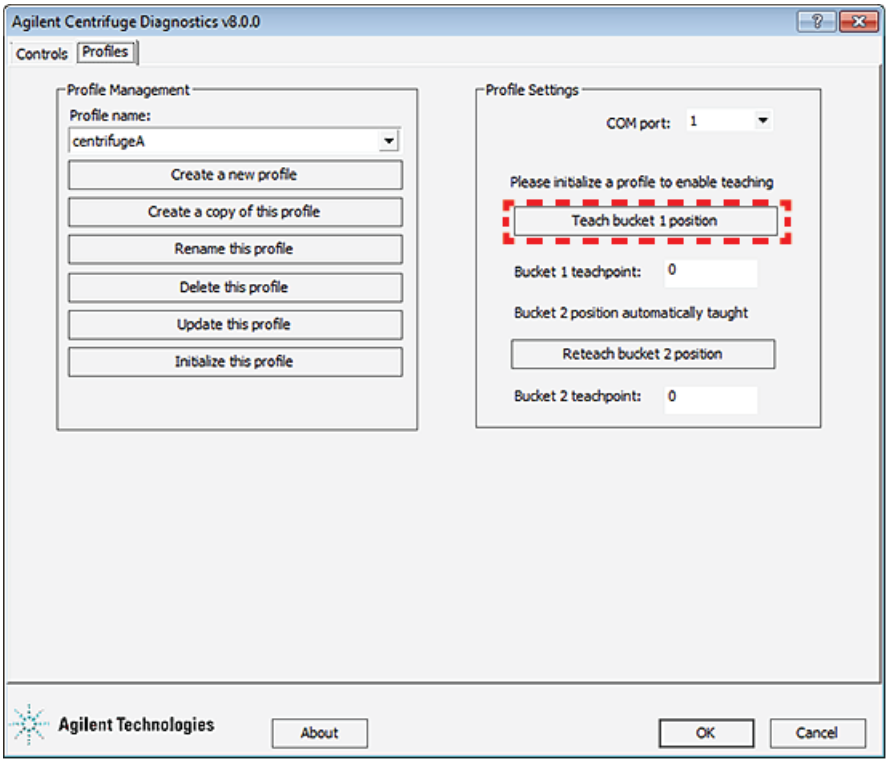
Preparing to set the bucket teachpoints

To prepare for teaching the bucket 1 position:

1 Open **Centrifuge Diagnostics**, and in the **Profiles** tab, select and initialize the profile.

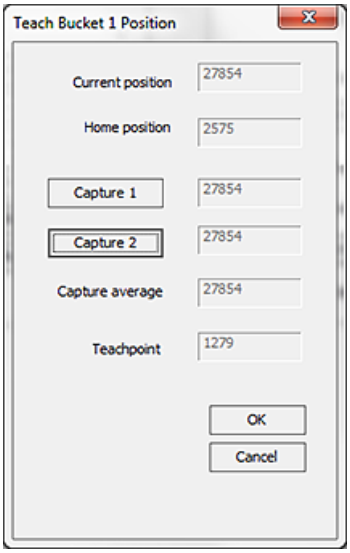
2 Click **Teach bucket 1 position**.

Figure Profiles tab



The **Teach Bucket Position 1** dialog box opens.

Figure **Teach Bucket 1 Position** dialog box



3 Turn off the air supply to the Centrifuge.

Note: If the door closes, see "Unlocking and opening the door manually" on page 73.

4 Disconnect the air supply. See "Disconnecting the air supply" on page 72.

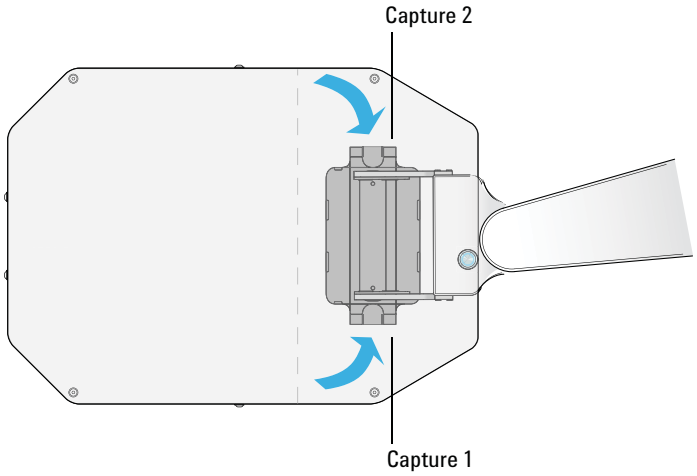
If you do not disconnect the air supply or turn off the air source, the door closes when the rotor is turned.

CAUTION If the bucket lock is extended when a bucket is misaligned, turning the rotor manually could cause the rotor or the bucket to collide with the bucket lock and damage the bucket, rotor or bucket lock. Ensure that the air supply is turned off before manually rotating the rotor.

Setting the bucket 1 teachpoint

The following procedure takes measurements of the farthest points the bucket can rotate counterclockwise (Capture 1) and clockwise (Capture 2) when a robot gripper is positioned over a bucket. The software averages these positions to center the bucket around the gripper and calculate the bucket teachpoint.

Figure Robot gripper positioned over a bucket in the Centrifuge (top view)



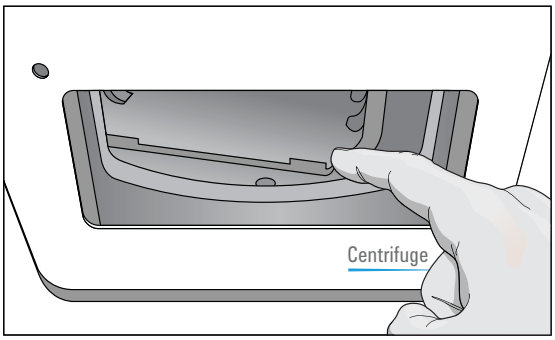
Alternatively, you can set an approximate teachpoint using a visual alignment method. For details, see "Visually aligning the bucket position" on page 53.

To mechanically align and teach the bucket 1 position:

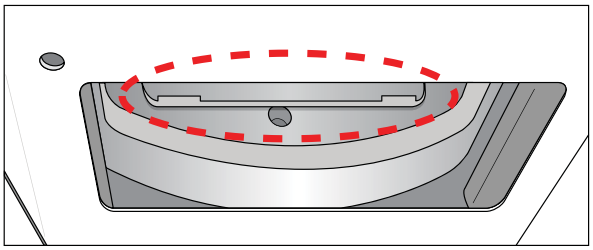
1 Manually rotate the rotor, until the bucket is visually aligned with the top edge of the door, as the following figure shows.

Figure Centrifuge bucket (**A**) misaligned and (**B**) properly aligned with the top edge of the door

A



B

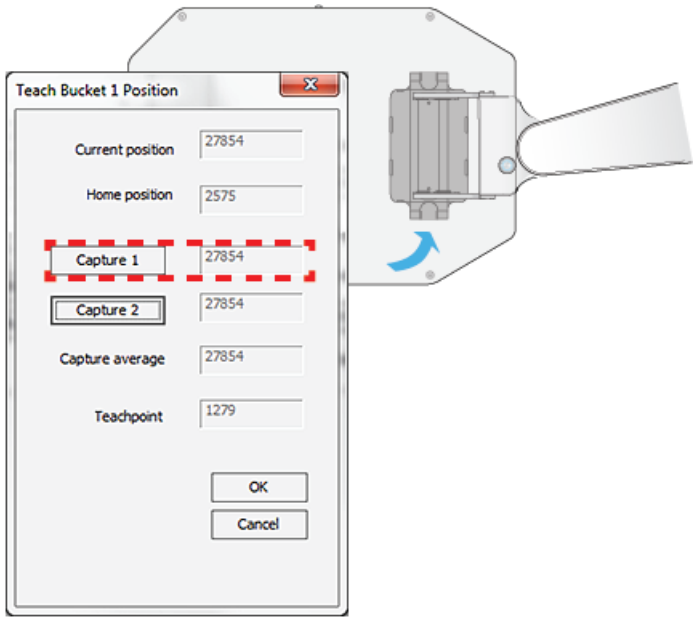


2 Insert the robot gripper into the Centrifuge so that the gripper is centered in the Centrifuge door. The gripper must be inserted far enough so that when the rotor is turned, the buckets contact the gripper.

3 Set the Capture 1 coordinates for bucket 1:

a Manually turn the rotor slightly counterclockwise so that the left side of the bucket lightly touches the gripper.

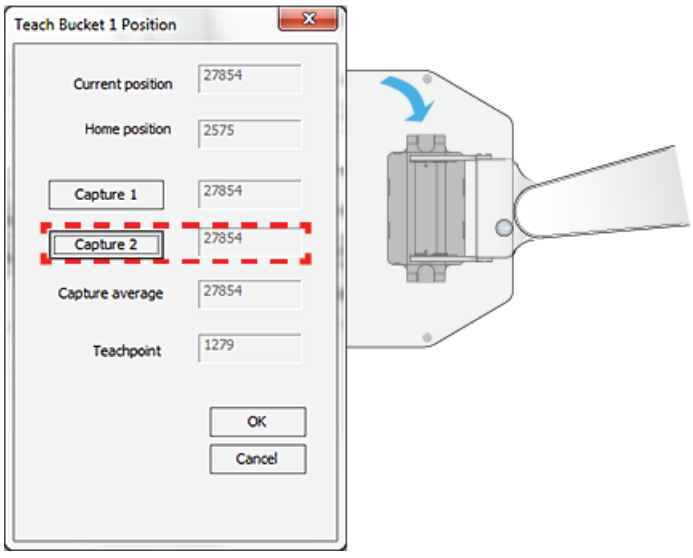
b In the **Teach Bucket 1 Position** dialog box, click **Capture 1**.



4 Set the Capture 2 coordinates for bucket 1:

a Manually turn the rotor slightly clockwise so that the right side of the bucket lightly touches the gripper.

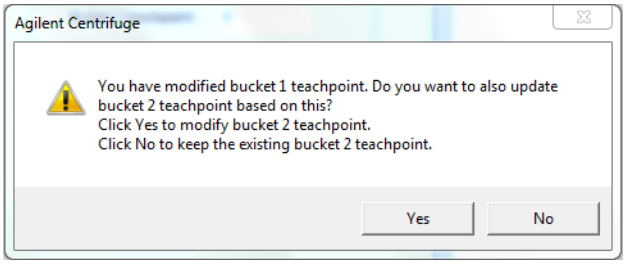
b In the **Teach Bucket 1 Position** dialog box, click **Capture 2**.



5 Reconnect and turn on the Centrifuge air.

6 In the **Teach Bucket 1 Position** dialog box, click **OK**.

7 When the message appears and asks if you want to update the bucket 2 teachpoint based on this change, click **Yes**.



8 In the **Profiles** tab, click **Update this profile** to save the setting, and then click **Close this profile**.

Note: The profile changes will take effect the next time you initialize the profile.

9 Remove the robot gripper from the Centrifuge door, and then use the following procedure to set the bucket 2 teachpoint.

IMPORTANT If you do not remove the gripper, it obstructs the closing of the door.

Setting the bucket 2 teachpoint

To set the bucket 2 home position teachpoint:

1 In the **Profiles** tab of **Centrifuge Diagnostics**, reinitialize the profile.

The Centrifuge rotates bucket 1 to the door, and then unlocks and opens the door.

2 Label bucket 1, as follows:

a Turn off the Centrifuge air.

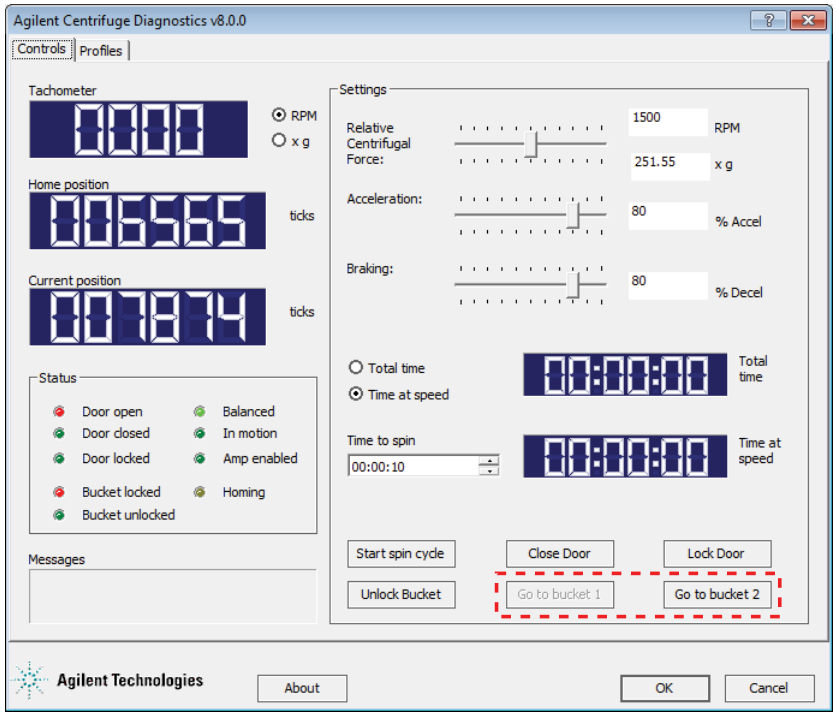
b Attach a piece of colored tape to bucket 1 so that you can keep track of bucket 1 versus bucket 2.

Note: Alternatively, you can place an empty microplate in bucket 1.

c Turn on the Centrifuge air.

3 In the **Controls** tab, click **Go to bucket 2**. The Centrifuge closes and locks the door, moves bucket 2 to the door, and then opens the door. Bucket 2 should be visible from the doorway.

Figure Controls tab



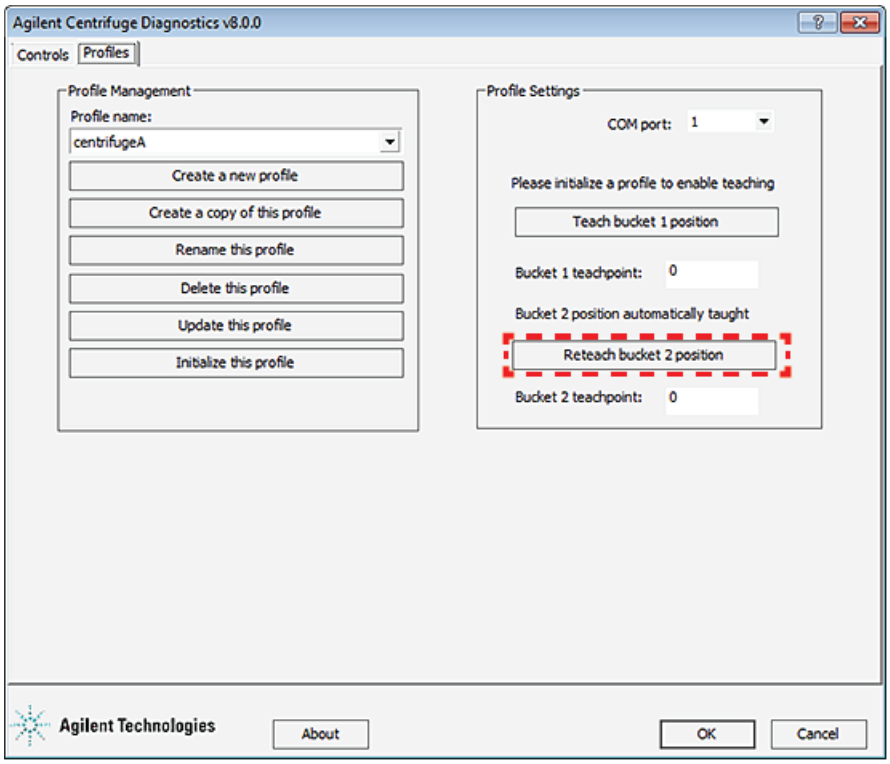
Ensure that bucket 2 is visually aligned with the top edge of the door.

4 Turn off the Centrifuge air.

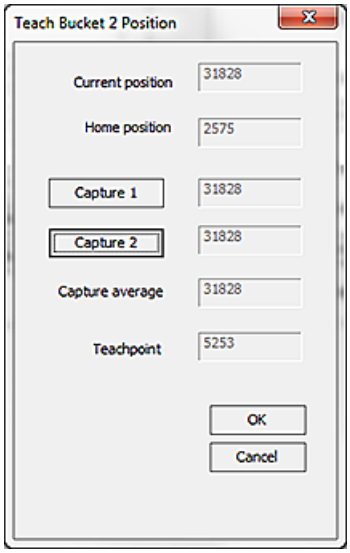
5 Insert the robot gripper into the Centrifuge so that the gripper is centered in the Centrifuge door. The gripper must be inserted far enough so that when the rotor is turned, the buckets contact the gripper.

6 To adjust the bucket 2 teachpoint:

a In the **Profiles** tab, click **Reteach bucket 2 position**.



b When the message **Timeout waiting for bucket to unlock** appears, click **OK**. The Teach Bucket 2 Position dialog box opens.



Note: The timeout message for the bucket lock occurs, as expected, because the air was turned off in a preceding step.

7 Set the Capture 1 coordinates for bucket 2 as follows:

   a Manually turn the rotor counterclockwise slightly so that the left side of the bucket lightly touches the gripper.

   b In the **Teach Bucket 2 Position** dialog box, click **Capture 1**.

8 Set the Capture 2 coordinates for bucket 2 as follows:

   a Turn the rotor slightly clockwise so that the right side of the bucket lightly touches the gripper.

   b In the **Teach Bucket 2 Position** dialog box, click **Capture 2**.

9 Reconnect and turn on the air source to the Centrifuge.

10 In the **Teach Bucket 2 Position** dialog box, click **OK.**

11 In the **Profiles** tab, click **Update this profile** to save the setting, and then click **Close this profile**.

   Note: The profile changes will take effect the next time you initialize the profile.

12 Remove the gripper from the Centrifuge door.

   IMPORTANT If you do not remove the gripper, it obstructs the closing of the door.

Visually aligning the bucket position

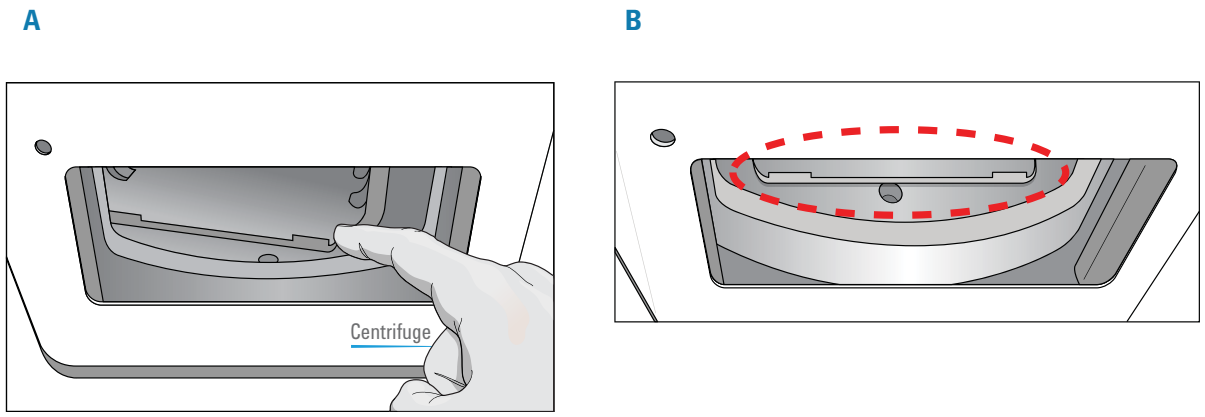
If you feel that a visual alignment is sufficient for your application, you may use the following procedure.

To set a teachpoint that precisely centers the robot gripper within the bucket, see "Setting the bucket 1 teachpoint" on page 48 and "Setting the bucket 2 teachpoint" on page 50.

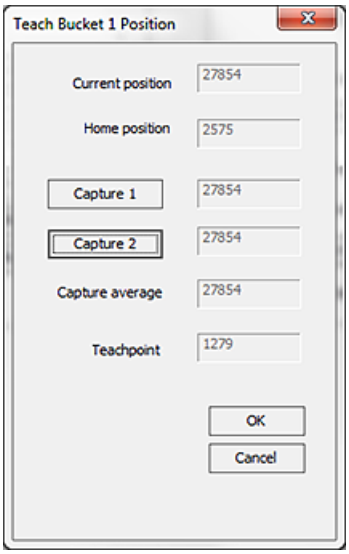
To visually align and teach the bucket position:

1 Manually rotate the rotor, until the bucket is visually aligned with the top edge of the door, as the following figure shows.

Figure Centrifuge bucket (**A**) misaligned and (**B**) properly aligned with the top edge of the door



2 In the **Teach Bucket 1 Position** dialog box, click **Capture 1**.



3 Without changing the position of the buckets, click **Capture 2**.

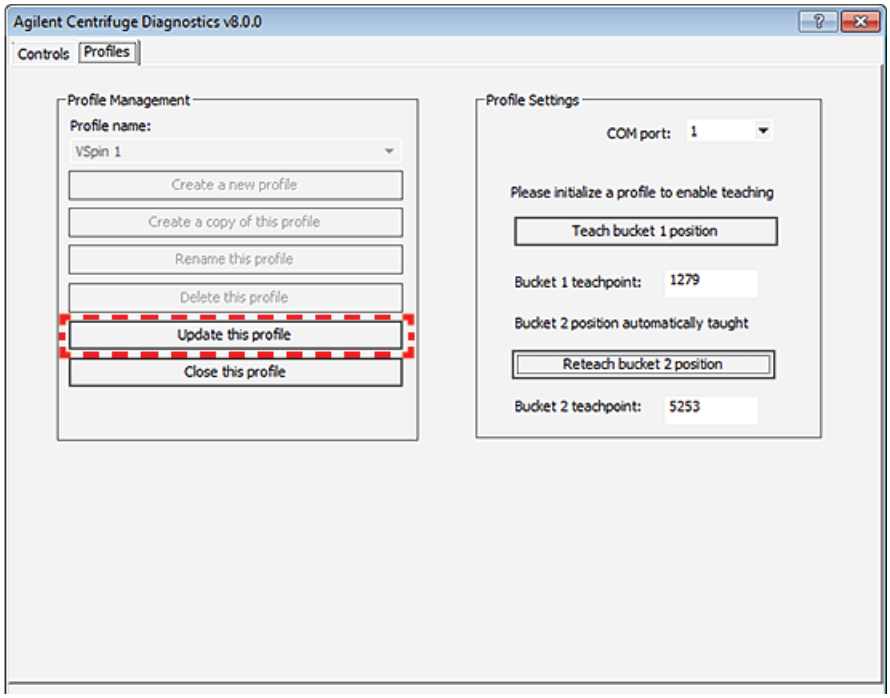
4 Reconnect and turn on the air source to the Centrifuge.

5 In the **Teach Bucket 1 Position** dialog box, click **OK**.

6 When the message appears and asks if you want to update the bucket 2 teachpoint based on this change, click **Yes**.

7 In the **Profiles** tab, click **Update this profile** to save the setting, and then click **Close this profile**.

Note: The profile changes will take effect the next time you initialize the profile.



Related information

For more information about...	See...
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62
Centrifuge Diagnostics	• "Using Centrifuge Diagnostics to perform a spin" on page 65 • *Centrifuge Diagnostics Version 8 Quick Reference*
How to use the VWorks software to run a protocol	• "Workflow for running a protocol" on page 58 • *VWorks Automation Control User Guide*

5
Performing a spin

This chapter contains the following topics:

Workflows for performing spins

About the workflows

You can use the Centrifuge to spin microplates in the following ways:

- 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.
- Using commands in Centrifuge Diagnostics to spin an individual microplate. See Workflow for using Centrifuge Diagnostics.

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 load and unload sample 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 *BioCel System User Guide*
2	Open the form or protocol that contains the Centrifuge tasks.	*VWorks Automation Control User Guide*
3	Make sure the spin parameters are set correctly.	*VWorks Automation Control User Guide*
4	Determine whether to load the counterweight in bucket 2 before the run.	*VWorks Automation Control User Guide*
5	Load the microplate and the counterweight, if required.	"Loading and unloading microplates and counterweights" on page 62
6	Start the protocol run.	*VWorks Automation Control User Guide*

Workflow for using Centrifuge Diagnostics

You can use Centrifuge Diagnostics to spin individual microplates without running protocols. The workflow is as follows.

Step	For this task...	See...
1	Initialize the Centrifuge in Centrifuge Diagnostics.	"Initializing the device profile and checking status" on page 42
2	Set the spin parameters.	"Setting the spin parameters in Centrifuge Diagnostics" on page 60
3	Load the microplate and counterweight, if required.	"Loading and unloading microplates and counterweights" on page 62
4	Start the spin cycle.	"Using Centrifuge Diagnostics to perform a spin" on page 65

Setting the spin parameters in Centrifuge Diagnostics

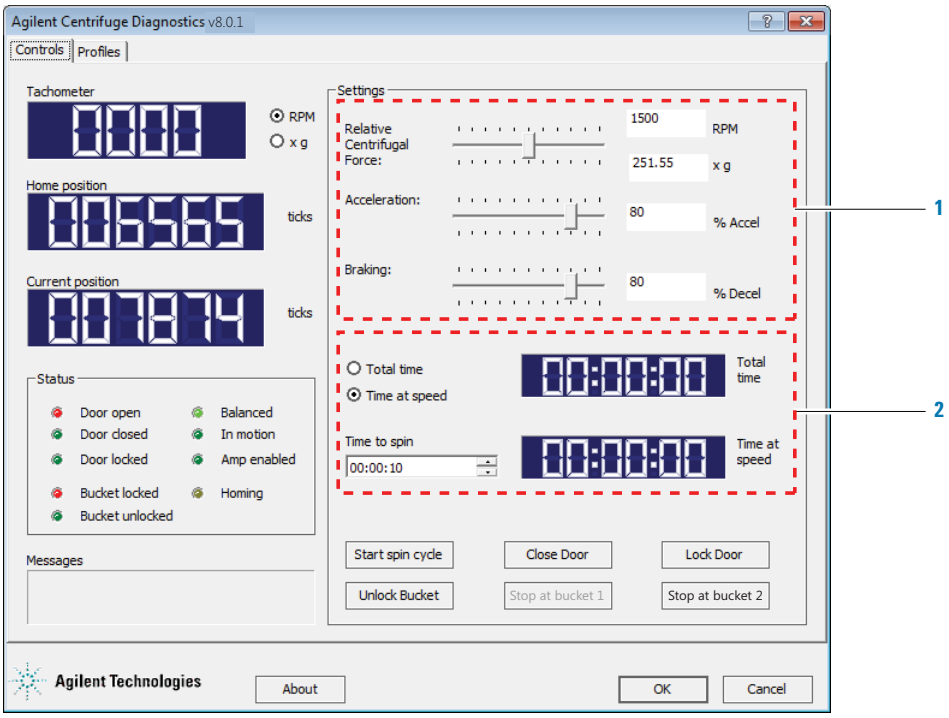
About this topic

This topic explains how to set the spin parameters in Centrifuge Diagnostics to spin an individual microplate.

If you want to run a protocol containing Centrifuge tasks to spin multiple microplates in one or more spin cycles, see "Workflow for running a protocol" on page 58.

Procedure

You set the spin parameters in the Centrifuge Diagnostics Controls tab. When you set the spin parameters, you are specifying the motion parameters (1) and time parameters (2).



To set the spin parameters:

1 In the **Centrifuge Diagnostics Controls** tab, set the motion parameters:

Motion parameter	Description
Relative Centrifugal Force	The rotor speed, in revolutions per minute (RPM) or as a multiple of gravity (x g). Drag the slider left or right to set the parameter, or type the desired value in either the **RPM** or **x g** box.

Motion parameter	Description
Acceleration	The rate of centrifugation, as a percent of the factory-set maximum acceleration. Drag the slider left or right to set the parameter, or type the desired value in the **% Accel** box.
Braking	The deceleration of the centrifuge, as a percent of the factory-set maximum deceleration. Drag the slider left or right to set the parameter, or type the desired value in the **% Decel** box.

2 Set the time parameters:

a Select one of the following to specify how the software should count the spin time:

Time parameter	Description
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.

b In the **Time to spin** box, type the length of total time or time at speed, in hh:mm:ss. Alternatively, you can use the up and down arrows to specify the length of time.

Related information

For more information about...	See...
Starting up the Centrifuge	"Starting up and shutting down" on page 33
Creating profiles	"Creating and editing device files" on page 34
Loading and unloading plates in the Centrifuge	"Loading and unloading microplates and counterweights" on page 62
Centrifuge Diagnostics controls and indicators	*Centrifuge Diagnostics Version 8 Quick Reference*
Using Centrifuge Diagnostics to perform a spin	"Using Centrifuge Diagnostics to perform a spin" on page 65
How to use the VWorks software to run a protocol	"Workflow for running a protocol" on page 58

Loading and unloading microplates and counterweights

Balancing the Centrifuge buckets

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.**

The Centrifuge buckets must be the same weight or within the balance tolerance to remain balanced during the spin. Unbalanced buckets can cause a spin error.

IMPORTANT Each Centrifuge is shipped with a pair of buckets that have been balanced to within 1 g of each other. To stay within the balance tolerance of the Centrifuge, use only the buckets that shipped with your Centrifuge. Do not use buckets from another Centrifuge.

IMPORTANT Before placing microplates and counterweights in the Centrifuge, make sure that the weight of the two items are within 10 g of each other to avoid a spin error.

If you want to spin one sample microplate, be sure to use a counterweight that is within 10 g of the sample microplate. The counterweight can be a microplate containing water. If you want to spin two sample microplates together, make sure they weigh within 10 g of each other.

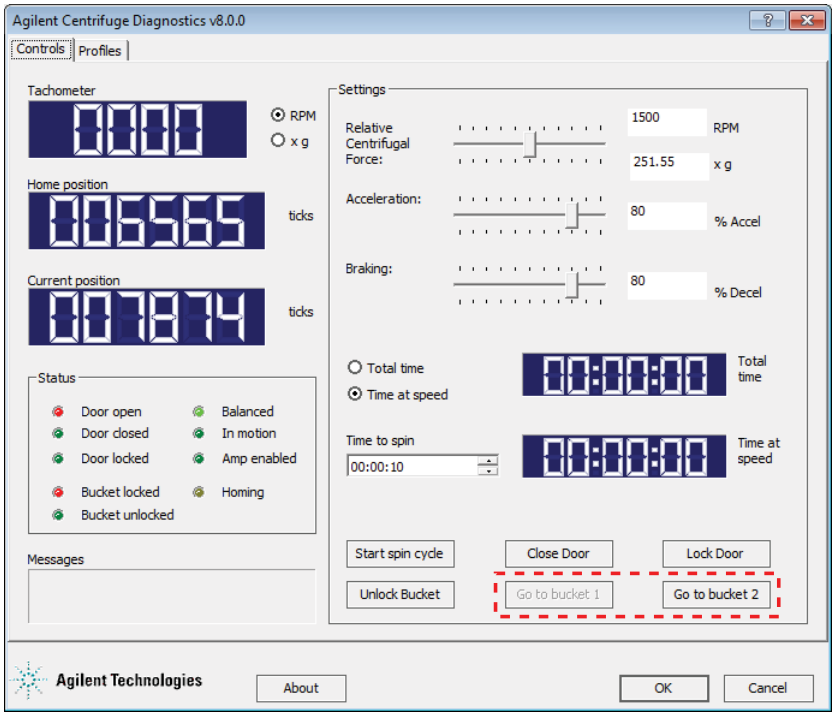
Note: The software does not provide indications that the buckets are unbalanced when you load the microplates and counterweights. If the buckets are unbalanced, the rotor will stop during the spin, and the Balance light in Centrifuge Diagnostics will turn on.

IMPORTANT If you are using a microplate counterweight, replace it regularly (weekly with heavy use), especially if the microplate is made from polystyrene.

Procedure

WARNING **The Centrifuge door closes and opens automatically when you click the Go to bucket commands. Keep away from the Centrifuge door while it is opening or closing. The Centrifuge door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.**

You use the **Go to bucket** commands in the Centrifuge Diagnostics Controls tab when loading and unloading microplates and counterweights in the Centrifuge.



To load microplates or the counterweight in the Centrifuge:

1. In the **Centrifuge Diagnostics Controls** tab, click **Go to bucket 2**. The Centrifuge closes and locks the door, moves bucket 2 to the door, and then opens the door. Bucket 2 should be visible from the doorway.
2. If you are using a counterweight, place it in bucket 2. If you are spinning two sample microplates, place one of the microplates in bucket 2.

   You can place the microplate or counterweight in the bucket manually or using the lab automation system robot. For instructions on how to use the robot, see the robot user documentation.
3. Click **Go to bucket 1**. The Centrifuge closes and locks the door, moves bucket 1 to the door, and then opens the door. Bucket 1 should be visible from the doorway.
4. Place the sample microplate in bucket 1.

To unload a microplate or counterweight:

1. In the **Centrifuge Diagnostics Controls** tab, click **Go to bucket 1** or **Go to bucket 2**. The Centrifuge closes and locks the door, moves the bucket to the door, and then opens the door. The labware should be visible from the doorway.
2. Remove the microplate or counterweight from the bucket.

   You can pick up the microplate or counterweight from the bucket manually or using the lab automation system robot. For instructions on how to use the robot, see the robot user documentation.
3. Repeat steps 1 and 2 to remove the second microplate or the counterweight.

Related information

For more information about...	See...
Using Centrifuge Diagnostics to perform a spin	"Using Centrifuge Diagnostics to perform a spin" on page 65
How to use the VWorks software to run a protocol	"Workflow for running a protocol" on page 58
Centrifuge Diagnostics controls and indicators	*Centrifuge Diagnostics Version 8 Quick Reference*

Using Centrifuge Diagnostics to perform a spin

About this topic

This topic explains how to use Centrifuge Diagnostics to spin an individual microplate.

If you want to run a protocol containing Centrifuge tasks to spin multiple microplates in one or more spin cycles, see "Workflow for running a protocol" on page 58.

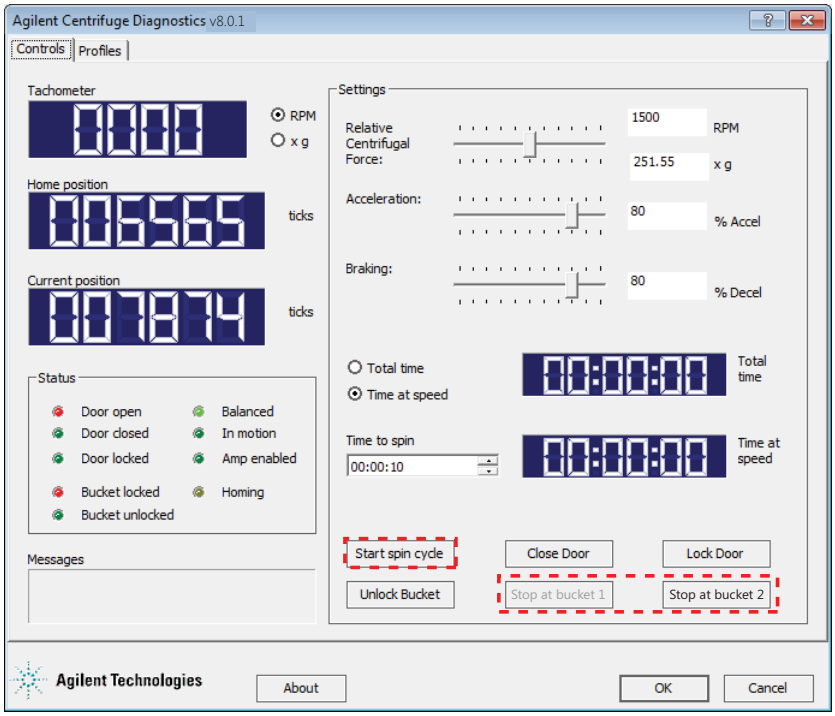
Procedure

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

WARNING **Keep away from the Centrifuge while it is in motion. Not all circumstances can be foreseen and serious injury is possible.**

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.**

You use the **Start spin cycle** command in the Centrifuge Diagnostics Controls tab to start spinning the microplate. You can use the **Stop at bucket** commands to stop the spin in progress.

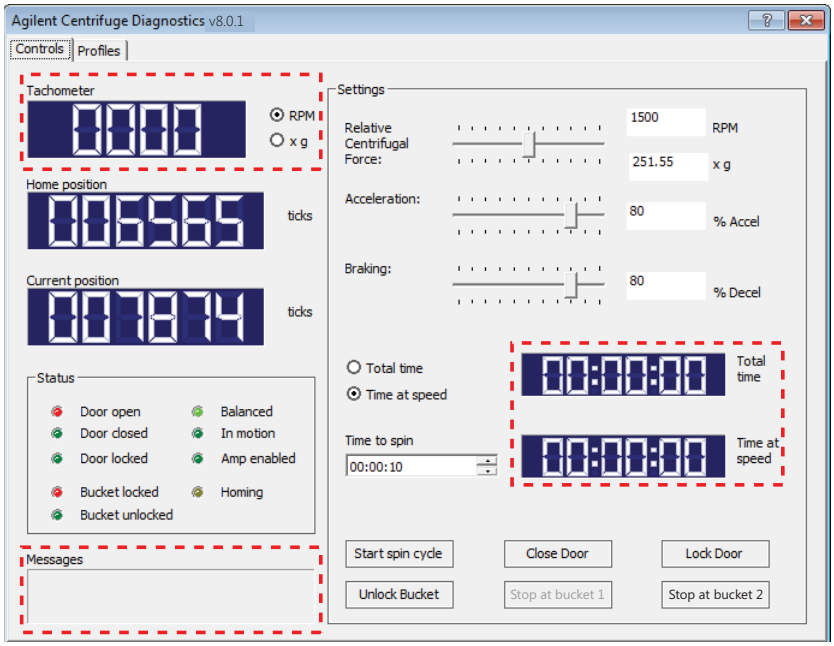


To start spinning the labware:

1. In the **Centrifuge Diagnostics Controls** tab, click **Start spin cycle**. The Centrifuge closes and locks the door, and then starts spinning the labware. When it is finished, the door opens. Bucket 1 (or the bucket loaded last) should be visible in the doorway.
2. To spin another sample microplate, replace the microplate that is in the bucket, and then start another spin cycle.

To monitor the progress of a spin cycle:

Check the information in the following areas of the **Controls** tab:



Name of area in the Controls tab	Description
Tachometer	The current spin speed. You can select the desired spin speed unit to display: **RPM** (revolutions per minute), or **x g** (a multiple of gravity).
Total time	The length of time, including acceleration and braking, of the current spin cycle.
Time at speed	The length of time during which the Centrifuge has been spinning at the target speed (not including acceleration and braking).
Messages	Error or status messages.

To stop a spin cycle:

In the **Centrifuge Diagnostics Controls** tab, click either **Stop at bucket 1** or **Stop at bucket 2**. The Centrifuge decelerates, moves the specified bucket to the door, and then opens the door.

Understanding the Status indicators

The following table lists descriptions of the Status indicators in the Controls tab.

Display title	Description
Door open	Indicates that the Centrifuge door is open.
Door closed	Indicates that the Centrifuge door is closed.
Door locked	Indicates that the door is locked.
Bucket locked	Indicates that the bucket at the door is locked in position to prevent the rotor from moving.
Bucket unlocked	Indicates that the bucket at the door is unlocked and the rotor can move.
Balanced	Indicates that the buckets are out of balance during spinning, because one of the buckets has more mass than the other bucket.
In motion	Indicates that the buckets are spinning.
Homing	Indicates that the Centrifuge is in the homing process.

Related information

For more information about...	See...
Safety guidelines	“Safety guidelines” on page 1
Setting the spin parameters	“Setting the spin parameters in Centrifuge Diagnostics” on page 60
Run a protocol to spin multiple microplates in one or more spin cycles	“Workflow for running a protocol” on page 58
Controls and indicators in Centrifuge Diagnostics	*Centrifuge Diagnostics Version 8 Quick Reference*

6
Maintaining the Centrifuge

This chapter contains the following topics:

Routine maintenance and cleaning

Before you start

This topic provides guidelines for periodic routine maintenance and cleaning.

WARNING **To prevent potential injury or equipment damage, always disconnect the Centrifuge power, air, and serial cable before performing any cleaning or maintenance.**

WARNING **Sample plates may contain toxic, caustic, or radioactive substances. If a sample plate containing anything other than innocuous materials breaks apart in the Centrifuge, contact Agilent Automation Solutions Technical Support.**

CAUTION If labware breaks apart inside the Centrifuge, ensure that all the fragments are removed. Labware fragments can interfere with moving parts and potentially damage the Centrifuge.

CAUTION 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.

CAUTION Trapped liquids in the Centrifuge may cause corrosion inside the device.

Preventive maintenance

To keep your Centrifuge working properly, Agilent Technologies recommends that you schedule at least one maintenance visit every two years. To schedule the maintenance service, contact Agilent Automation Solutions Technical Support.

Spindle lubrication

The Centrifuge requires no lubrication except for the spindle, which has been designed to remain lubricated for two years of operation.

Do not attempt to lubricate the spindle yourself. If you hear squeaking noises, or notice that it takes longer for the Centrifuge to reach the set spin velocity, contact Agilent Automation Solutions Technical Support.

Bucket pin lubrication

The Centrifuge bucket pins use bushings and do not require lubrication.

If the buckets do not swing freely, do not attempt to lubricate the bucket pins yourself. Contact Agilent Automation Solutions Technical Support.

Centrifuge rotor

CAUTION The Centrifuge has a permanently attached rotor. Tampering with or adjusting the rotor mounting screw, which fastens the rotor to the central motor axle, can result in equipment damage. If the rotor mounting screw requires maintenance, contact Agilent Automation Solutions Technical Support.

Routine cleaning procedure

Clean the Centrifuge weekly or as needed. Do not let liquids contact:

- The electronic components
- Mechanical components inside the motor assembly
- The spindle support assembly

To clean the Centrifuge:

1. Use standard laboratory wipes and a mild detergent or isopropyl alcohol to clean the exterior painted white surfaces and the metal surfaces of dust, grime, chemical deposits, and other debris.
2. Remove the buckets. Inspect and clean the interior.
3. Clean the buckets using standard laboratory wipes and a mild detergent or isopropyl alcohol.
4. Install the buckets.

Cleaning up broken plates

Counterweight plates are particularly susceptible to falling apart because of repeated wear. However, the fluid spilled from a counterweight plate is usually water, which is easy to clean up.

Whenever a plate breaks apart in the Centrifuge, follow these guidelines:

- Depending on the amount of spillage, you may need to remove the buckets, or disassemble the Centrifuge.

  To remove the buckets, see "Removing the buckets" on page 74.

  If the Centrifuge might require disassembly, contact the Automation Solutions Technical Support.
- Use a long pair of tweezers to remove broken plate fragments.
- If not much liquid spilled, you can vacuum up smaller plate fragments.
- Make sure that excess liquid is removed. Avoid using the Centrifuge until it has dried completely.

Related information

For more information about...	See...
Disconnecting the air supply	"Disconnecting the air supply" on page 72
Unlocking the door	"Unlocking and opening the door manually" on page 73
Removing the buckets	"Removing the buckets" on page 74
Installing the buckets	"Installing the buckets" on page 25
Reporting problems	"Reporting problems" on page 84

Disconnecting the air supply

When to disconnect the air supply

Disconnect the air supply before:

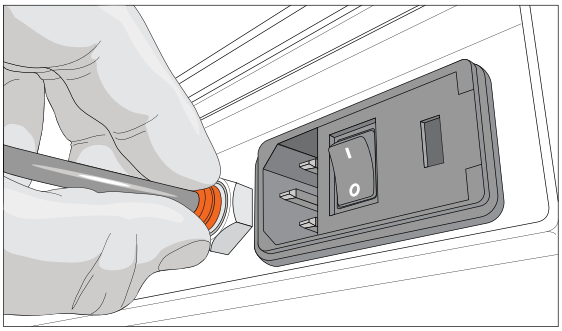
- Performing maintenance on the Centrifuge
- Cleaning the Centrifuge
- Cleaning up broken plates

Procedure

WARNING **Working with open, charged air lines can result in injury. To prevent potential injury or equipment damage, turn off the air supply before disconnecting the air line from the Centrifuge.**

To disconnect the air line:

1 At the back of the Centrifuge, push in the orange locking collar to release the air line.



2 Gently, pull on the air line with your free hand until the tubing comes out.

Related information

For more information about...	See...
Connecting the air supply	“Connecting the device” on page 27
Specifications for air supply	“Laboratory requirements” on page 15
Reporting problems	“Reporting problems” on page 84

Unlocking and opening the door manually

Before you start

Before cleaning or performing maintenance on your Centrifuge, you will need to unlock and open the door.

WARNING **To prevent potential injury or equipment damage, always disconnect the Centrifuge power, air, and serial cable before performing any cleaning or maintenance.**

WARNING **To prevent potential injury or equipment damage, do not attempt to manually unlock the door while the rotor is moving. Although no longer powered, the buckets may still be rotating at a dangerous speed.**

To disconnect the air hose, see "Disconnecting the air supply" on page 72.

Procedure

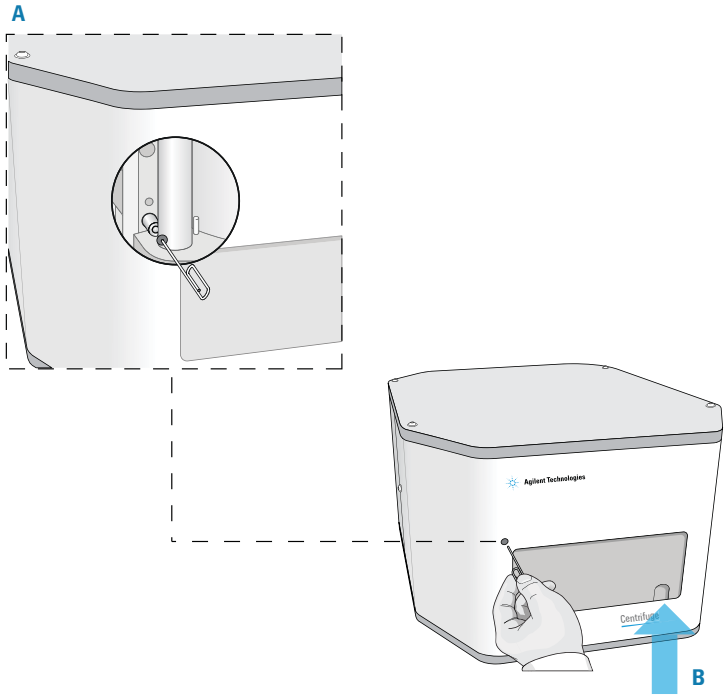
To manually unlock and open the door:

1 Put a small, thin tool, such as a large unfolded paperclip, through the hole at the upper left of the door to push against and fully retract the lock pin.

Ensure that the tool is inserted at an angle so that it goes between the door column and the cover, as the following figure (**A**) shows

At the same time, push upward in the indentation (**B**) in the door with your other hand.

Figure Centrifuge (**A**) door-lock access hole and (**B**) door indentation



2 Remove the tool after the door begins to open, to continue opening the door. Otherwise, the tool will obstruct the door's movement.

Related information

For more information about...	See...
VWorks software	• *VWorks Automation Control Setup Guide* • *VWorks Automation Control User Guide*
Controls and indicators in Centrifuge Diagnostics	*Centrifuge Diagnostics Version 8 Quick Reference*
Reporting problems	"Reporting problems" on page 84

Removing the buckets

About this topic

You should remove the buckets before cleaning or moving the Centrifuge.

Before you start

WARNING To prevent potential injury or equipment damage, always disconnect the Centrifuge power, air, and serial cable before performing any cleaning or maintenance.

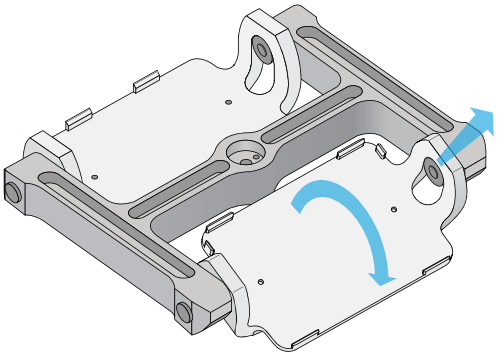
Ensure that the power and air are turned off. To disconnect the air hose, see "Disconnecting the air supply" on page 72.

To access the buckets when the air is turned off, you open the door manually. See "Unlocking and opening the door manually" on page 73.

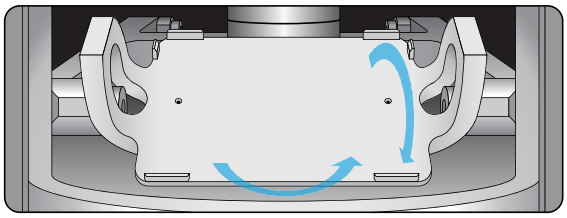
Procedure

To remove a bucket:

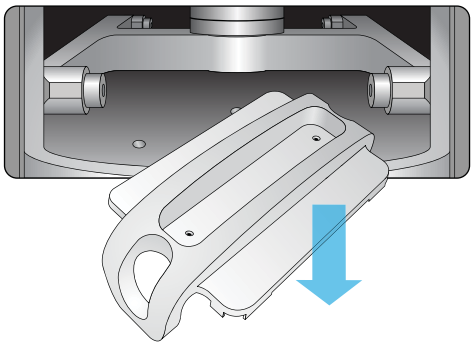
1 Roll the bucket as the following figure shows, and then pull the bucket towards you until it comes free of the pins.



2 Rotate one end of the bucket towards you, and turn it upside down.



3 Remove the bucket from the door opening.



For more information about...	See...
Unlocking the door manually	“Unlocking and opening the door manually” on page 73
Installing the buckets	“Installing the buckets” on page 25
Reporting problems	“Reporting problems” on page 84

Testing the actuators

About this topic

To diagnose problems with the following Centrifuge actuators, you can test them in Centrifuge Diagnostics:

- Lock Bucket and Unlock Bucket
- Lock Door and Unlock Door
- Open Door

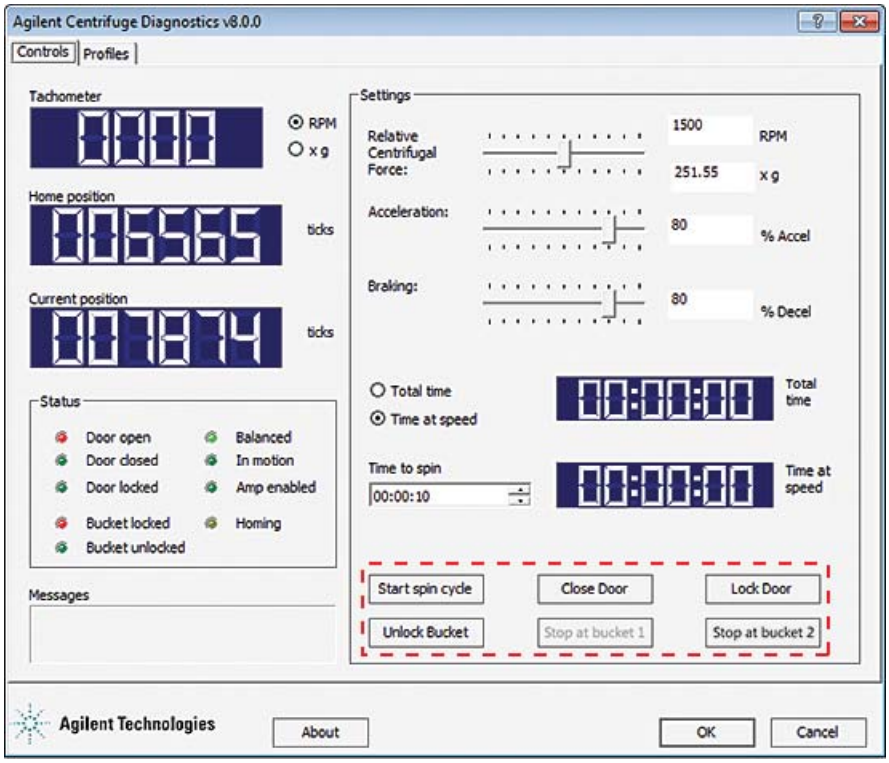
  Note: The door cannot be opened until it is unlocked.

Before you start

Initialize the Centrifuge in Centrifuge Diagnostics. For instructions, see "Initializing the device profile and checking status" on page 42.

The following figure shows the actuator controls in the Controls tab.

Figure Actuator controls in the Controls tab



If there are problems with the actuators, check the indicators in the Status area and check the Messages area of the Controls tab.

Locking and unlocking the bucket assembly

The bucket assembly (buckets and rotor) locks automatically before a plate is picked from or placed on a bucket. When locked, the buckets do not swing and the rotor does not turn. You can also manually lock the bucket assembly.

To unlock the bucket assembly:

On the **Controls** tab, click **Unlock Bucket**.

The bucket assembly is now free to spin, and can be moved by hand.

To lock the bucket assembly:

On the **Controls** tab, click **Lock Bucket**.

The bucket assembly locks, restricting bucket swinging and rotor spinning.

Locking and unlocking the door

Between spin cycles, you can command the door to lock or unlock.

The door must be locked before you can start a spin, and remains locked throughout the spin. If the rotor starts spinning, the hardware interlocks close and lock the door automatically.

To lock the door:

In the **Controls** tab, click **Lock Door**.

The door locks, and cannot be opened without sending an unlock command or unlocking it manually.

To unlock the door:

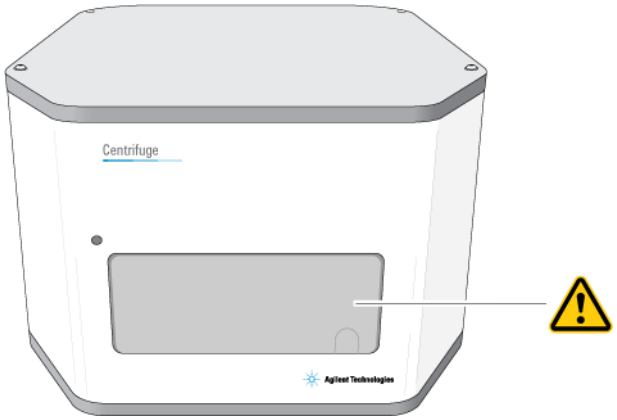
In the **Controls** tab, click **Unlock Door**.

The door unlocks.

Opening and closing the door

WARNING **Keep away from the Centrifuge door while it is opening or closing. The Centrifuge door can cause possible pinching, piercing, or bruising if your hand is in the opening when it closes.**

Figure Centrifuge door



Between spin cycles, you can command the door to open.

The door must be closed before you can start a spin.

The door will not open until it is unlocked.

To open the door:

1. In the **Controls** tab, verify that the door is unlocked by checking the **Door locked** status light in the **Status** area.
2. Click **Open Door**.

   The door opens.

To close the door:

Click **Close door**.

The door closes.

Checking error messages

The following types of error and status messages appear in the Messages area of the Control tab:

- Bucket lock failed
- Door lock failed
- Door open failed

Door closed status anomaly

The Door closed sensor is not triggered when the door is fully closed, but rather when it is just starting to close.

As a result, it is occasionally possible for the door to be open slightly, but for the Door closed status light to still be lit.

Related information

For more information about...	See...
Error messages	"Troubleshooting Centrifuge error messages" on page 82
Controls and indicators in Centrifuge Diagnostics	*Centrifuge Diagnostics Version 8 Quick Reference*
Reporting problems	"Reporting problems" on page 84

Replacing the fuse

Before you start

WARNING **To prevent potential injury or equipment damage, disconnect the instrument power, air, and communication cables before performing the following procedure.**

CAUTION A blown fuse can indicate an over-current condition caused by a ground fault or faulty electronics. If the fuse blows again after replacement, troubleshoot the problem by disconnecting the power supply and inspecting the AC wiring through the power entry module.

CAUTION Use only the specified fuse type for replacement. Using an incorrect fuse can damage the Centrifuge.

Ensure that you have the following:

- Fuse of the specified type: 7 A, 250 V, 3 AG
- Flathead screwdriver

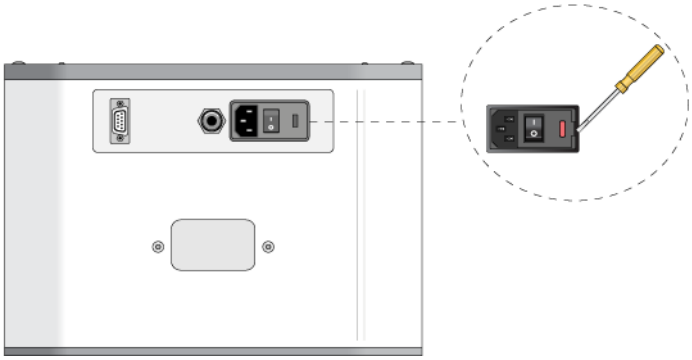
Procedure

To replace the fuse in the power switch:

1 Shut down the Centrifuge, and unplug the power cable from the rear panel connector.

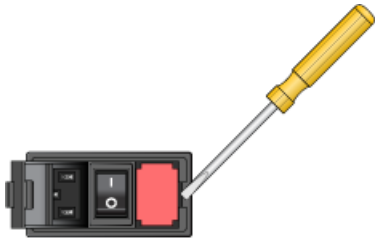
2 At the rear panel power switch enclosure, use a small flat-head screwdriver (2.5 mm) to pry open the tab at the top of the enclosure and open the enclosure cover.

Figure Fuse enclosure location



3 Insert the screwdriver head in the enclosure notch to dislodge the fuse cartridge. Slide the fuse cartridge all the way out of the enclosure.

Figure Fuse enclosure location



4 Replace the fuse in the cartridge.

5 Slide the fuse cartridge back into the fuse enclosure.

6 Press the enclosure cover securely into the closed position.

7 Plug in the power cord at the rear panel connector.

Related information

For more information about...	See...
Safety guidelines	“Safety guidelines” on page 1
Troubleshooting problems	“Troubleshooting hardware problems” on page 81
Reporting problems	“Reporting problems” on page 84

Troubleshooting hardware problems

Refer to the following table to resolve common errors. If your particular issue is not in the table, or if the recommended steps do not solve your problem, see "Reporting problems" on page 84.

Problem	Possible cause	Solution
The Centrifuge does not turn on.	The site does not meet the electrical requirements.	See "Laboratory requirements" on page 15.
	The device is not connected to the power source, or the power cord is damaged.	Ensure that you are using the correct country-specific power cord and plug. Inspect the power cord and connections, and ensure that the device is connected to the power source.
	The AC inlet fuse is bad.	See "Replacing the fuse" on page 79. If the fuse blows immediately after replacement, stop using the device and see "Reporting problems" on page 84.
The buckets were level before a spin cycle. But after the spin cycle the buckets are not level.	The upper corner of a deep-well microplate with lid is hitting the rotor during the spin cycle.	Ensure that your labware fits within the Centrifuge specifications for labware height. For details, see "Labware specifications" on page 20. *Note:* If the microplate meets the size specifications without adding the lid, you can seal the microplate instead of using a lid.

Troubleshooting Centrifuge error messages

Refer to the following table to resolve common errors. If your particular issue is not in the table, or if the recommended steps do not solve your problem, see "Reporting problems" on page 84.

Error	Possible cause	Solution
A position-error condition was encountered	The Centrifuge failed to go to the specified position.	Check to see if something is blocking the rotor, such as a piece of plastic from a plate.
Aborting current process	You have chosen an action that has aborted this process. For example, you clicked Open Door before the door finished closing.	Wait for the current action to finish before you perform the next action.
An imbalance condition was encountered	The buckets were imbalanced during a spin.	Ensure that the weight in the buckets is balanced before you start a spin. See "Starting a Spin" on page 58.
Bad acceleration percentage: Must be between 1.0 and 100.0	The spin parameters are out of range.	On the Controls tab, choose an acceleration percentage between 1.0 and 100.0
Bad bucket number: Must be 1 or 2		Select bucket 1 or bucket 2. The Centrifuge has only two buckets.
Bad deceleration percentage: Must be between 1.0 and 100.0		On the Controls tab, choose a deceleration percentage between 1.0 and 100.0
Bad time: Must not be negative		Choose a time value that is 0 or greater.
Bad timer mode: Must be 0 or 1		Choose a value of 0 or 1.
Bad velocity percentage: Must be between 1.0 and 100.0		Choose a value between 1.0 and 100.0.
Could not connect to the Centrifuge	Power or communications are not functioning properly.	Ensure that the: • Power cord is properly plugged in to the Centrifuge power entry and the wall outlet. • Power switch is turned on. • Fuse is not burned out. • Serial cable is properly plugged into the Centrifuge and the computer. • Centrifuge is plugged into the serial port specified in the profile.

Error	Possible cause	Solution
<*the action*> may not be called at present time	The Centrifuge is currently performing another process, and cannot perform the requested action. For example, the door cannot be opened while the rotor is spinning.	Wait for the current action to finish before you perform the next action.
NmcNoOp() failed: Communication likely failed	The Centrifuge may have become disconnected during operation.	Ensure that the: • Power cord is properly plugged in to the Centrifuge power entry and the wall outlet. • Power switch is turned on. • Serial cable is properly plugged into the Centrifuge and the computer.
Profile does not exist	The Centrifuge profile does not exist.	Create a new profile or select an existing one.
Time out error	The action did not complete within the allotted time. The power or communications to the Centrifuge has been interrupted.	Ensure that the: • Power cord is properly plugged in to the Centrifuge power entry and the wall outlet. • Fuse is not burned out. • Power switch is turned on. • The serial cable is properly plugged into the Centrifuge and the computer. Perform the action again.
Tried to actuate bucket lock but failed	The system may have insufficient air pressure.	Check to make sure that the: • Air hose is properly connected to the Centrifuge and to the air source • Air is turned on at the source • Air pressure is at the proper level as listed in “Laboratory Requirements” on page 23

Reporting problems

Contacting Automation Solutions Technical Support

If you find a problem with the Centrifuge, contact Automation Solutions Technical Support. For contact information, see Notices on the back of the title page.

Reporting hardware problems

When contacting Agilent Technologies, make sure you have the serial number of the device ready.

Reporting software problems

When you contact Automation Solutions Technical Support, make sure you provide the following:

- Short description of the problem
- Relevant software version number (for example, automation control software, diagnostics software, and firmware)
- Error message text (or screen capture of the error message dialog box)
- Relevant files, such as log files

Reporting user guide problems

If you find a problem with this user guide or have suggestions for improvement, send your comments in an email to documentation.automation@agilent.com.

Related information

For more information about...	See...
Troubleshooting hardware problems	“Troubleshooting hardware problems” on page 81
Error messages	“Troubleshooting Centrifuge error messages” on page 82
Safety guidelines	“Safety guidelines” on page 1

Agilent Technologies

User Guide

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