

Labware Stacker

User Guide

Original Instructions

Notices

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Contact Information

Agilent Technologies Inc.
Automation Solutions
5301 Stevens Creek Blvd.
Santa Clara, CA 95051
USA

Technical Support: 1.800.979.4811 (US only)
or +1.408.345.8011 (rest of the world)
service.automation@agilent.com

Customer Service: 1.866.428.9811
or +1.408.345.8356
orders.automation@agilent.com

Customer Service by country:
<http://www.chem.agilent.com/en-US/Contact-US/Pages/ContactUs.aspx>

Documentation feedback:
documentation.automation@agilent.com

Web:
www.agilent.com/lifesciences/automation

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Safety Notices

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

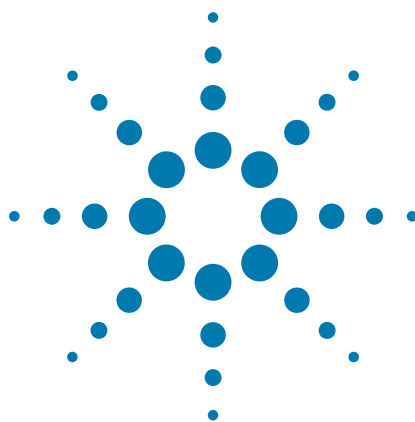
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Preface

This preface contains the following topics:

- “About this guide” on page vi
- “Accessing Agilent Automation Solutions user information” on page viii

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 Stacker before it is used.
Integrator	Configures hardware and writes software.
Lab manager, administrator, or technician	<ul style="list-style-type: none">• Manages the automation system that contains the Stacker• 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 Stacker and solves routine problems.

What this guide covers

This guide contains the safety guidelines and the installation, setup, operation, and maintenance procedures for the Labware Stacker.

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 safety and regulatory compliance content.	“Safety guidelines” on page 1
Simplified and updated the software overview to reflect the latest versions.	“Software overview” on page 14
Added the labware specifications.	“Laboratory requirements” on page 18
Updated the unpacking procedures.	“Unpacking the Labware Stacker” on page 23
Included a description of how to add the Stacker device to a VWorks device file.	“Creating and editing VWorks device files” on page 32

Feature and description	See...
Updated all diagnostics procedures based on Labware Stacker Diagnostics version 19.0 and added a quick-reference.	<ul style="list-style-type: none"> • “Setting up the device” on page 29 • “Configuring the device and labware” on page 51 • “Quick reference” on page 89
Added a procedure for changing the fuse.	“Replacing the fuse” on page 82
Added a description of how to report problems.	“Reporting problems” on page 88

Software version

This guide documents Labware Stacker Diagnostics version 19.0.

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.
- *Stacker ActiveX Version 18 User Guide*. Describes the ActiveX controls for the Labware Stacker.
- *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, set task parameters for each device in the system, and how to run and monitor protocols.

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 88

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

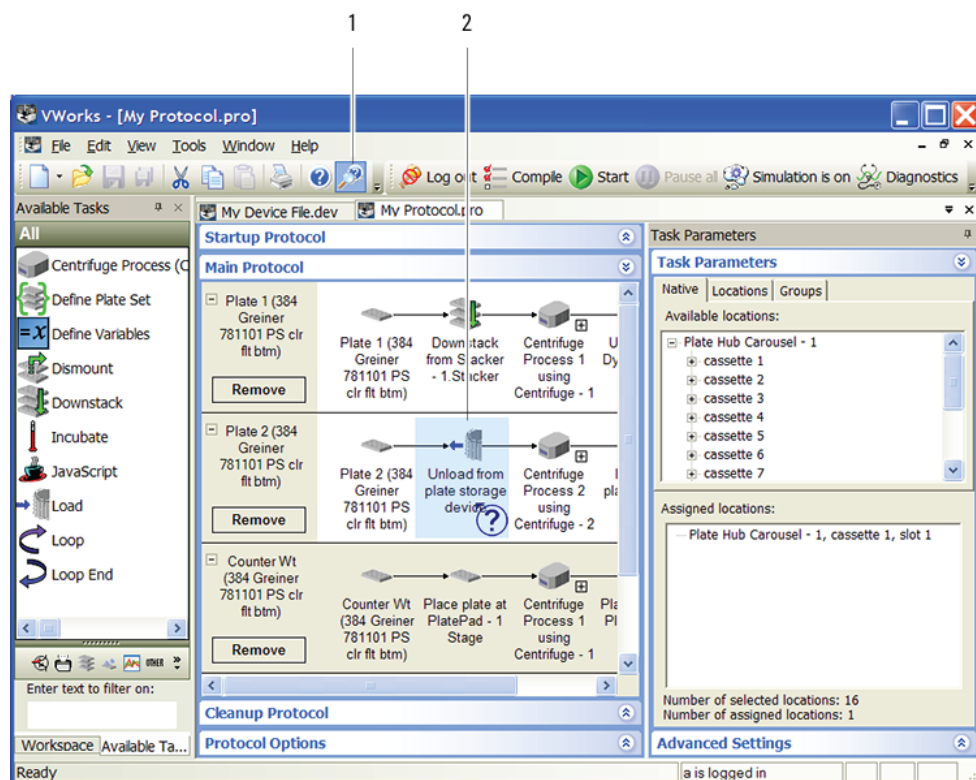
Knowledge base topics are displayed using web browser software such as Microsoft Internet Explorer and Mozilla Firefox.

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



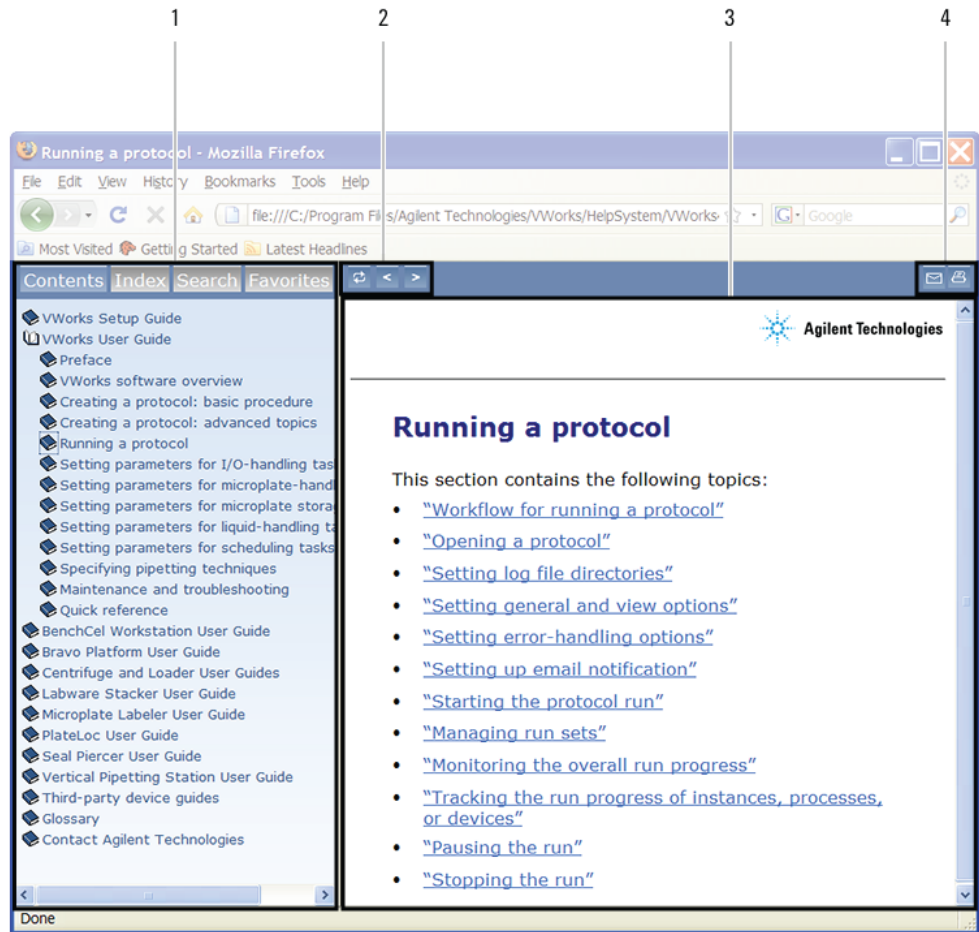
To access the context-sensitive help feature:

- 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.



Safety guidelines

This chapter contains the following topics:

- “General safety information” on page 2
- “Safety and regulatory compliance” on page 3
- “Potential hazards” on page 5

General safety information

Before installing and using the Labware Stacker

Make sure that you are properly trained in:

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

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*.

Related information

For information about...	See...
Safety and regulatory compliance	“Safety and regulatory compliance” on page 3
Mechanical hazards	“Mechanical moving-parts hazards” on page 5

Safety and regulatory compliance

The Labware Stacker 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 Labware Stacker is designed to comply with the regulations and standards listed in the following table.

Regulatory Compliance	Standard
EMC	
European Union	EMC Directive 2014/30/EU IEC 61326-1:2012 / EN 61326-1:2013
Canada	ICES/NMB-001:2006
Australia/New Zealand	AS/NZS CISPR 11:2011
Safety	
European Union	Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU 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 Labware Stacker 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: $L_p < 70$ dB according to EN ISO 779:2010.

Schalldruckpegel: $L_p < 70$ dB nach EN ISO 779:2010.

1 Safety guidelines

Safety and regulatory compliance

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 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Related information

For information about...	See...
General precautions, intended product use statement, and list of safety labels	<i>Automation Solutions Products General Safety Guide</i>
Mechanical hazards	“Mechanical moving-parts hazards” on page 5

Potential hazards

About this topic

This topic describes potential hazards specific to the Labware Stacker. See the [Automation Solutions Products General Safety Guide](#) for potential hazards that are present on all the Agilent Automation Solutions products.

Mechanical moving-parts hazards

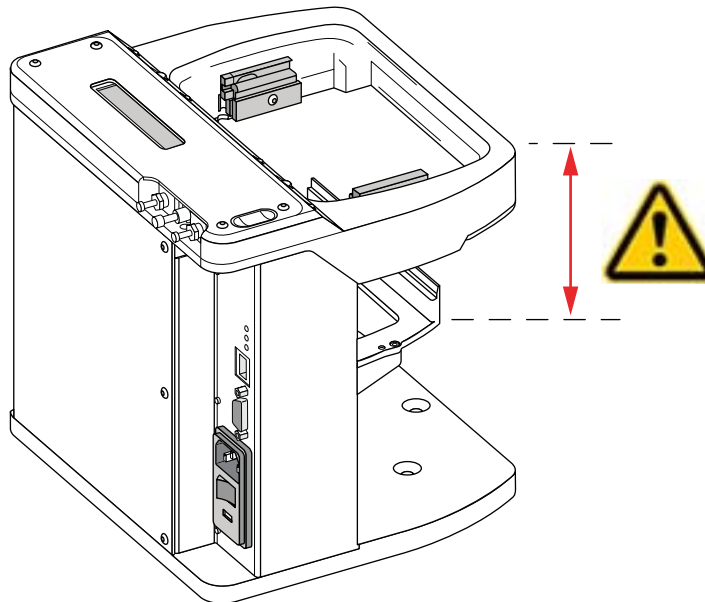


WARNING Keep away from the Labware Stacker while it is in motion. Not all circumstances can be foreseen and serious injury is possible. It is the responsibility of every operator to follow warnings and safety labels.



WARNING The Labware Stacker plate stage moves up and down during initialization. To prevent potential injury, keep away from the Labware Stacker while it is in motion.

Figure Labware Stacker plate stage vertical travel



Sharp edges and pinch hazards

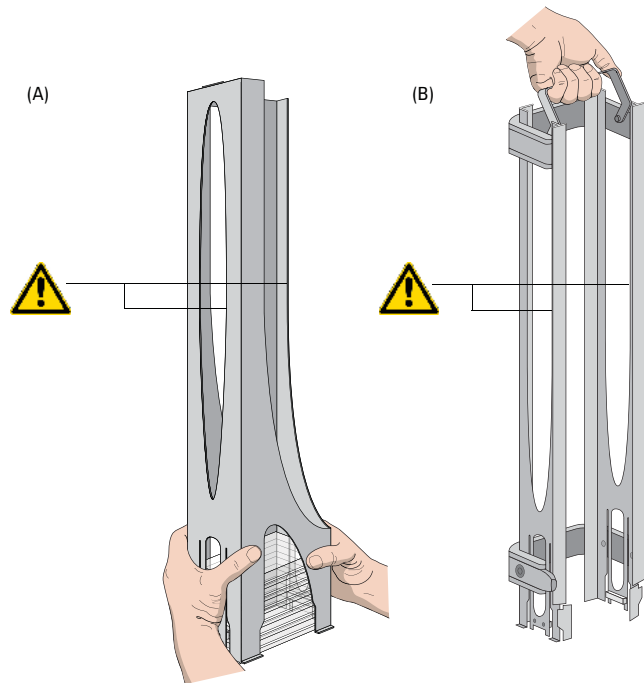


WARNING Pinch hazard! Keep your fingers out of the path of the labware rack when you mount it on the Labware Stacker.



WARNING Use the rack handle to carry the labware rack. Do not hold a rack by the interior edges. The interior edges can have sharp surfaces that can cause cuts if handled improperly.

Figure Sharp surfaces on the labware racks: standard model (A), and front load model (B)



Miscellaneous



WARNING To prevent potential injury, disconnect the power cord, air line, and communication cable before performing any service to the Labware Stacker.

Related information

For information about...

General precautions, intended product use statement, and list of safety labels

Safety and regulatory compliance

See...

Automation Solutions Products General Safety Guide

“Safety and regulatory compliance” on page 3



2 Introduction

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

- “Hardware overview” on page 8
- “Connection panel” on page 13
- “Software overview” on page 14
- “Quick start” on page 15

Hardware overview

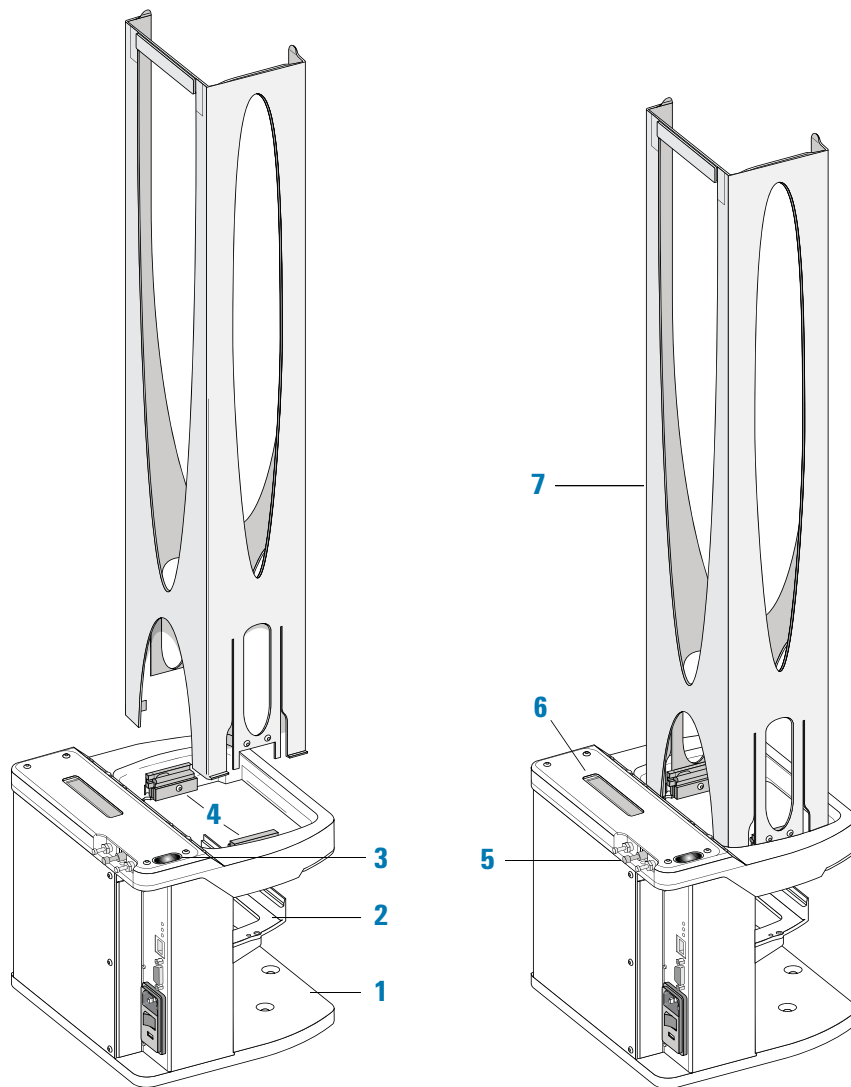
Introduction

The Agilent Labware Stacker is a robot-accessible microplate stacker that is used in lab automation systems to dispense and receive microplates from robotic systems. The Labware Stacker can hold deep-well and shallow-well microplates, tip boxes and lids.

Main components

The following figure and table describe the main components of the Labware Stacker.

Figure Labware Stacker components

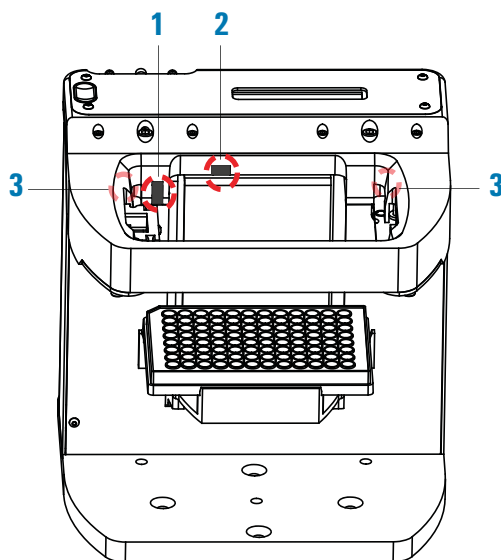


Item	Part	Comment
1	Base	The Stacker base that contains dowel pin holes and screw holes on the bottom surface for attaching the device to a prepared laboratory table.
2	Plate stage	The platform that moves up and down to move labware between the rack and Presentation teachpoint, which is where a robot picks up or places labware on the plate stage.
3	Load/release button	<p>The button that loads or releases a microplate from the rack.</p> <ul style="list-style-type: none"> • Load. Moves the bottom microplate in the rack from the released position, resting atop the rack gripper, to being held by the gripper (loaded position). • Release. Releases the microplate from the gripper hold and moves the microplate up to sit on top of the gripper. When the microplates are released, you can remove the rack.
4	Rack shelf	<p>The pneumatic shelf that provides a level surface to support the mounted labware rack. The air supply must be on and the shelf must be extended to enable the rack to be mounted properly.</p> <p>Each shelf has slots into which you insert the vertical tabs of the rack when you mount the rack on the device.</p>
5	Air pressure regulator	<p>The control for adjusting the pressure of the compressed air that is used to close the grippers.</p> <p><i>Note:</i> The two similar controls to the left and right are flow controls that affect the speed with which the grippers open and close. You should not need to adjust the flow controls.</p>
6	Display	<p>The panel that displays a text string. For example, you can display a different name for each Labware Stacker in an automation system.</p> <p>To change the display text, you can run the corresponding ActiveX method, or you can set the display text using the Labware Stacker Diagnostics software. The displayed text can be set during a run by the controlling software. For example, the VWorks software can specify the name of the type of labware that should be loaded into a Labware Stacker.</p>
7	Labware rack	The removable storage rack for the labware. You can remove the rack from the Labware Stacker to add, remove, and transport labware. See “Labware racks” on page 10 .

Stacker sensors

The following figure and table describe the sensors on the Labware Stacker.

Figure Sensor locations

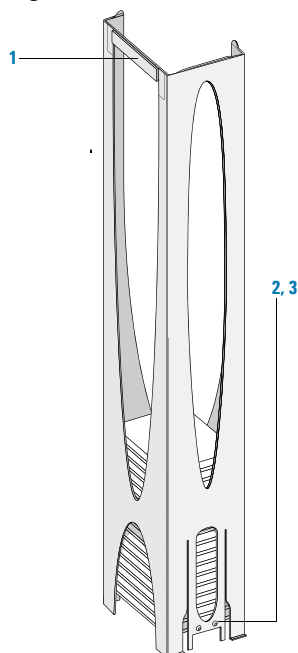


Item	Name	Description
1	Rack present sensor	The sensor that indicates if a rack is loaded on the Labware Stacker.
2	Plate present sensor	The sensor that indicates if a microplate is in the stacker grippers.
3	Notch sensors (not shown)	The two sensors on the left and right interior vertical surfaces next to the rack shelf. The sensors can detect the presence of a notch in the left or right corner of microplate.

Labware racks

The labware racks are available in three models: standard rack, top-load rack, and front-load rack. All the rack models have the following basic parts.

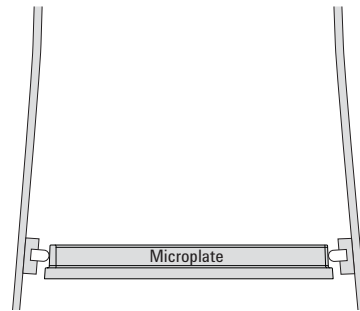
Figure Standard rack containing labware



Item	Name	Description
1	Carrying handle	The standard rack has a polished top bar that can be used as a carrying handle. The top-load and front-load racks have fold-down carrying handles.
2	Tabs	A pair of vertical tabs are located at the bottom on the rack sides. The tabs insert into the shelf slots on the device when you mount the rack on the device.
3	Stacker grippers (not shown)	The two horizontal protrusions (pads) on the inward-facing surface of each vertical tab. The pair of grippers hold a microplate during the loading, downstacking, and upstacking processes. When loaded, the bottom microplate is gripped by the grippers, holding up the rest of the stack of microplates. The grippers release the bottom microplate to the plate stage when dispensing microplates (downstacking). The grippers grip the microplate on the plate stage when receiving microplates from the robot (upstacking).

The following figure shows a closeup view of a labware rack, with a microplate in the gripper. The front wall of the rack is not shown to reveal the gripper pads that are hidden from view.

Figure Labware rack closeup view showing microplate held by the gripper pads



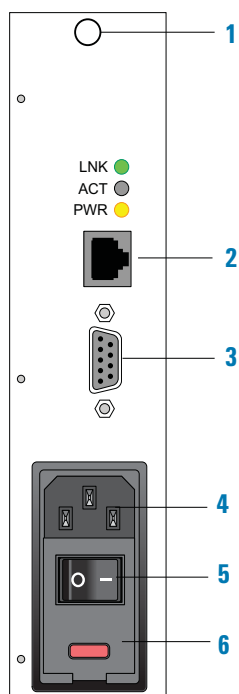
Related information

For information about...	See...
Safety guidelines	“Safety guidelines” on page 1
Connectors	“Connection panel” on page 13
Software	“Software overview” on page 14

Connection panel

The following figure and table describe the connection panel on the Labware Stacker.

Figure Connection panel



Item	Part	Comment
1	Air supply port	Connects the Labware Stacker to a compressed-air source. The Labware Stacker uses compressed air to move components, such as opening and closing the grippers.
2	Ethernet port	Connects the Labware Stacker to the controlling computer.
3	Serial port (DB-9 RS-232 9-pin)	Used to install the device firmware at the manufacturer.
4	AC power entry	Connects the power cord.
5	Power switch	Turns on (I) and off (O) the device power.
6	Fuse panel	Houses the AC inlet fuse.

Related information

For information about...	See...
Specifications for air supply, power, and fuse	“Laboratory requirements” on page 18
Connecting the communication cable, air line, and power cord	“Connecting the device” on page 25
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Safety guidelines	“Safety guidelines” on page 1

Software overview

About this topic

This topic describes the software that you use to operate the Labware Stacker.

- [“Labware Stacker Diagnostics” on page 14](#)
- [“Laboratory automation software” on page 14](#)

Labware Stacker Diagnostics

The Labware Stacker Diagnostics software enables you to:

- *Create and manage profiles.* A profile specifies how the device establishes communication with the controlling computer.
- *Diagnose problems.* You can view status information and move components to diagnose and troubleshoot problems.

You open Labware Stacker Diagnostics from the VWorks software or by using the Stacker ActiveX control.

Laboratory automation software

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

VWorks software

The VWorks software enables you to:

- *Set up the Labware Stacker.* During setup, you create a device file for the Labware Stacker or add the device to a device file. You use Labware Stacker 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.

Stacker ActiveX control

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

Related information

For information about..	See...
Setting up the VWorks software, including defining labware	<i>VWorks Automation Control Setup Guide</i>
Setting up the Labware Stacker	“Setup workflow” on page 30
Labware Stacker Diagnostics	“Quick reference” on page 89
How to use the VWorks software to run a protocol	<i>VWorks Automation Control User Guide</i>
Stacker ActiveX control	<i>Stacker ActiveX User Guide</i>

Quick start

Overall setup workflow

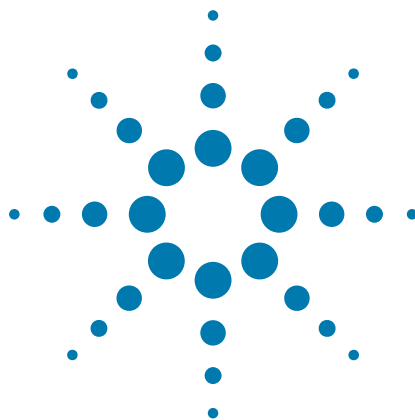
The following table presents the basic steps for setting up the Labware Stacker for operation.

Step	For this task...	See...
1	Prepare the laboratory for the installation.	“Laboratory requirements” on page 18
2	Unpack the Labware Stacker.	“Unpacking the Labware Stacker” on page 23
3	Install the Labware Stacker.	<ul style="list-style-type: none"> • “Mounting the Labware Stacker” on page 24 • “Connecting the device” on page 25
4	Turn on the Labware Stacker.	“Starting up and shutting down” on page 31

Step	For this task...	See...
5	Install the VWorks software, or integrate the Stacker ActiveX control.	One of the following: <ul style="list-style-type: none"> <i>VWorks Automation Control Setup Guide</i> <i>Stacker ActiveX User Guide</i>
6	<i>VWorks software only.</i> Start the VWorks software and log in.	<i>VWorks Automation Control User Guide</i>
7	<i>VWorks software only.</i> Add the Stacker device to a device file.	“Creating and editing VWorks device files” on page 32
8	Establish communication with the Labware Stacker.	<ul style="list-style-type: none"> “Creating and editing profiles” on page 38 “Initializing the Labware Stacker” on page 41
9	Load the labware racks.	<ul style="list-style-type: none"> “Filling or emptying a rack with labware” on page 43 “Loading and releasing a rack” on page 46
10	Configure the Labware Stacker.	“Configuring the device and labware” on page 51
11	Set the robot teachpoint at the Labware Stacker.	Robot user documentation
12	Write and run protocols.	One of the following: <ul style="list-style-type: none"> <i>VWorks Automation Control User Guide</i> Automation software user documentation

Related information

For information about...	See...
Setting up the VWorks software, including defining labware	<i>VWorks Automation Control Setup Guide</i>
Setting up the Labware Stacker	“Setup workflow” on page 30
Labware Stacker Diagnostics	“Quick reference” on page 89
How to use the VWorks software to run a protocol	<i>VWorks Automation Control User Guide</i>
Stacker ActiveX control	<i>Stacker ActiveX User Guide</i>



3 Installing the Labware Stacker

This chapter describes how to install the Labware Stacker.

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

The topics are:

- “Installation workflow” on page 18
- “Laboratory requirements” on page 18
- “Unpacking the Labware Stacker” on page 23
- “Mounting the Labware Stacker” on page 24
- “Connecting the device” on page 25

Installation workflow

Workflow

Perform the following procedures in the order given.

Step	For this task...	See...
1	Verify that the installation location meets the site requirements.	“Laboratory requirements” on page 18
2	Unpack the Labware Stacker.	“Unpacking the Labware Stacker” on page 23
3	Mount the Labware Stacker on the laboratory table.	“Mounting the Labware Stacker” on page 24
4	Connect the power, air supply, and computer.	“Connecting the device” on page 25
5	Install the VWorks software, or integrate the Stacker ActiveX control.	One of the following: <ul style="list-style-type: none">• <i>VWorks Automation Control Setup Guide</i>• <i>Stacker ActiveX User Guide</i>

Related information

For information about...	See...
Installing external devices	External device user documentation
Setting up the Labware Stacker	“Setting up the device” on page 29
Defining labware in the software	<i>VWorks Automation Control Setup Guide</i>
Writing protocols in the VWorks software	<i>VWorks Automation Control User Guide</i>

Laboratory requirements

About this topic

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

Laboratory space

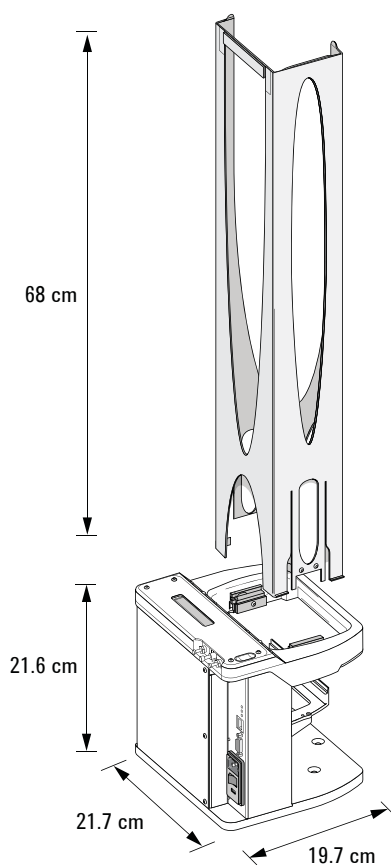
General bench requirements

Make sure the bench for the Labware Stacker has the following:

- Proximity to power and air sources
- Enough space to accommodate the Labware Stacker, computer, and integrated devices
- Sufficient clearance on the back side of the Labware Stacker to access power, communication, and air tubing connections
- A level surface and a fixed position
- Proper height for any operator to comfortably operate the Labware Stacker

Space requirements

The following figure and table provide the dimensions of the Labware Stacker.



Dimension	Stacker (without rack)	Labware rack (standard)
Height	21.6 cm (8.5 in)	68 cm (26.8 in)
Width	21.7 cm (8.6 in)	8.9 cm (3.5 in)
Depth	19.7 cm (7.8 in)	13.3 cm (5.25 in)
Weight	5.3 kg (11.6 lb)	2.25 kg (4.9 lb)

3 Installing the Labware Stacker

Laboratory requirements

Note: The rack dimensions listed are for the standard racks. The rack weight is for the front-loading style rack and does not include liquid-filled microplates. The height and weight are slightly different with different rack types.

Electrical requirements

The Labware Stacker has the following power requirements.

Utility	Requirement
Electrical	100–240~, 50/60 Hz
Operating AC current	1.2A/120V or 72A/240V (typical)
AC entry fuse	1 A, 250V, 5x20 mm, Slo-Blo

Compressed air requirements

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

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

CAUTION 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. Ensure that the air coming into the device is properly filtered from moisture or aerosolized impurities and from a recommended air source.

CAUTION Air pressure greater than 0.83 MPa (120 psi) can result in equipment damage. Ensure that the air flow rate and pressure meet the specified requirements.

To maintain the desired air supply in the device, the Labware Stacker requires a source of air as follows:

Requirement	Value
Quality	Clean, dry, compressed
Flow rate and pressure	28.3 Lpm at 0.35 to 0.55 MPa (1 cfm at 50 to 80 psi)

The air supply port on the Labware Stacker uses 0.125-inch tubing and fittings. You may use an adapter to connect the 0.125-inch tubing from the air supply port to 0.25-inch tubing from your house air supply.

Environmental requirements

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

Requirement	Value
Pollution degree	2
Installation category	II
Temperature	4 to 40 °C
Humidity condition	10% to 90% RH, non-condensing
Elevation	1 to 2000 m

Make sure the Labware Stacker is located away from the following:

- Heat and air conditioning ducts
- Direct sunlight

Computer requirements and networking considerations

The Labware Stacker requires an Ethernet connection to the controlling computer. The computer configuration should include one of the following:

- One network card if the controlling computer will not be connected to your organization's local area network (LAN).
- Two network cards if the controlling computer will be connected to the Labware Stacker LAN and to your organization's LAN.



WARNING Connecting the Labware Stacker to a company or general network can potentially cause injury. Remote computer operators might accidentally initiate an operation that causes the device to move unexpectedly, possibly injuring nearby lab personnel. Avoid connecting the device to a company or general network. Ensure that anyone with access to the device is trained in the potential hazards and how to avoid them.

An Ethernet switch is required if you want to connect the Labware Stacker to a network that has other devices on it.

Note: The Stacker has an RS-232 serial port that is reserved for use by Agilent service personnel.

Additional computer 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, see the user documentation supplied with the product.

Acceptable microplates

The Labware Stacker 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.

Related information

For information about...	See...
Laboratory requirements for other devices in the lab automation system or workstation	Device user documentation
Contacting technical support	"Reporting problems" on page 33
Installing the Labware Stacker	"Installation workflow" on page 18
Safety guidelines	"Safety guidelines" on page 1

Unpacking the Labware Stacker

Before you start

Move the shipping box to the area where you will be installing the device.

IMPORTANT Save the packaging materials in case you need to move or ship the Labware Stacker.

Unpacking the shipping box

To unpack the shipping box:

- 1 Open the box and remove the top foam packing insert.
- 2 Lift the contents out of the box and set each item carefully on the lab table where you want to install the device.
- 3 Remove the plastic bags and other packaging.
- 4 Inspect all items in the shipment for completeness and potential shipping damage. Make sure that the following items are included in the box:
 - Labware Stacker
 - Power cord, country-specific
 - [Automation Solutions Products General Safety Guide](#)
 - VWorks ActiveX Controls Software Kit

Depending on your order, the shipment can also include the following required items:

- Labware rack
- Polyurethane tubing and fittings for the air supply connection
- Ethernet cables

Related information

For information about...	See...
Laboratory requirements	“Laboratory requirements” on page 18
Installing the Labware Stacker	“Installation workflow” on page 18
Mounting the Labware Stacker	“Mounting the Labware Stacker” on page 24
Safety guidelines	“Safety guidelines” on page 1

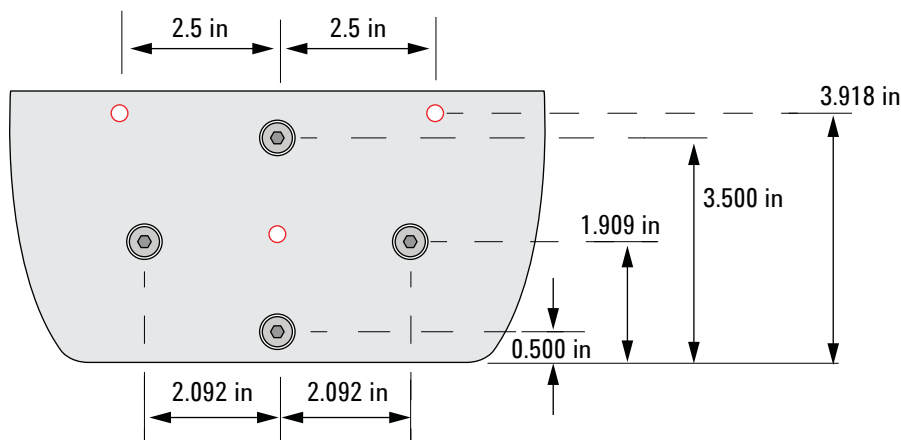
Mounting the Labware Stacker

Use the following procedure to mount the Labware Stacker on a stable laboratory table. Ensure that the Labware Stacker is mounted in such a way that all sides of the device are easily accessible to the user for cleaning and maintenance.

Procedure

The following figure shows the three 0.25-inch dowel pin holes and four M6 flathead screw holes on the Stacker base.

Figure Mounting hole pattern on the Stacker base



To mount the Labware Stacker:

- 1 Refer to the preceding figure, and measure the table mounting holes to ensure that they will accommodate the pattern of dowel pins and screws on the Stacker base.
- 2 Place three 0.25-inch dowel pins in the dowel pin holes on your tabletop.
- 3 Aligning the three Stacker dowel pin holes with the dowel pins on your tabletop, place the Labware Stacker on the tabletop, ensuring that all three dowel pins fit properly into each hole.
- 4 Install the four M6 flathead screws into each of the four screw holes. Ensure that the screws are completely screwed into the base.
- 5 Check that the Labware Stacker is firmly mounted to your tabletop.

Related information

For information about...	See...
Laboratory requirements	“Laboratory requirements” on page 18
Installing the Labware Stacker	“Installation workflow” on page 18
Connecting the Labware Stacker	“Connecting the device” on page 25

Connecting the device

Before you start

- Make sure the laboratory setup requirements have been met. See “Laboratory requirements” on page 18.
- Ensure that the computer and Labware Stacker are turned off.
- Make sure you have the supplied Ethernet cable, power cord, and air connection kit, including tubing and fittings.

Connecting the air line



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 Labware Stacker air valves and can eventually cause a malfunction. Ensure that the air supply is properly filtered for moisture and aerosol impurities.

CAUTION Air pressure greater than 0.83 MPa (120 psi) can result in equipment damage. Ensure that the air flow rate and pressure meet the specified requirements.

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

To install the compressed air line:

- 1 Turn off the air supply before connecting the air tubing to the Labware Stacker.
- 2 Cut the supplied 0.125-inch tubing to the required length.
- 3 Connect one end of the tubing to the air source.
If your air line uses a threaded port, attach the 0.125-in NPT fitting to the port.
- 4 Plug the other end of the 0.125-inch tubing into the one-touch air-supply port on the Labware Stacker.
- 5 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.
- 6 Turn on the air.

The grip pressure is internally regulated to 0.28 MPa (40 psi), although it may be changed for particular microplate types. For details, see “Adjusting the grip pressure” on page 59.

Connecting the power cord

To connect the power cord to the Labware Stacker:

- 1 On the Labware Stacker, 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 Labware Stacker.
- 3 Connect the other end of the power cord to an AC outlet with a grounded circuit.

Connecting the device to the computer



WARNING Connecting the Labware Stacker to a company or general network can potentially cause injury. Remote computer operators might accidentally initiate an operation that causes the device to move unexpectedly, possibly injuring nearby lab personnel. Avoid connecting the device to a company or general network. Ensure that anyone with access to the device is trained in the potential hazards and how to avoid them.

Typically, you use an Ethernet switch to connect the Labware Stacker to a local area network (LAN) that has other devices on it.

To connect through an Ethernet switch:

Note: If you are adding the Labware Stacker to an existing LAN, [step 1](#) should already be done.

- 1 Connect the switch to the computer as follows:
 - a Connect the power cord to the switch.
 - b Connect one end of the Ethernet cable into any Ethernet port on the switch, and connect the other end of the cable to an Ethernet port on the computer.
- 2 Connect the Labware Stacker to the switch as follows:
 - a Connect one end of a second Ethernet cable to a port on the Ethernet switch.
 - b Connect the other end of the cable to the Ethernet port on the Labware Stacker.

IMPORTANT Do not use a crossover cable with an Ethernet switch. The switch performs the crossover function.

Note: You can connect as many devices to the network as there are Ethernet ports available.

About configuring the computer's network card

If you are adding the Labware Stacker to an existing LAN, the network card should already be configured.

Make sure the value of the network card IP address and subnet mask are as follows:

- IP address: 192.168.0.1
- Subnet mask: 255.255.255.0

Related information

For information about...	See...
Installing the VWorks software	<i>VWorks Automation Control Setup Guide</i>
Integrating the Stacker ActiveX control	<i>Stacker ActiveX User Guide</i>
How to confirm that the computer is communicating with the Labware Stacker	“Initializing the Labware Stacker” on page 41
Laboratory requirements	“Laboratory requirements” on page 18
Installing the Labware Stacker	“Installation workflow” on page 18
Loading a labware rack	“Loading and releasing a rack” on page 46

3 Installing the Labware Stacker

Connecting the device



4 Setting up the device

This chapter contains the following topics:

- “Setup workflow” on page 30
- “Starting up and shutting down” on page 31
- “Creating and editing VWorks device files” on page 32
- “Opening diagnostics software” on page 36
- “Creating and editing profiles” on page 38
- “Initializing the Labware Stacker” on page 41
- “Filling or emptying a rack with labware” on page 43
- “Loading and releasing a rack” on page 46

Setup workflow

Perform the following procedures in the order listed to set up the Labware Stacker.

Step	Procedure	See...
1	Turn on the Labware Stacker.	“Starting up and shutting down” on page 31
2	<i>VWorks software only.</i> In the VWorks software, add the Stacker device to a device file.	“Creating and editing VWorks device files” on page 32
3	<i>VWorks software only.</i> Open the Labware Editor, and edit the labware definitions to include the Stacker parameters.	VWorks Automation Control Setup Guide
4	Open Labware Stacker Diagnostics and create a profile.	<ul style="list-style-type: none">• “Opening diagnostics software” on page 36• “Creating and editing profiles” on page 38
5	Initialize the Stacker profile.	“Initializing the Labware Stacker” on page 41
6	Loading a labware rack.	<ul style="list-style-type: none">• “Filling or emptying a rack with labware” on page 43• “Loading and releasing a rack” on page 46
7	Configure the Labware Stacker and the labware.	“Configuring the device and labware” on page 51
8	Set the external robot teachpoint for picking and placing labware on the plate stage.	User documentation for the external robot

Starting up and shutting down

Starting up the Labware Stacker

To start up the Labware Stacker:

- 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 At the Labware Stacker, press the power switch to the on (I) position.
- 4 Start the automation control software, for example, the VWorks software.
- 5 *VWorks software only.* Ensure that VWorks simulation is off.
- 6 Initialize the device.

For details, see [“Initializing the Labware Stacker” on page 41](#).

If you have not yet created a device file or configured the device profile for your setup, see [“Creating and editing profiles” on page 38](#).

Shutting down the Labware Stacker

To shut down the Labware Stacker:

- 1 Close the Labware Stacker Diagnostics dialog box, if applicable.
- 2 Exit the automation control software.
VWorks software only. In the VWorks window, select the Stacker device in the device tab, and then click **Close selected device**.
- 3 Shutdown the computer.
- 4 On the back of the Stacker, press the power switch to the off position (O).
- 5 Turn off the air supply to the Labware Stacker.

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Creating profiles	“Creating and editing profiles” on page 38
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46

Creating and editing VWorks 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 VWorks device file that you want to use, proceed to the following:

- [“Adding a Labware Stacker to the device file” on page 33](#)
- [“Setting the Labware Stacker device properties” on page 34](#)

If you are using the Stacker ActiveX control to integrate with third-party automation control software, you can skip this topic.

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.

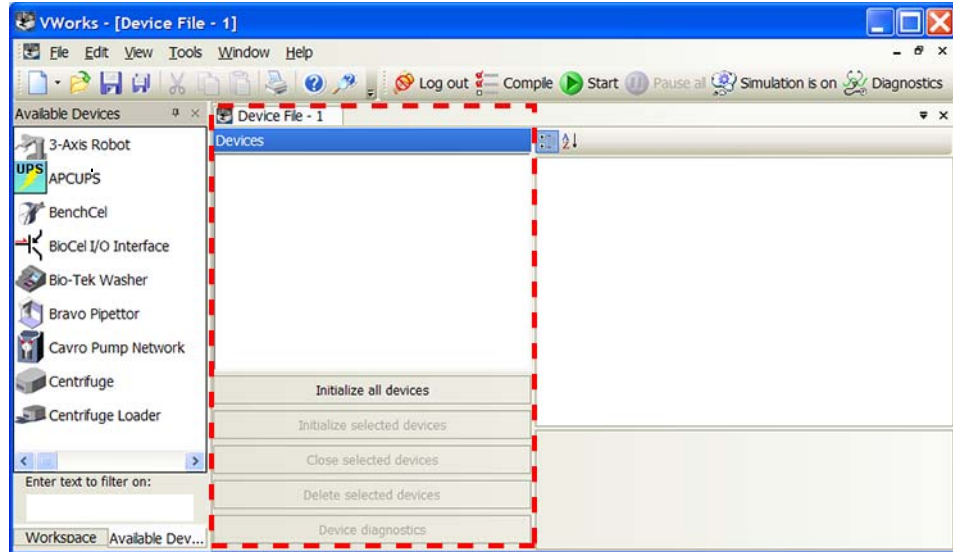
For detailed information about device files and associations with profiles, teachpoint files, and other VWorks components, see the [VWorks Automation Control User Guide](#).

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.

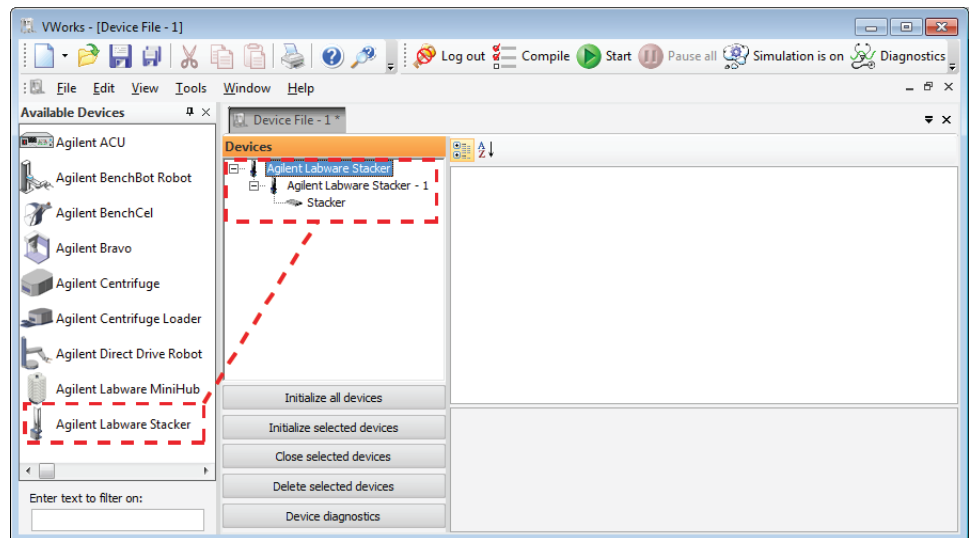


- 2 Select **File > Save** to save the device file. The file name appears in the Device File tab.

Adding a Labware Stacker to the device file

To add the Labware Stacker to the device file:

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



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

Note: If you do not see the Labware Stacker in the Available Devices list, check that the plugin file (.dll) is stored in the following folder:

C:\Program Files (x86)\Agilent Technologies\VWorks\Plugins

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

Setting the Labware Stacker device properties

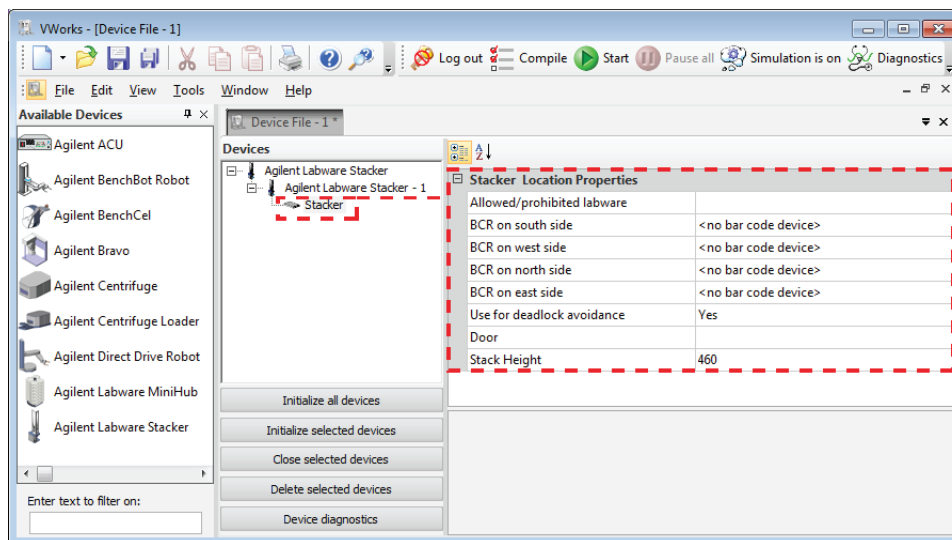
To set the Labware Stacker properties:

- 1 In the **Labware Stacker Properties** area of the device file, type or select the following:

Property	Description
Name	The name of the Labware Stacker.
Profile	The profile associated with the Labware Stacker 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 38 , and then return to this step to select the profile.
Disable	The option to disable this device. Ensure that the check box is clear if you want to enable this device.

IMPORTANT Without the profile, you will not be able to establish communication with the device.

- 2 In the **Devices** area, expand **Labware Stacker**, and then select **Stacker**.
- 3 In the **Stacker 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 .

Parameter	Description
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.
Door	Not applicable
Stack Height	Type the maximum height (mm) of the rack you are using. For example, type 660 if you are using a 660-mm tall rack.

- 4 Select **File > Save** to save the device file.

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Creating profiles	“Creating and editing profiles” on page 38
Using the VWorks software	VWorks Automation Control User Guide

Opening diagnostics software

About this topic

The Labware Stacker Diagnostics software enables you to create device profiles and control the motions of the Labware Stacker. The way you access Diagnostics depends on the automation control software that you are using:

- “Opening Diagnostics from the VWorks software” on page 36
- “Opening Diagnostics from third-party software” on page 37

Opening Diagnostics from the VWorks software

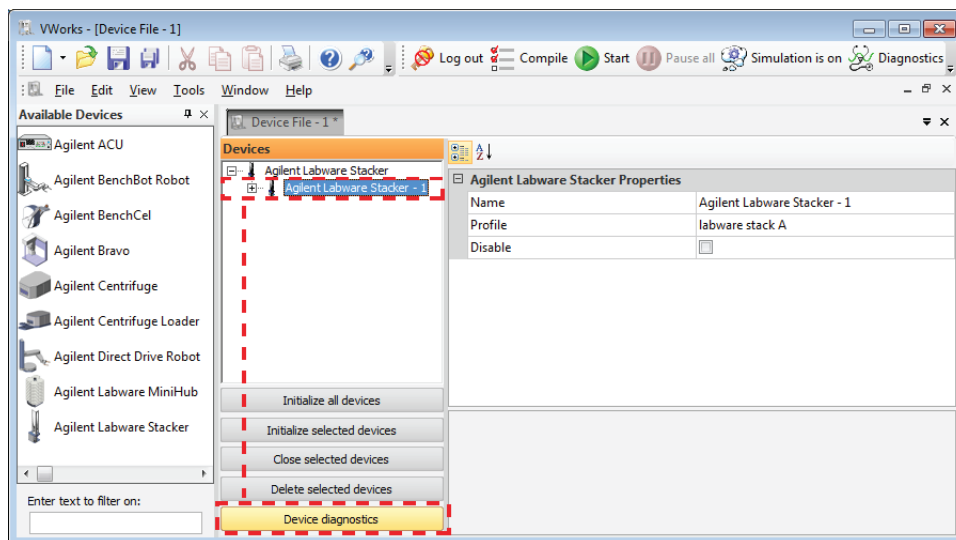
To open Labware Stacker Diagnostics:

- 1 In the **VWorks** window, ensure that the device file for your Labware Stacker is open.

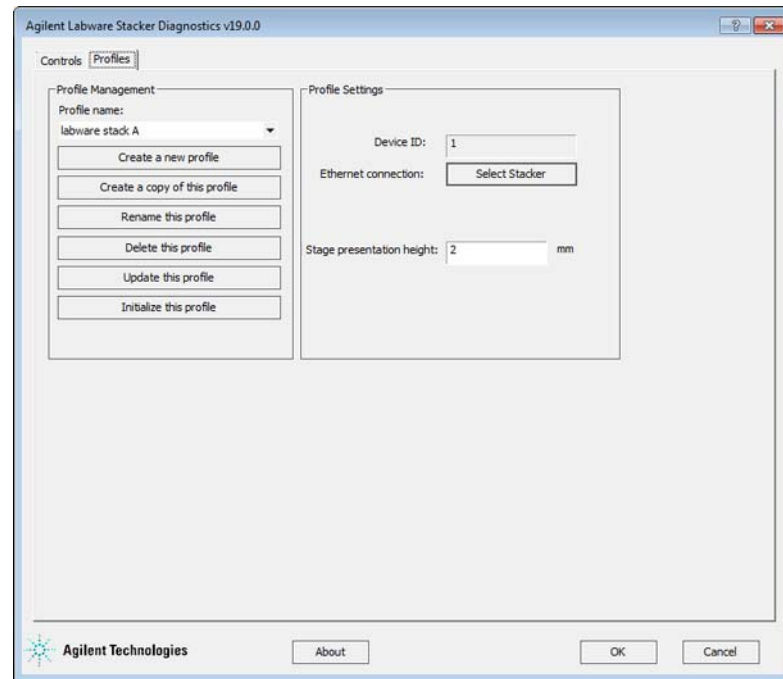
To open the device file, choose **File > Open**. In the **Open** dialog box, select the ***.dev** file type, navigate to the device file, and then click **Open**.

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

- 2 Select the Labware Stacker device, and then click **Device diagnostics**.



The Labware Stacker Diagnostics dialog box opens.



Opening Diagnostics from third-party software

If you are using a different automation software, call the ShowDiagsDialog method to open Labware Stacker Diagnostics. For a description of the ActiveX methods, properties and events, see the *Stacker ActiveX User Guide*.

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Creating profiles	“Creating and editing profiles” on page 38
Using the VWorks software	<i>VWorks Automation Control User Guide</i>
ActiveX controls	<i>Stacker ActiveX Version 18 User Guide</i>
Labware Stacker Diagnostics reference	“Quick reference” on page 89

Creating and editing profiles

About profiles

A profile is a collection of settings that manages how you connect to a device. The Labware Stacker profile specifies the following.

- Ethernet connection used to establish communication between the Labware Stacker and the controlling computer.
- The presentation height of the plate stage.

You use the Labware Stacker Diagnostics software to create and manage the Labware Stacker profiles.

Note: If you are using the VWorks software, be aware that each device in the device file requires a unique profile.

Workflow

Use the following workflow for the Labware Stacker:

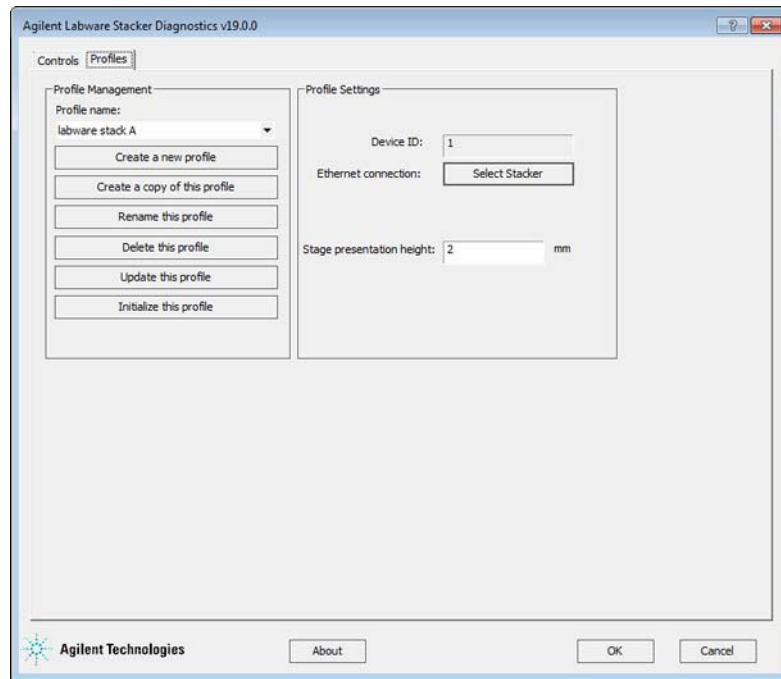
Step	Task	See...
1	If you have not done so already, open Labware Stacker Diagnostics.	“Opening diagnostics software” on page 36
2	Create the Labware Stacker profile.	“Creating a Labware Stacker profile” on page 38
3	Initialize the profile to verify that you can establish communication with the Labware Stacker.	“Initializing the profile in Labware Stacker Diagnostics” on page 41

Creating a Labware Stacker profile

To create a Labware Stacker profile:

- 1 In the **Profiles** tab of Labware Stacker Diagnostics, click **Create a new profile**.

Figure Labware Stacker Diagnostics Profiles tab



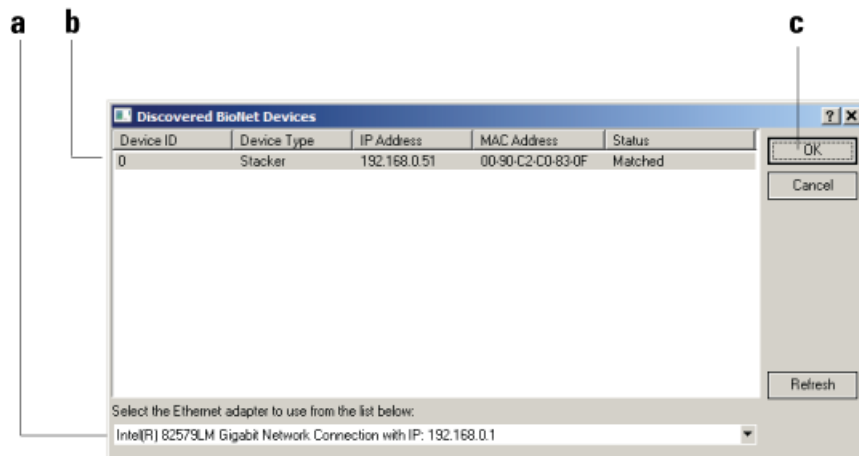
- 2 In the **Create Profile** dialog box that opens, type a profile name, and then click **OK**.

If you have multiple Labware Stackers in a system, ensure that you assign a profile name that enables you to identify each device's profile.

- 3 Next to **Ethernet connection**, click **Select Stacker**.

In the **Discovered BioNet Devices** dialog box that appears:

- a Click the **Select the Ethernet adapter to use from the list below**, and select the correct adapter for the device connection.
- b In the list of devices that appear, select the Stacker device. To successfully communicate with the Stacker device, the **Status** column must display **New** or **Matched**.
- c Click **OK**.



4 Setting up the device

Creating and editing profiles

- 4 Use the default value for the **Stage presentation height** setting.
If necessary, you can change this position after you establish communication with the device.
- 5 To save the profile settings, click **Update this profile**.
- 6 Verify that you can establish communication as follows:
 - a Click **Initialize this profile**.
 - b Ensure that the Labware Stacker initializes.

Editing and managing profiles

Editing profiles

To edit a profile:

- 1 In the **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 **Profiles** tab, you can select an existing profile, and then rename, copy, or delete the profile.

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Configuring the Labware Stacker	“Configuring the device and labware” on page 51
Using the VWorks software	VWorks Automation Control User Guide
ActiveX controls	Stacker ActiveX Version 18 User Guide
Labware Stacker Diagnostics reference	“Quick reference” on page 89

Initializing the Labware Stacker

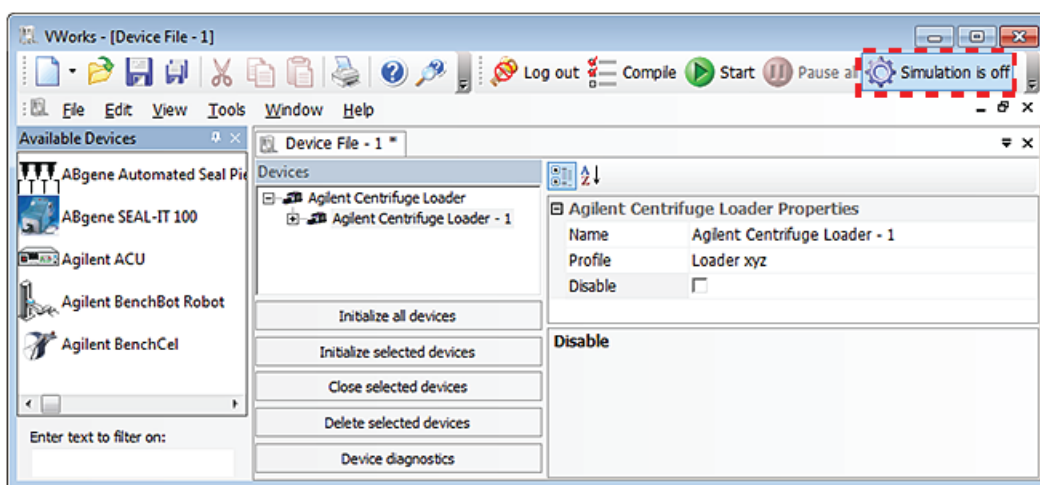
About this topic

To establish communication between the computer and the Labware Stacker, you initialize the device in one of the following ways:

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

Before you start

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



WARNING The Labware Stacker plate stage moves up and down during initialization. To prevent potential injury, keep away from the Labware Stacker while it is in motion.

Initializing the profile in Labware Stacker Diagnostics

To initialize a profile in Labware Stacker Diagnostics:

- 1 Open the **Labware Stacker 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**.

Initializing the Labware Stacker in the VWorks software

To initialize the Labware Stacker from the VWorks 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 **Labware Stacker** device.
- 3 In the **Labware Stacker Properties** area, make sure the correct profile is selected.
- 4 Click **Initialize selected devices**.

Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Creating profiles	“Creating and editing profiles” on page 38
Configuring the Labware Stacker	“Configuring the device and labware” on page 51
Using the VWorks software	VWorks Automation Control User Guide
ActiveX controls	Stacker ActiveX Version 18 User Guide
Labware Stacker Diagnostics reference	“Quick reference” on page 89

Filling or emptying a rack with labware

Before you start

The labware rack stores the stack of labware (microplates, tip boxes, and tube racks) that are processed during a protocol run.



WARNING Make sure you understand how to handle the racks safely. See “[Sharp edges and pinch hazards](#)” on page 5.

IMPORTANT Ensure that you position the rack so that the opening is facing you. Determine how the microplates should be oriented in the rack.

The procedure can vary depending on the rack model:

- *Standard or top-load racks.* Place the rack on a flat, level surface. Although it is possible to fill or empty a mounted rack, the top of a mounted rack can be difficult to access safely.
- *Front-load racks.* The rack can be mounted on the Labware Stacker or placed on a flat, level surface.

Filling the standard and top-load racks



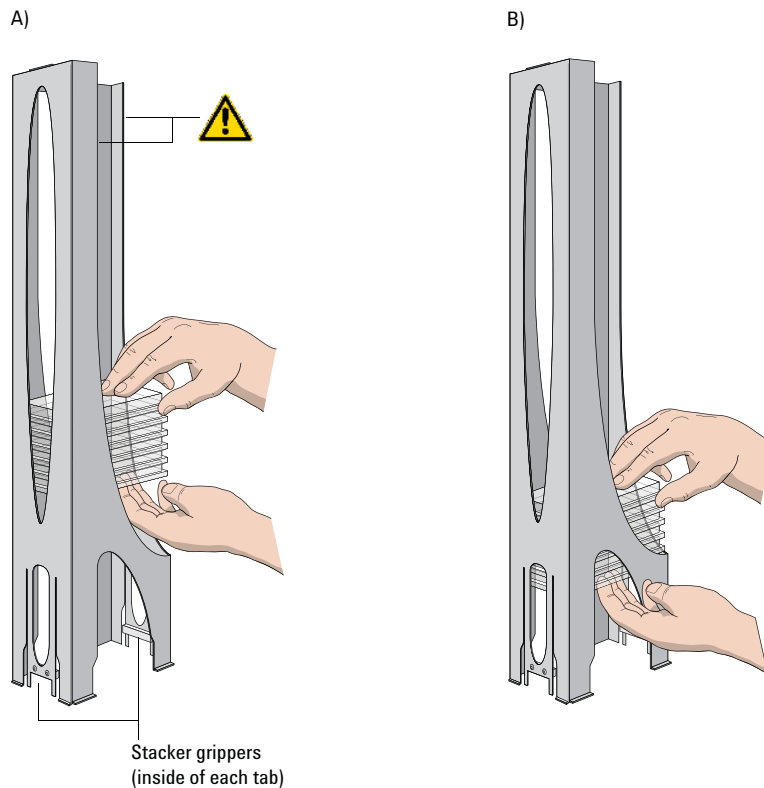
WARNING Use care to avoid sliding your hand on the interior edges in the rack. The edges can have sharp surfaces.

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

4 Setting up the device

Filling or emptying a rack with labware

Figure Filling a standard rack: A) Sliding the stack down through the top, B) Supporting the stack through the bottom slot



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

- 1 Place the rack on a flat, level surface.
- 2 Using both hands, carefully slide a small stack of labware down through the top of the rack.
You can use one hand to support underneath the labware stack, while the other hand holds the top of the labware to keep it level. See figure.
- 3 *Standard racks only.* When you reach the bottom of the open slot, transfer your hand positions so that you continue supporting the labware through the bottom slot.
- 4 Ensure that the bottom labware in the stack rests on the rack stacker grippers.

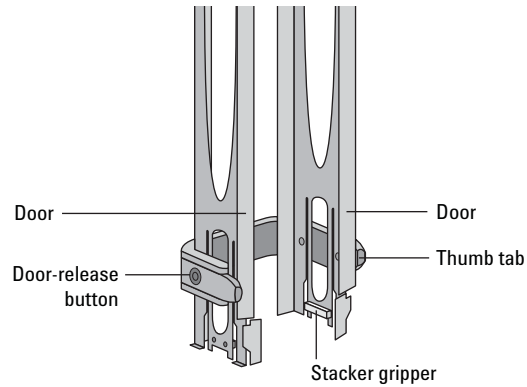
To remove labware from a standard or top-load rack:

- 1 If possible, remove the rack from the device, and place the rack on a flat, level surface.
- 2 Carefully slide the labware in small stacks, up and out of the top of the rack.

Filling a front-load rack

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

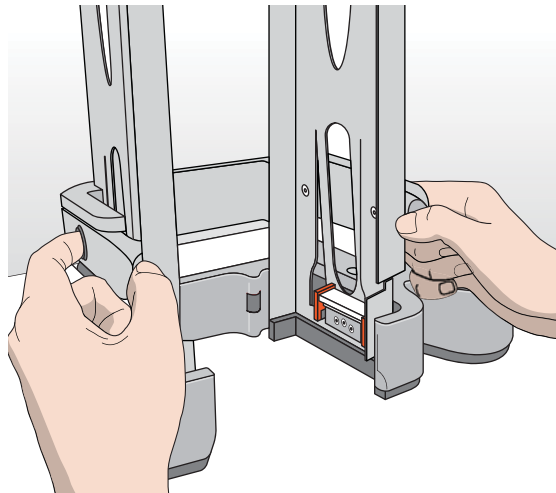
Figure Door mechanism on the front-load rack



To place labware into a front-load rack:

- 1 If the rack is mounted on the Stacker device, verify that the stack is in the unloaded state.
- 2 On each side of the rack, slide the Door-release (black) buttons forward, while pushing outward on the thumb tabs. The rack doors open.

Figure Opening the front-load rack



- 3 Place the labware directly through the open rack doors so that the bottom labware rests on the rack stacker grippers. Ensure the labware is level in the rack.
- 4 To close the doors, press the thumb tabs inward until the doors snap shut.

To remove labware from a front-load rack:

- 1 If the rack is mounted on the Stacker device, verify that the stack is in the unloaded state.
- 2 To open the rack doors, slide the black Door-release buttons forward on each side of the rack, while pressing outward on the thumb tabs.
- 3 Carefully, lift the labware out through the front of the rack.

Related information

For information about...	See...
Laboratory requirements	“Laboratory requirements” on page 18
Installing the Labware Stacker	“Installation workflow” on page 18
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Safety guidelines	“Safety guidelines” on page 1

Loading and releasing a rack

Before you start

The labware rack stores the stack of labware (microplates, tip boxes, and tube racks) that are processed during a protocol run.



WARNING Make sure you understand how to handle the racks safely. See “Sharp edges and pinch hazards” on page 5.

CAUTION Mounting a labware rack on the Labware Stacker before turning on the air supply can result in potential equipment damage. Ensure that the air supply is on and the Stacker shelves are extended before attempting to mount a rack on the Labware Stacker.

CAUTION To prevent potential equipment damage, ensure that you remove the rack from the Stacker before attempting to move the Labware Stacker.

When you stack microplates into a rack, the bottom microplate sits on the rack’s stacker grippers. When you mount a rack on the Labware Stacker, the bottom microplate remains resting on the rack’s stacker grippers.

When you *load the stack*, the bottom microplate moves down and is held on the sides by the stacker grippers.

When you *release the stack*, the grippers release the microplate and the plate stage moves the bottom microplate up so that it sits on top of the stacker grippers. You can remove the rack only when the stack is released.

Note: The Labware Stacker will not operate until the stack is loaded.

Mounting a rack and loading the stack

To mount a rack and load the stack:

- 1 Lower the rack onto the Stacker, positioning the rack so that the rectangular tabs are seated in the shelf slots of the Stacker.

Note: The rack can be oriented with the open corner at the front or back.

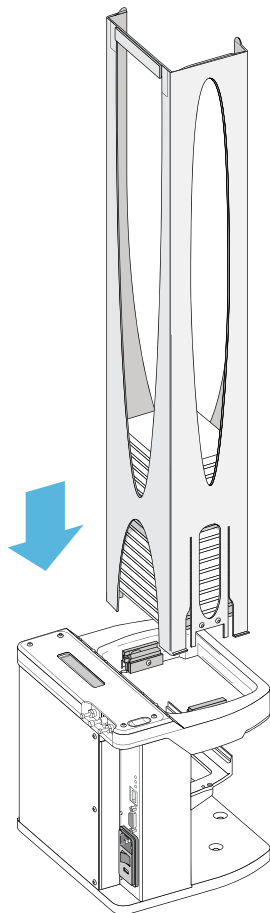
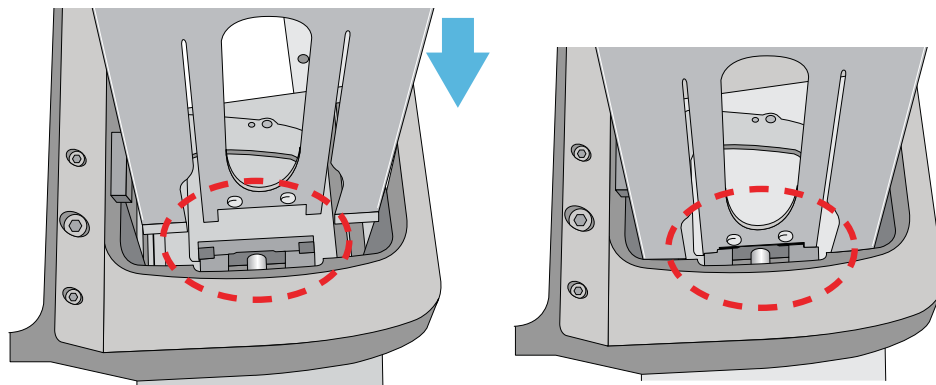


Figure Detail of rack tab above Stacker shelf slots and seated in slots



Ensure that the rack sits level on the Stacker shelf.

4 Setting up the device

Loading and releasing a rack

Note: The mounted rack sits on four small, round bumpers that keep it level, one is located on either side of each shelf. If a bumper is damaged or missing, contact Agilent Automation Solutions Technical Support.

- 2 To load the stack, do one of the following:
 - Press the load/release button on top of the Stacker device.
 - In **Labware Stacker Diagnostics**, click the **Control** tab, and then click **Load stack**.

Figure Load/release button on the Stacker device

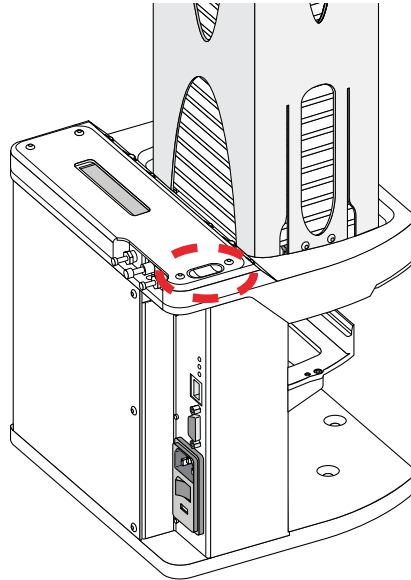
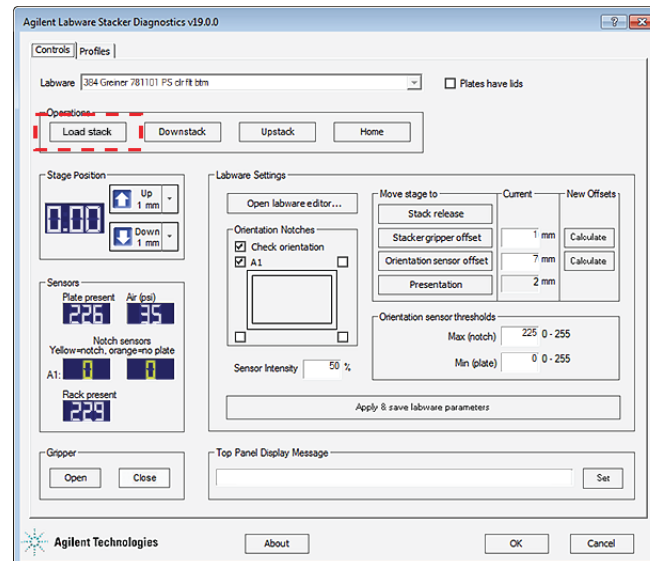


Figure Load stack/Release stack button in the Control tab



Releasing the stack

To release the stack:

- 1 Do one of the following:
 - Press the load/release button on the top of the Stacker device.
 - In the **Labware Stacker Diagnostics** dialog box, click the **Control** tab, and then click **Release stack**.
- 2 Lift the rack up and off the Labware Stacker.

Related information

For information about...	See...
Laboratory requirements	“Laboratory requirements” on page 18
Installing the Labware Stacker	“Installation workflow” on page 18
Filling a rack with labware	“Filling or emptying a rack with labware” on page 43
Safety guidelines	“Safety guidelines” on page 1
Labware Stacker Diagnostics	<ul style="list-style-type: none">• “Opening diagnostics software” on page 36• “Quick reference” on page 89

4 Setting up the device

Loading and releasing a rack



5 Configuring the device and labware

This chapter describes how to configure the Labware Stacker using Labware Stacker Diagnostics.

The topics are:

- “Configuration workflow” on page 52
- “Selecting the labware in diagnostics” on page 53
- “Placing a microplate on the plate stage manually” on page 57
- “Testing a microplate in the Labware Stacker” on page 58
- “Adjusting the grip pressure” on page 59
- “Adjusting the labware-specific gripper offset” on page 61
- “Setting up microplate orientation checking” on page 64
- “Changing the text in the top-panel display” on page 75
- “Changing the Presentation teachpoint” on page 77

For a description of the controls and settings in Labware Stacker Diagnostics, see “Quick reference” on page 89.

Configuration workflow

Verifying your labware in the Labware Stacker

If your lab automation system is already set up and you only need to check that a particular labware works with a particular Labware Stacker, perform the following procedures.

Step	For this task...	See...
1	Verify that your labware is defined for the Labware Stacker.	“Selecting the labware in diagnostics” on page 53
2	Test your labware in the Labware Stacker.	“Testing a microplate in the Labware Stacker” on page 58

Configuring a newly installed Labware Stacker

If this is a new installation, use the following workflow to completely configure the Labware Stacker.

Step	For this task...	See...
1	Verify that your labware is defined for the Labware Stacker.	“Selecting the labware in diagnostics” on page 53
2	Test your labware in the Labware Stacker.	“Testing a microplate in the Labware Stacker” on page 58
3	Adjust the grip pressure	“Adjusting the grip pressure” on page 59
4	Adjust the labware-specific gripper offset	“Adjusting the labware-specific gripper offset” on page 61
5	Configure the microplate orientation checking option	“Setting up microplate orientation checking” on page 64
6	Display a message on the Stacker top panel.	“Changing the text in the top-panel display” on page 75
7	Adjust the Presentation teachpoint, if necessary.	“Changing the Presentation teachpoint” on page 77
8	Test your labware in the Labware Stacker.	“Testing a microplate in the Labware Stacker” on page 58

Selecting the labware in diagnostics

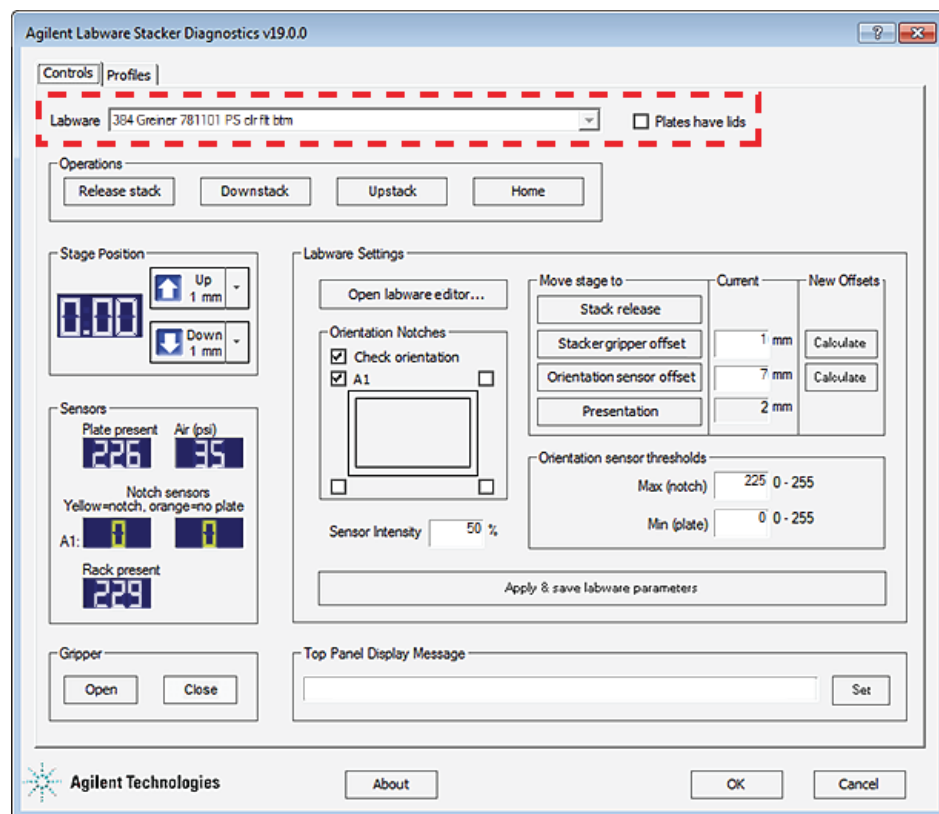
For the Labware Stacker to handle a microplate properly during diagnostics operations, you must select the type of microplate that you intend to use from the Labware list. The Labware list includes only the labware for which a labware definition has been created. If your labware is not in the list, see “Adding a labware to the list” on page 54.

The following procedures assume that Labware Stacker Diagnostics is open. For instructions, see “Opening diagnostics software” on page 36.

Selecting the labware

To select the labware type:

In the **Labware** list, select the labware type.



The **Plates have lids** check box is cleared and unavailable if no lid is specified in the labware definition. (In the Labware Editor, the Can have lid check box is cleared in the Plate properties tab.) Likewise, the **Plates have lids** check box is selected if the labware definition specifies that the plate properties include a lid.

Adding a labware to the list

You use the VWorks Labware Editor to create and manage labware definitions.

To open the Labware Editor:

- 1 In the **Controls** tab, click **Open labware editor**. The Labware Editor window opens.

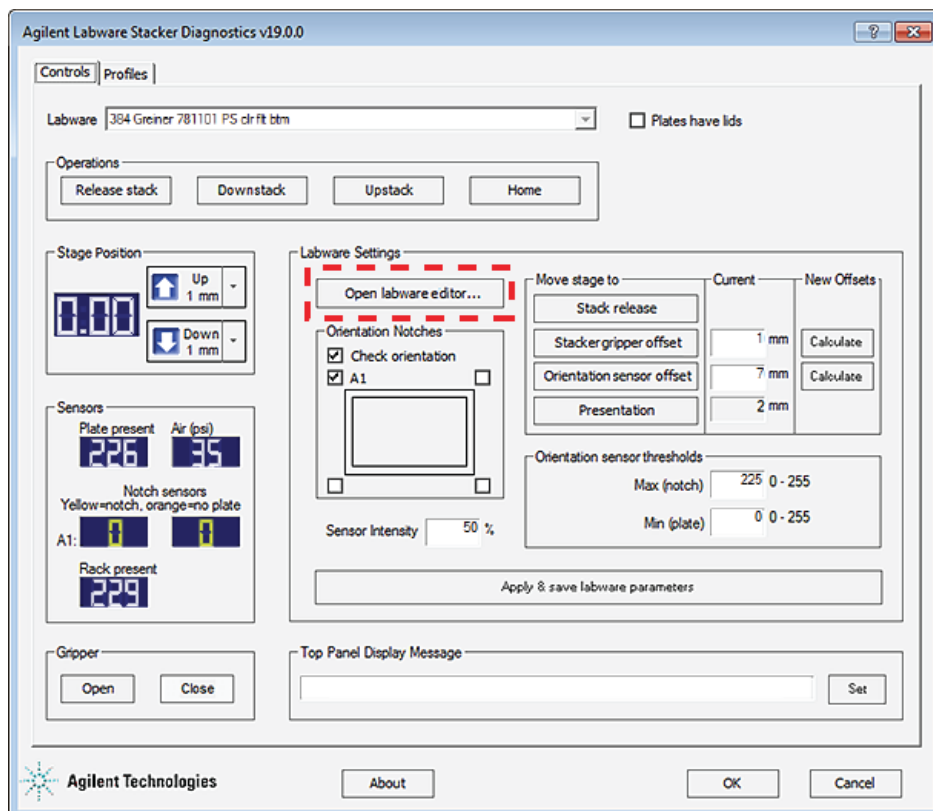
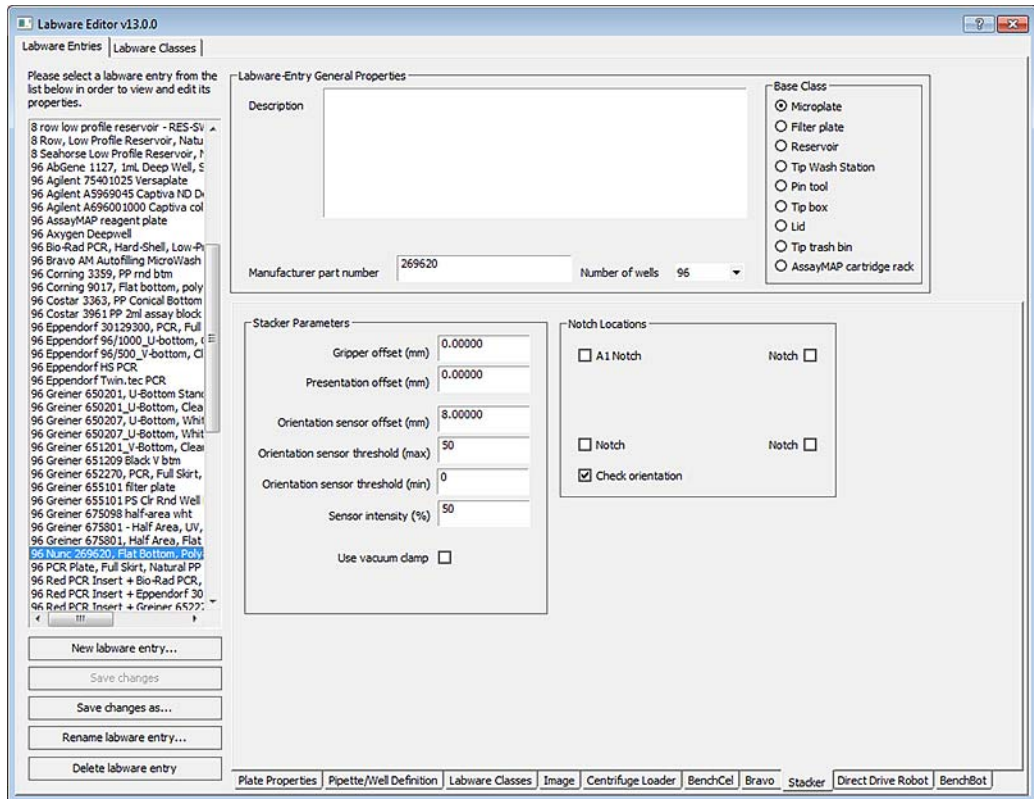


Figure Stacker tab in the Labware Editor window



2 Ensure that the labware definitions for the Labware Stacker define the following:

a Plate properties. The physical properties of the labware, such as width, length, and number of wells.

You adjust these properties in the Plate properties tab of the Labware Editor. For instructions on how to use the Labware Editor, see the [VWorks Automation Control Setup Guide](#).

b Stacker properties. The properties specific to the Labware Stacker, such as Gripper offset, Orientation sensor offset, Orientation sensor thresholds, Sensor intensity, and notch locations.

You can adjust the Stacker properties of the labware in either of the following:

- Labware Editor–Stacker tab
- Labware Stacker Diagnostics–Control tab

Note: If you edit properties in the Labware Editor, you can re-initialize the Labware Stacker profile to display the new values in Labware Stacker Diagnostics.

Related information

For more information about...

Opening Labware Stacker Diagnostics

See...

“Opening diagnostics software” on page 36

5 Configuring the device and labware

Selecting the labware in diagnostics

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Workflow for configuring the Labware Stacker	“Configuration workflow” on page 52
Labware Editor	<i>VWorks Automation Control Setup Guide</i>
Labware Stacker Diagnostics reference	“Quick reference” on page 89

Placing a microplate on the plate stage manually

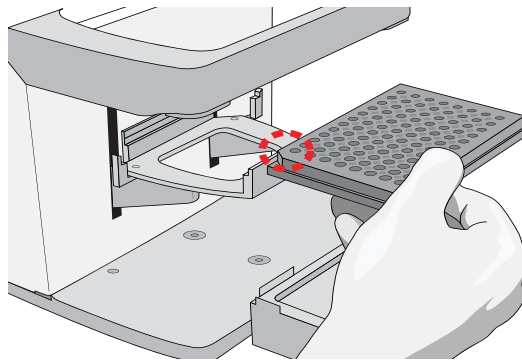
About this topic

When you are first configuring the Labware Stacker, you need to manually place the labware on the plate stage.

Procedure

To place a microplate on the plate stage:

Place the microplate on the plate stage so that the A1 well is at the back left as viewed by a plate-handling robot.



Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Testing microplates in the Labware Stacker	“Testing a microplate in the Labware Stacker” on page 58

Testing a microplate in the Labware Stacker

About this topic

Use the following procedure to ensure that the labware you want to use is handled correctly by the Labware Stacker.

Procedure

To test a microplate in the Labware Stacker:

- 1 In **Labware Stacker Diagnostics**, click the **Control** tab.
- 2 In the **Labware** list, select the microplate type that you are testing.
- 3 Load a labware rack filled with the selected microplates. For details, see [“Loading and releasing a rack” on page 46](#).
- 4 Verify that the microplate downstacks properly:
 - a In the **Control** tab, click **Downstack**, and observe the microplate as it moves from the rack onto the plate stage.
 - b Remove the microplate from the plate stage and set it aside.
 - c Repeat this step as desired to verify the downstacking.
- 5 Verify that the microplate upstacks properly:
 - a Place a microplate on the plate stage.
 - b In the **Control** tab, click **Upstack**, and observe the microplate as it moves from the plate stage into the labware rack.

What to do if errors occur

If you receive errors while testing the microplate handling:

- Check the parameter settings for the labware definition. See [“Adding a labware to the list” on page 54](#).
- Modify the grip pressure, if appropriate. See [“Adjusting the grip pressure” on page 59](#).

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Troubleshooting errors	“Troubleshooting error messages” on page 84

Adjusting the grip pressure

About the grip pressure

The Stacker air pressure regulator determines the force with which the Labware Stacker grips labware, also known as the grip pressure. The grip pressure is internally regulated to 0.28 MPa (40 psi), although it may be changed for particular microplate types.

When to adjust the grip pressure

The grip pressure might require adjustment to ensure that the grippers can grip light, flexible, or heavy microplates with the proper force:

- Light or flimsy microplates might distort when held with the default grip pressure of 0.24 MPa (35 psi).

In this case, lower the grip pressure.

CAUTION Setting the grip pressure less than 0.10 MPa (15 psi) can result in equipment damage. Ensure that you set the grip pressure greater than 0.10 MPa (15 psi).

- If the stack of microplates in the rack is heavy, the bottom microplate might fall out of the gripper. For example, the stack may include many microplates, or the microplates might be of a heavy material and contain a lot of liquid.

In this case, increase the grip pressure.

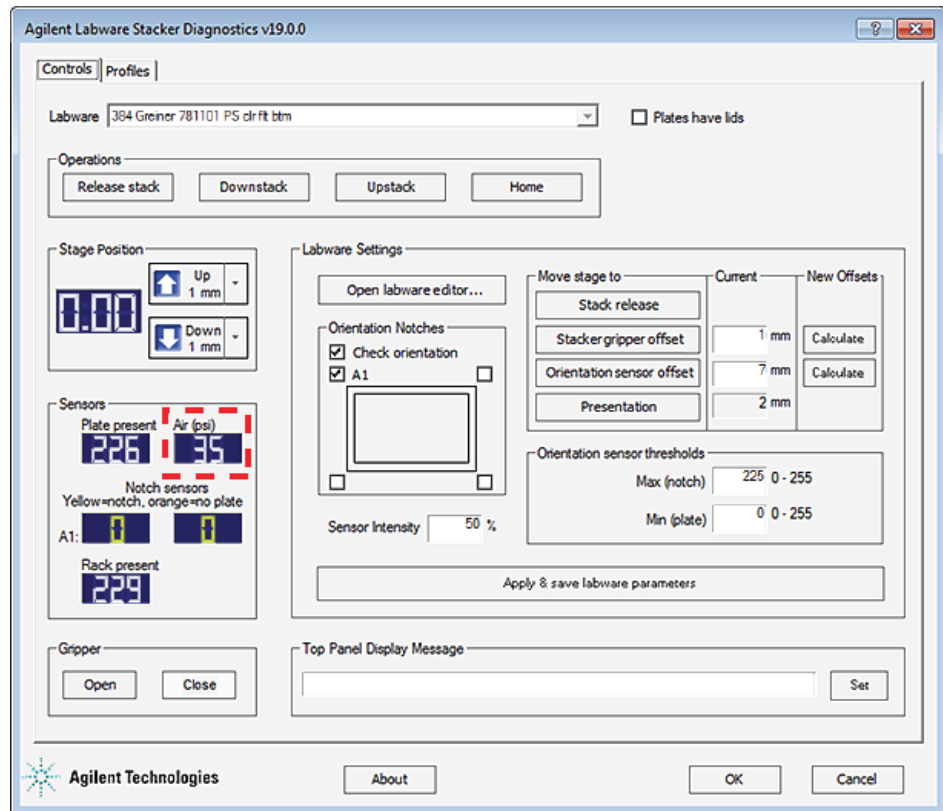
CAUTION To prevent potential equipment damage, ensure that the grip pressure does not exceed the maximum air pressure specified in “Compressed air requirements” on page 20.

Procedure

To adjust the grip pressure:

- 1 Initialize the device in Labware Stacker Diagnostics.
- 2 In the **Control** tab, make a note of the value in the **Air (psi)** display.

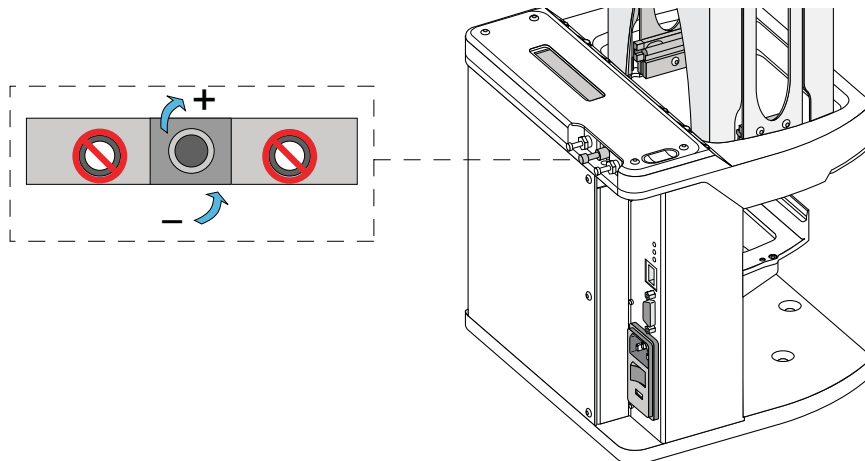
Figure Air (psi) display in the Controls tab



- 3 Locate the air-pressure regulator on the Labware Stacker. Using your fingers or a pair of needle-nose pliers, unscrew the locking ring by turning it counterclockwise.
- 4 Adjust the grip pressure by turning the regulator.
 - Clockwise to increase the pressure (+).
 - Counterclockwise to decrease the pressure (-).

IMPORTANT Do not turn the two air-flow controls to the left and right of the regulator.

Figure Air pressure regulator on the Labware Stacker



- 5 In the **Control** tab, use the **Gripper** controls to open and close the grippers three times to allow the pressure to adjust.
- 6 Lock the locking ring by turning it clockwise.

Related information

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Troubleshooting errors	“Troubleshooting error messages” on page 84

Adjusting the labware-specific gripper offset

About this topic

The Stacker gripper offset is specific to a given labware type. This property, which is part of the labware definition, specifies the distance below the standard Gripper teachpoint for the gripper to handle a given labware type.

You can adjust this value in the following locations:

- Labware Editor–Stacker tab
- Labware Stacker Diagnostics–Control tab

This topic describes how to adjust the gripper offset in the Labware Stacker Diagnostics–Control tab.

When to adjust the gripper offset

You can adjust the gripper offset if the Labware Stacker is not gripping a type of labware correctly.

Before you start

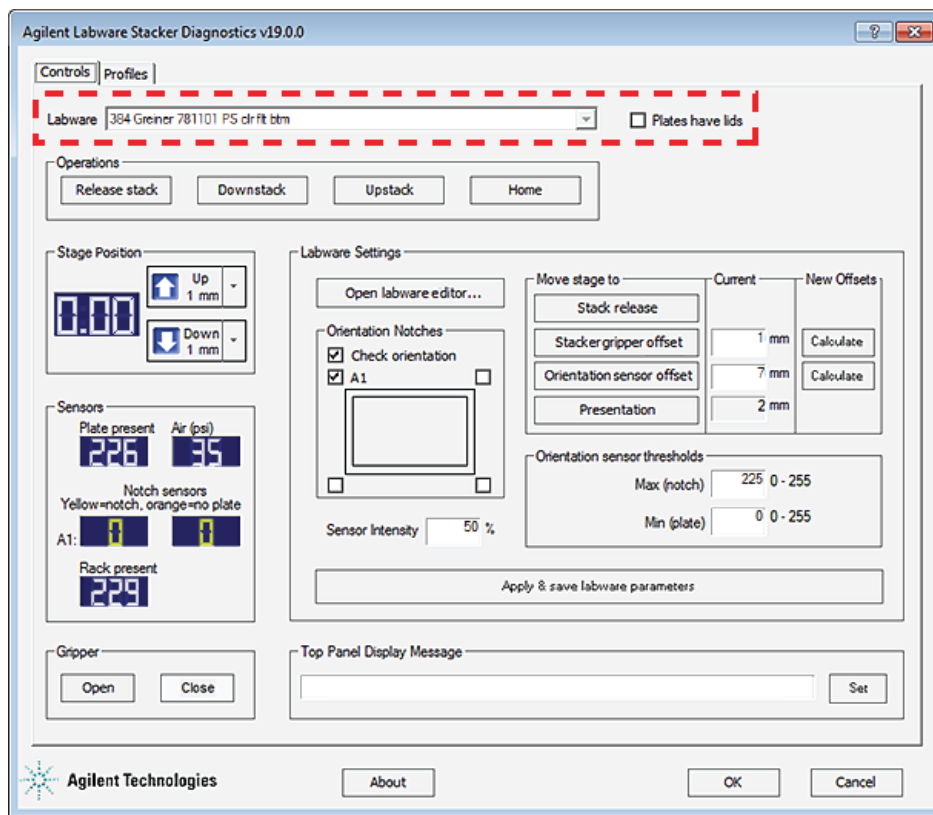
Ensure that you do the following.

Step	For this task...	See...
1	Fill the rack with at least two of the given labware type.	“Filling or emptying a rack with labware” on page 43
2	Load and lock the rack in place on the Labware Stacker.	“Loading and releasing a rack” on page 46
3	Ensure that Labware Stacker Diagnostics is open.	“Opening diagnostics software” on page 36
4	Verify a labware definition has been created for the labware type that you are using.	“Adding a labware to the list” on page 54

Procedure

To change the Stacker gripper offset value in a labware definition:

- 1 In **Labware Stacker Diagnostics**, click the **Control** tab.
- 2 Select the microplate type from the **Labware** list.



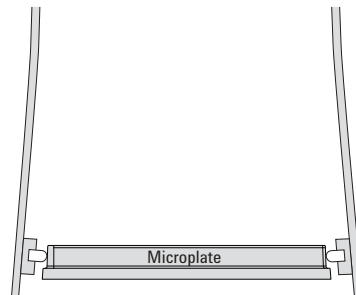
- 3 Under **Operations**, click **Load stack**, if necessary, to load the rack so that the bottom microplate is held by the stacker grippers.

- 4 Looking through the sides and the front of the rack, visually examine the position of the grippers holding the microplate.
 - If the grip position is good, do not change the Stacker gripper offset for this labware definition.

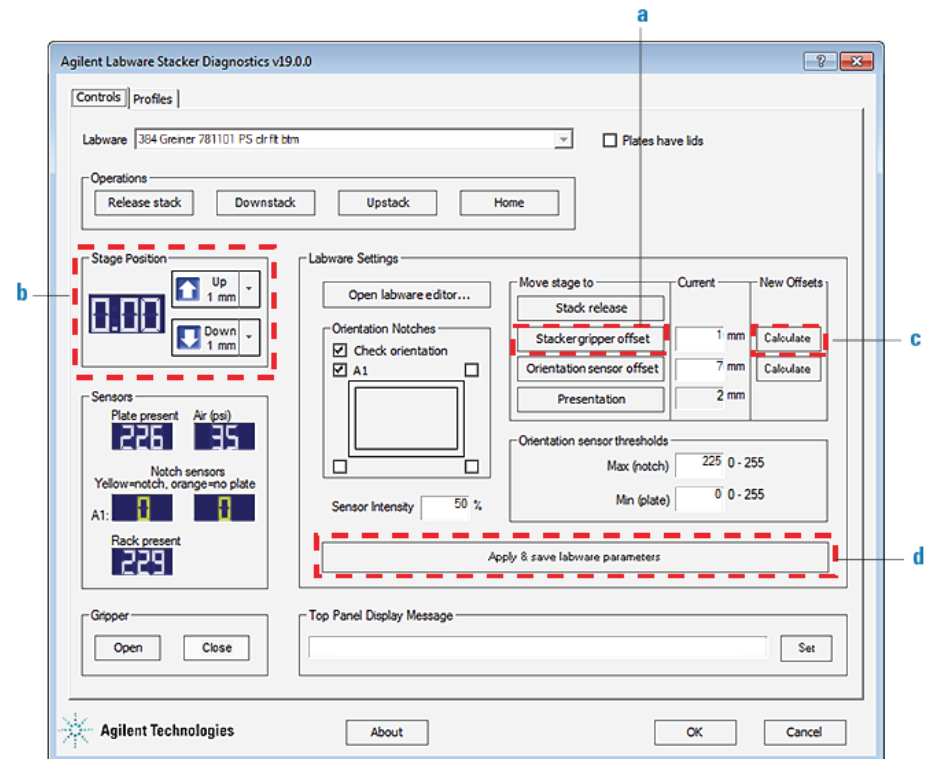
Ensure that the microplate is held level and is not tilted. Make sure the grippers are not gripping on edge of the microplate skirt.

 - If the grip position requires adjustment, continue to the next step.

Figure Labware rack closeup view showing microplate held by stacker grippers



- 5 Click **Downstack** to move the microplate out of the stacker grippers and onto the plate stage.
- 6 With the microplate resting on the plate stage, move the plate stage to the desired Stacker gripper offset as follows:



- a Under **Move stage to**, click **Stacker gripper offset**.
- b Use the **Up** or **Down** control in the **Stage Position** area to adjust the height of the plate stage.

- c Click **Calculate** next to **Stacker gripper offset** to change the value to the current location.
Note: A value greater than the original value will grip the microplate below the original grip point. A value lower than the original value will grip the microplate above the original grip point.
 - d Click **Apply & save labware parameters** to save the new value.
- 7 Repeat [step 3](#) to [step 6](#) until the grip position is correct.

Related information

For more information about...	See...
Troubleshooting errors	“Troubleshooting error messages” on page 84
Control tab reference	“Labware Stacker Diagnostics—Control tab” on page 92

Setting up microplate orientation checking

About the microplate orientation checking option

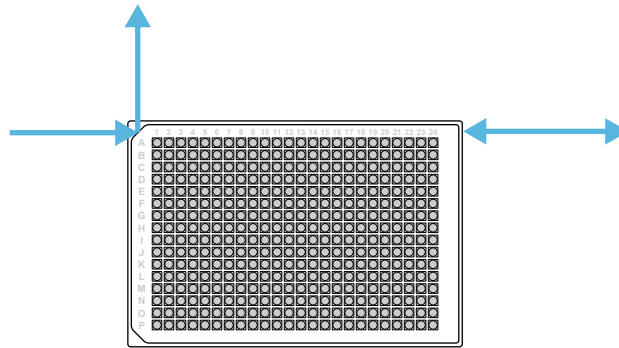
The Labware Stacker has two notch sensors that can detect the presence of a notch in the left or right far corners of a microplate (from the robot’s perspective) when a microplate is downstacked. Although the Labware Stacker has only two notch sensors, if a microplate with two notches is on the plate stage, and no notches are detected, an error message will tell you to rotate the microplate 180°.

Each notch sensor has an emitter that transmits light and a receiver that reads the amount of light reflected by the surface of the microplate. If the light beam bounces off a wall that is

- Perpendicular to the light path, most of the light will reflect back. The resulting reading will be relatively high.
- Not perpendicular to the light path (notched corner), the light will be deflected. The resulting reading will be significantly lower.

The following figure shows the emitted and reflected light path.

Figure Emitted and reflected light path on notch and microplate wall with no notch (top view)



Workflow to set up microplate orientation checking

The Labware Stacker uses the following labware properties to determine whether a notch is present in the corresponding corner of a microplate. You might need to adjust one or more of these settings to optimize the orientation checking accuracy for your microplate type.

- **Orientation notches.** The location of the notches on the microplate.
- **Orientation sensor offset.** The distance (mm) the plate stage will move below the standard Orientation sensor teachpoint to detect the microplate when the Check orientation option is enabled.
- **Sensor intensity.** The percentage of maximum sensor intensity for all sensors. If the sensor intensity is set too low, a microplate will not be detected even though one is present. If it is set too high, the sensors might become saturated and fail to detect the orientation of a microplate.
- **Orientation sensor thresholds**
 - **Max (notch).** Specifies the highest value that an orientation sensor can register when sensing a notch. Any sensor reading above this value indicates that a solid microplate wall is present. Any sensor value below this threshold indicates that either a notch, or no microplate is present.
 - **Min (plate).** Specifies the lowest value that a notch orientation sensor can register and still consider a notch to be present. A sensor reading below this threshold indicates that no microplate is on the plate stage.

IMPORTANT Ensure that the microplate you plan to use has notches only on one side of the microplate.

Refer to the following workflow and figure to set up orientation checking.

Step	Task	See...
1	Turn on orientation checking and specify the notch locations for your microplate.	“Turning on orientation checking” on page 67
2	Set the initial Orientation sensor offset for your microplate.	“Calculating the initial Orientation sensor offset” on page 68

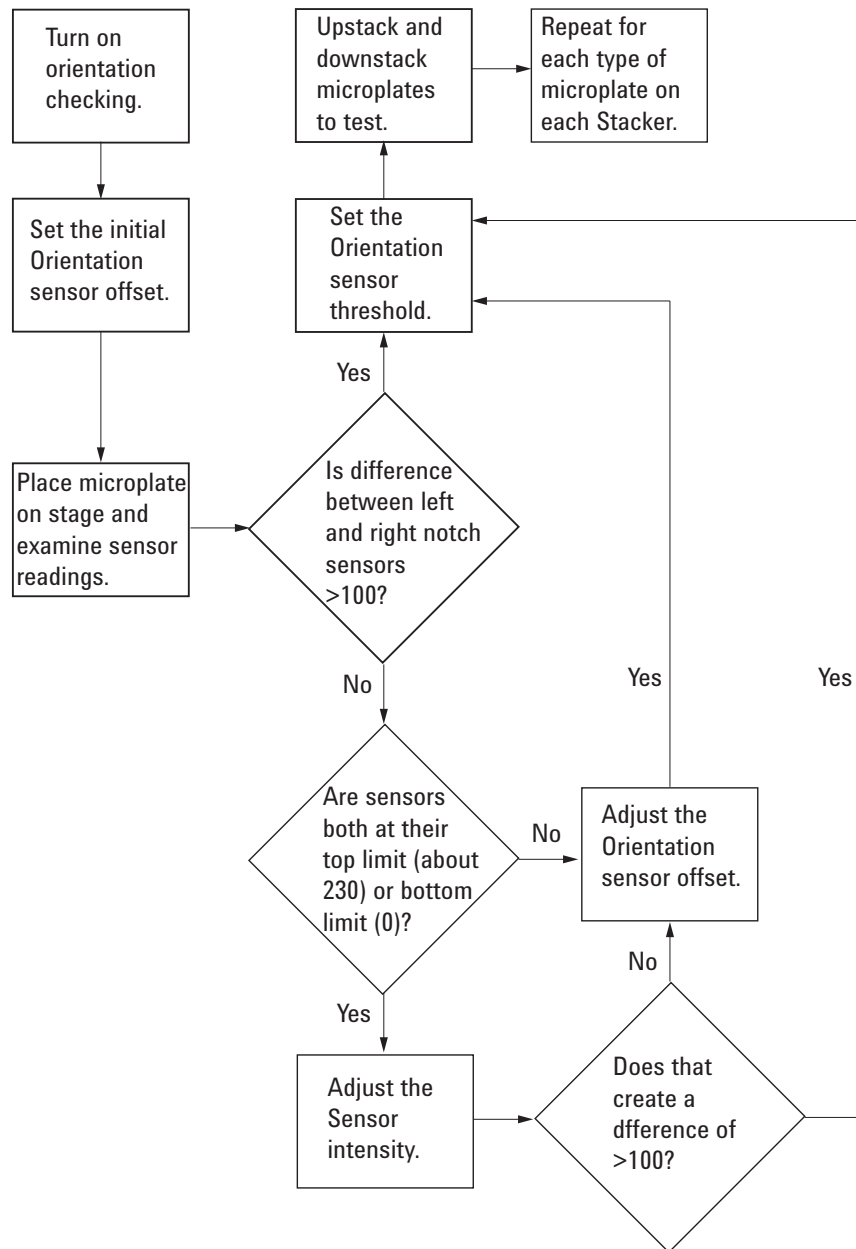
5 Configuring the device and labware

Setting up microplate orientation checking

Step	Task	See...
3	Examine the sensor readings for your microplate.	“Examining the sensor reading for your microplate” on page 69
4	Refer to the following figure, and if necessary, adjust one or more of the following:	
	<ul style="list-style-type: none">• Sensor Intensity	“Adjusting the sensor intensity” on page 70
	<ul style="list-style-type: none">• Orientation sensor thresholds	“Adjusting the Orientation sensor thresholds” on page 71
	<ul style="list-style-type: none">• Orientation sensor offset	“Adjusting the Orientation sensor offset” on page 72

The following figure shows the workflow to set up microplate orientation checking. The overall goal is to obtain notch sensor values that are widely separated for the left and right sides of the microplate, and an Orientation sensor threshold that lies roughly half way between those notch sensor values.

Figure Workflow for setting up notch orientation checking



Turning on orientation checking

You can turn on orientation checking in the following locations:

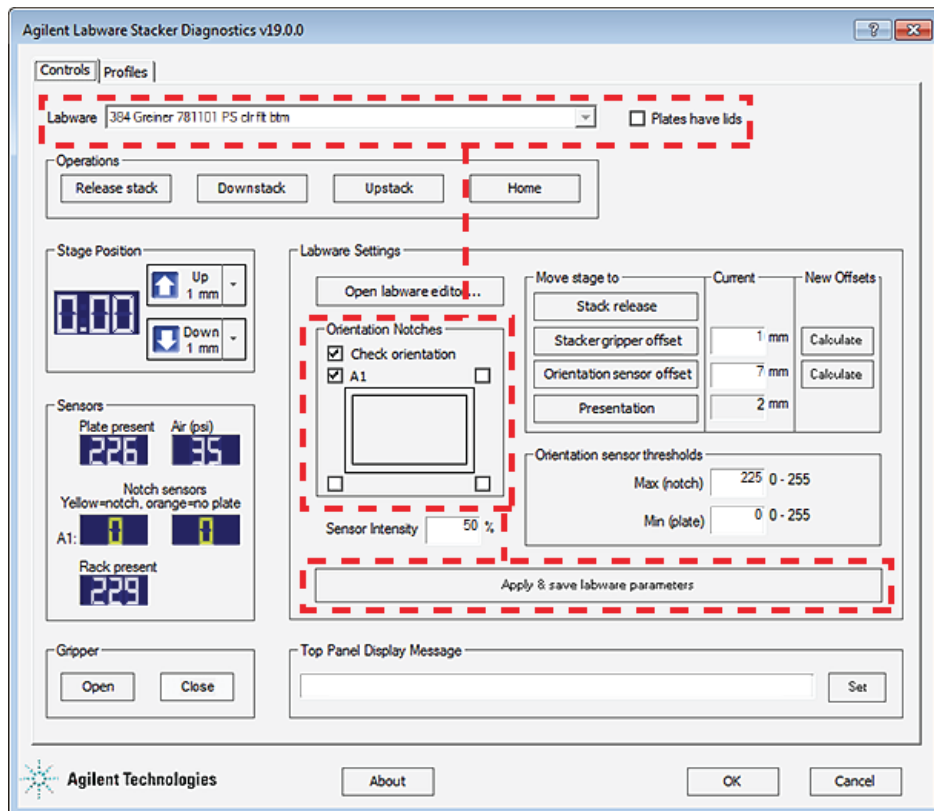
- Labware Editor—Stacker tab
- Labware Stacker Diagnostics—Control tab

Use the following procedure to turn on orientation checking in the Control tab of Labware Stacker Diagnostics.

Note: If orientation checking is turned off, the plate stage still moves to the Orientation teachpoint during upstack and downstack operations, but the orientation is registered as correct regardless of the actual orientation of the microplate.

To turn on plate orientation checking:

- 1 In **Labware Stacker Diagnostics**, click the **Control** tab.
- 2 Select the microplate type from the **Labware** list.
- 3 Under **Orientation Notches**, select the **Check orientation** check box, and then select the notch check box or check boxes that correspond with the labware.



- 4 Click **Apply & save labware parameters** to save the change to this labware definition.

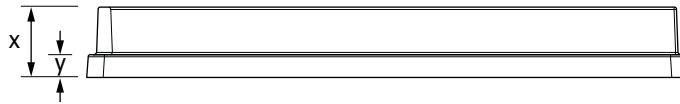
Calculating the initial Orientation sensor offset

The Orientation sensor offset is the height at which the orientation checking sensors view the microplate, with respect to the sensor.

IMPORTANT To detect notches, the Orientation sensor offset must be appropriate for your specific labware type. For example, a microplate might have an Orientation sensor offset of 8 mm, but a tip box might have an offset value of 42 mm.

You can calculate an initial value by taking the average of the microplate height plus the height of the microplate skirt: $(x + y)/2$

where x and y are the dimensions shown in the following figure.



To enter the initial plate-specific orientation sensor offset value:

- 1 In **Labware Stacker Diagnostics**, click the **Control** tab.
- 2 Select the microplate type from the **Labware** list.
- 3 In the **Move stage to** area, type the initial value in the **Current** box (mm) next to **Orientation sensor offset**.
- 4 Click **Apply & save labware parameters** to save the change to this labware definition.

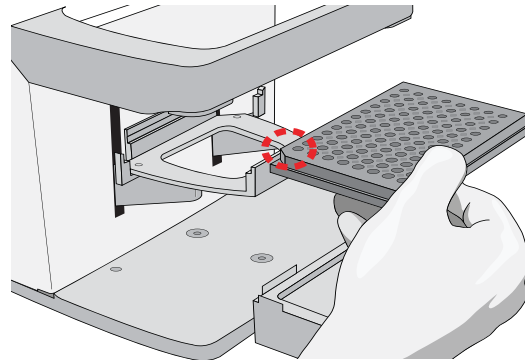
Examining the sensor reading for your microplate

Before making further adjustments to the settings, use the following procedure and examine the sensor reading for your microplate.

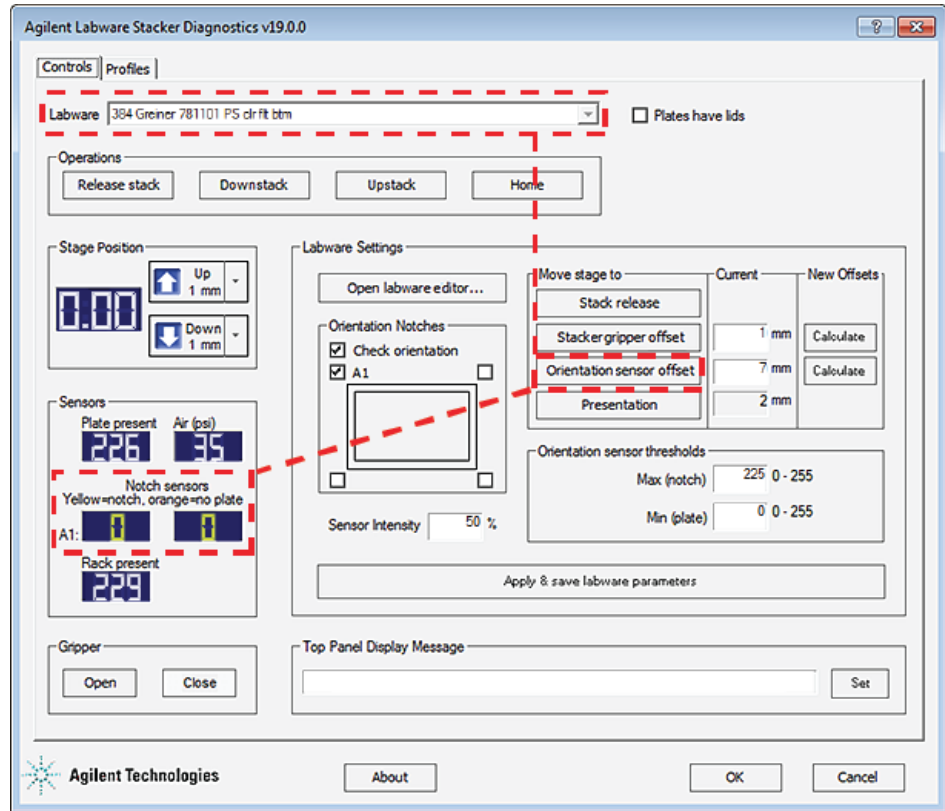
To examine the sensor readings for your microplate:

- 1 Place the microplate that you are testing on the Stacker plate stage. For instructions, see [“Placing a microplate on the plate stage manually” on page 57](#).

Ensure that the microplate has a notched corner on either the left or the right side closest to the Stacker device.



- 2 In **Labware Stacker Diagnostics**, ensure that the microplate type is selected in the **Control** tab **Labware** list.
- 3 In the **Move stage to** area, click **Orientation sensor offset**. The plate stage moves to the specified offset from the Orientation sensor teachpoint.



4 In the **Sensors** area, examine the **Notch sensors** readings:

- If the sensor readings are widely separated (>100), they are detecting a notch on one side and a solid microplate wall on the other side. To verify the adjustment, upstack and downstack the microplate several times. See “Testing a microplate in the Labware Stacker” on page 58.
 - If the sensor readings for notched and unnotched corners are similar, adjust the Sensor Intensity. See “Adjusting the sensor intensity” on page 70.
 - If both numbers are very high, reduce the Sensor Intensity.
 - If both numbers are very low, increase the Sensor Intensity.
- Refer to the figure under “Workflow to set up microplate orientation checking” on page 65 to determine what to do next.

Adjusting the sensor intensity

When to adjust the sensor intensity

If the sensor intensity is set too low, a microplate will not be detected even though one is present. If it is set too high, the sensors might become saturated, causing failure to detect the orientation of a microplate.

The following factors can affect the reading of the notch sensor and might require that you adjust the Sensor intensity value:

- **Microplate position.** For optimum results, the sensor light should bounce off of the microplate at halfway between the top of the microplate and the top of the microplate skirt.

- **Microplate color.** White reflects light differently than black or darker colors. The sensor light is more sensitive to white, which emits more reflected light than other colors, so the sensor intensity should be lower when using white plates. The following table provides some guidelines for sensor intensity settings based on microplate color.

Microplate color	Sensor intensity value
White	<10%
Black	50%
Clear	Adjust value as necessary

- **Microplate material.** Shiny or reflective microplates might require lower light intensity.
- **Microplate condition.** Cracks, chips, scratches, or defects in the area where the sensor light contacts the microplate can affect sensor reading.
- **Ambient light.** Brighter rooms might require lower light intensity.

Procedure

To adjust the Sensor intensity:

- 1 In **Labware Stacker Diagnostics**, ensure that the microplate type is selected in the **Control** tab **Labware** list.
- 2 In the **Sensor Intensity** area, type the new value, and then click **Apply & save labware parameters**.
- 3 Examine the sensor readings for your microplate. For details, see [“Examining the sensor reading for your microplate” on page 69](#).

Adjusting the Orientation sensor thresholds

The Orientation sensor thresholds determine what the Labware Stacker considers a notch. If the Labware Stacker does not observe a notch when it should, adjust the Orientation sensor thresholds.

When the plate stage is in the Orientation sensor position, the notch sensors should clearly detect a notch.

Specifications

The sensor on the notched side of the microplate should display a negative (orange) number.

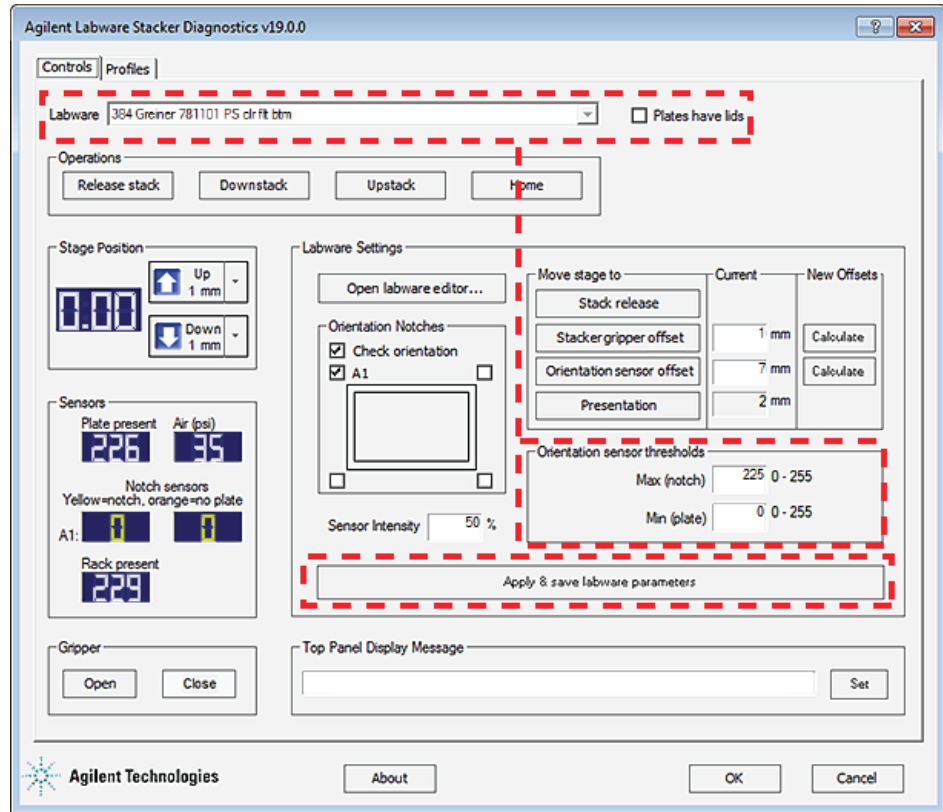
The sensor on the side of the microplate with no notch should display a positive (white) number.

If this is not true, follow the instructions below to change the Orientation sensor thresholds.

To adjust the Orientation sensor thresholds:

- 1 In **Labware Stacker Diagnostics**, ensure that the corresponding microplate type is selected in the **Control** tab **Labware** list.
- 2 In the **Orientation sensor thresholds** area, type the following values:
 - **Max (notch).** The highest value that an orientation sensor can register when sensing a notch. Any sensor reading above this value indicates that a solid microplate wall is present. Any sensor value below this threshold indicates that either a notch, or no microplate is present.

- **Min (plate).** The lowest value that an orientation sensor can register and still consider a notch to be present. A value below this threshold indicates no microplate is present on the stage.

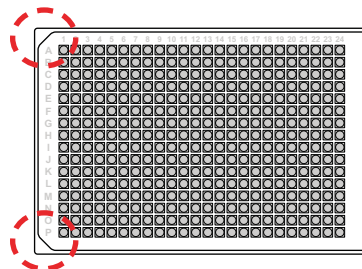


- 3 Click **Apply & save labware parameters**.
- 4 Examine the notch sensor readings for your microplate. See [“Examining the sensor reading for your microplate”](#) on page 69.

Adjusting the Orientation sensor offset

Before you start:

- 1 Remove the rack from the Labware Stacker. For instructions, see [“Loading and releasing a rack”](#) on page 46.
- 2 Ensure that the microplate has only one side with notched corners. For example, the following figure shows a microplate with notches on its west side.



- 3 Place the microplate on the plate stage. For instructions, see “Placing a microplate on the plate stage manually” on page 57.

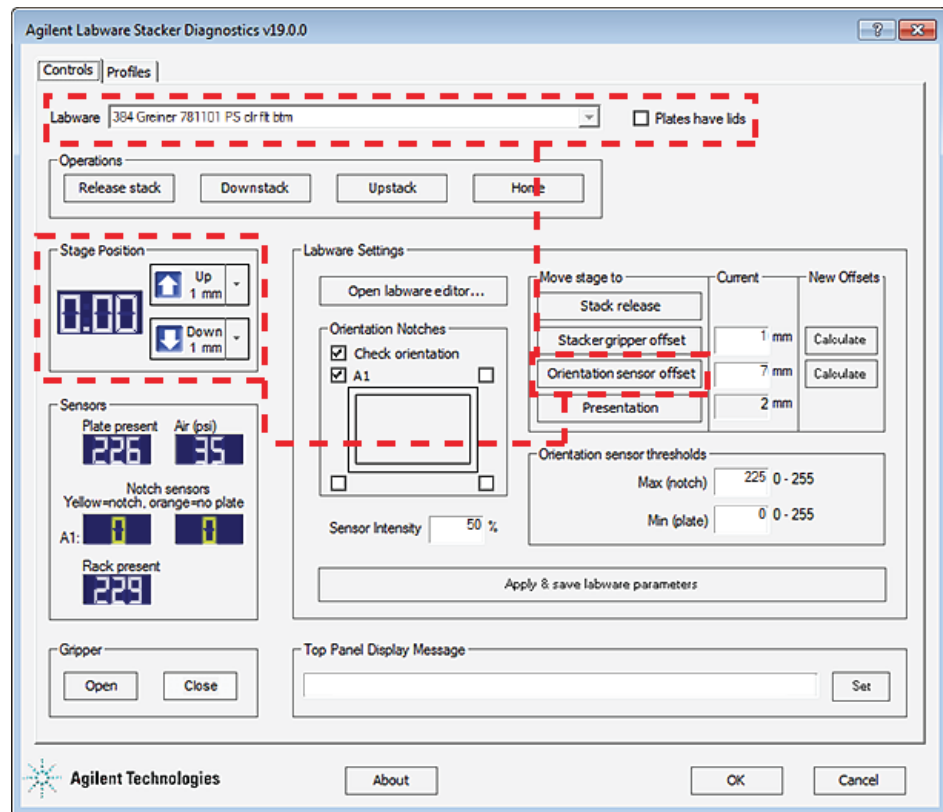
To adjust the plate-specific orientation sensor offset:

- 1 In the **Control** tab, select the corresponding microplate from the **Labware** list.
- 2 In the **Move stage to** area, click **Orientation sensor offset**.
The plate stage moves to the Orientation sensor position.
- 3 In the **Stage Position** area, click **Down** until the left and right Notch sensors both display zero.

At this point, the emitted light beam is above the microplate.

- 4 Click **Up** until the sensor corresponding to the corner with the notch has a white value.

This position indicates that the top of the microplate is just aligned with the top of the sensor’s vertical range.



- 5 Write down the value displayed in the **Stage Position** display.
- 6 Continue to click **Up** until the values displayed for the left and right **Notch sensors** are large and white.
At this point, the light beams on both sides are hitting the top of the microplate skirt and reflecting back.
- 7 Write down the value that appears in the **Stage Position** display.
- 8 Calculate the average of the two values you recorded in steps 5 and 7.
This calculation represents the midpoint of the valid sensor range.

- 9 In the **Move stage to** area, set the value of the **Orientation sensor offset** to zero, click **Apply & save labware parameters**, and then click **Orientation sensor offset** to move the plate stage to the orientation sensor teachpoint.
- 10 Compare the value that appears in the **Stage Position** display (orientation sensor teachpoint) with the value that you calculated in step 8.
The difference represents the plate-specific orientation sensor offset to achieve an optimal reading position.
- 11 Set the new value for **Orientation sensor offset**.
For example, if the Orientation sensor teachpoint stage position value is 65 mm and the calculated value is 70 mm, enter an offset value of 5 mm.
- 12 Click **Apply & save labware parameters**.

Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Troubleshooting errors	“Troubleshooting error messages” on page 84
Controls in the Control tab	“Labware Stacker Diagnostics—Control tab” on page 92

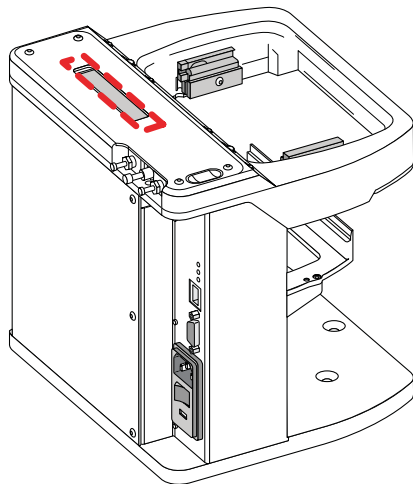
Changing the text in the top-panel display

About this topic

This topic describes how to use Labware Stacker Diagnostics to display a text message in the top panel on the Stacker.

Note: Long messages are scrolled across the display.

Figure Display on the top panel of the Stacker



To use the ActiveX control to set the text message in the display, see the [Stacker ActiveX Version 18 User Guide](#).

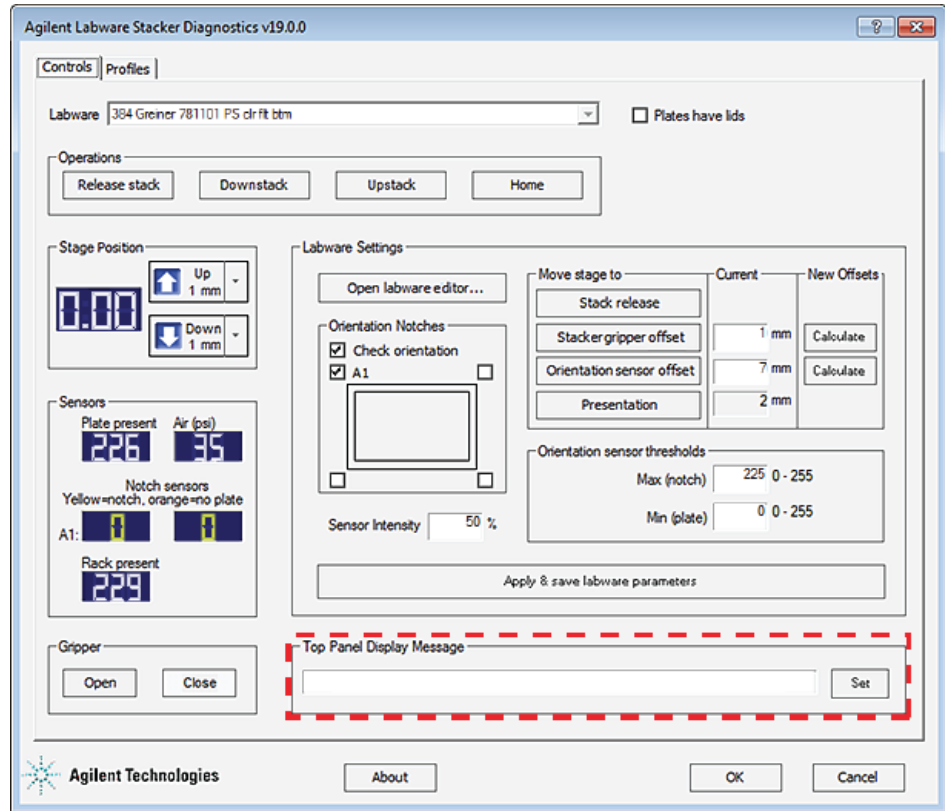
Procedure

To change the text in the display on the top panel:

- 1 Open **Labware Stacker Diagnostics**.
- 2 In the **Control** tab, type the new text in the **Top Panel Display Message** box.
- 3 Click **Set**. The message displays on the top of the device.

5 Configuring the device and labware

Changing the text in the top-panel display



Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Troubleshooting errors	“Troubleshooting error messages” on page 84
Control tab reference	“Labware Stacker Diagnostics—Control tab” on page 92

Changing the Presentation teachpoint

About this topic

The Presentation teachpoint specifies the plate stage height (mm) above the home position at which a robot picks up or places a microplate on the plate stage.

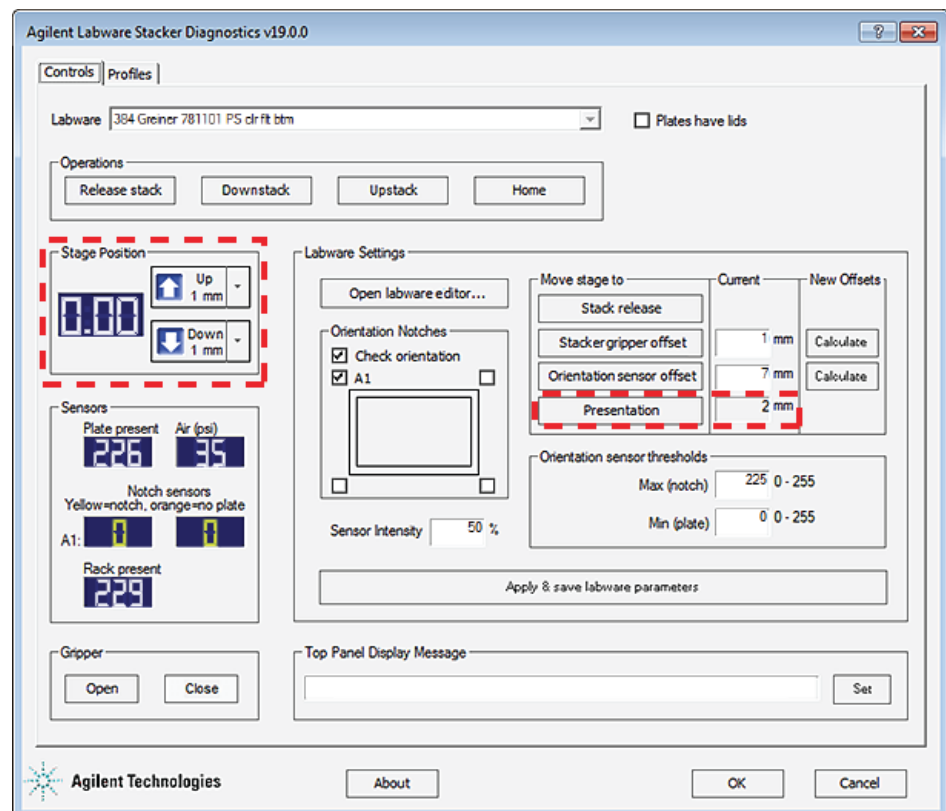
IMPORTANT The Presentation teachpoint may be changed only if a particular configuration requires a value that is different from the 2.0 mm default.

IMPORTANT Do not change this value for a Labware Stacker that is used on a BioCel Automation System.

Procedure

To change the Presentation teachpoint:

- 1 Initialize the profile in Labware Stacker Diagnostics.
- 2 In the **Control** tab, under **Move stage to**, click **Presentation**. The plate stage moves to the Presentation teachpoint.

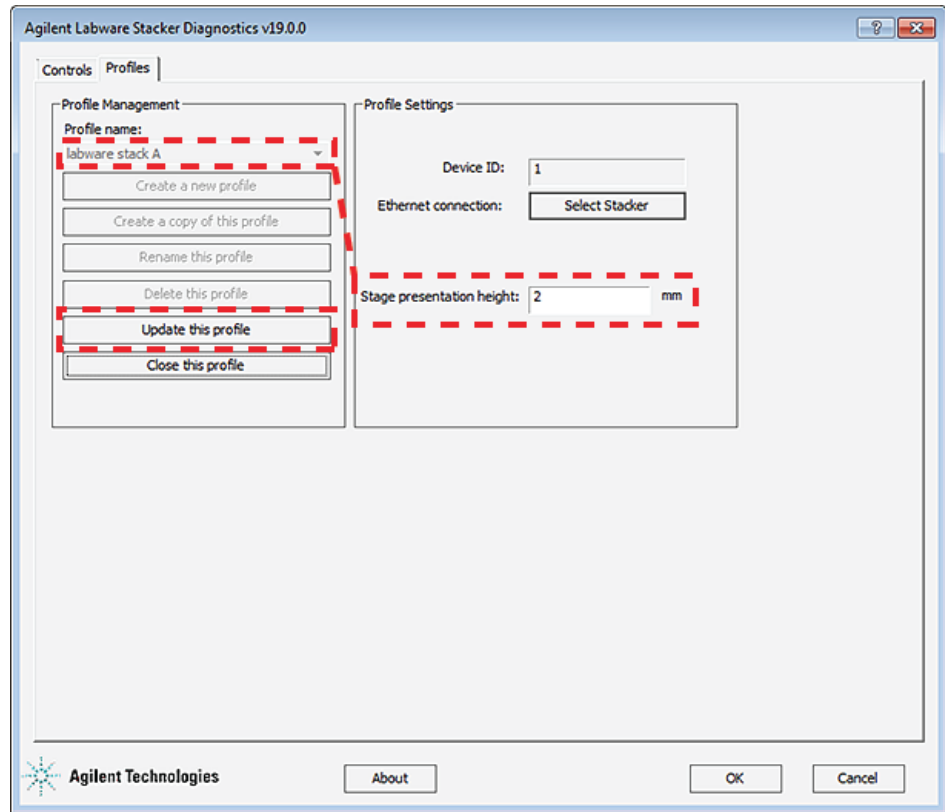


- 3 In the **Stage Position** area, verify that the display shows the current location of the Presentation teachpoint. For example, if the Presentation teachpoint is 2 mm, the Stage Position display should show 2 mm \pm 0.03.

5 Configuring the device and labware

Changing the Presentation teachpoint

- 4 Click the **Up** and **Down** controls to move the plate stage to the desired Presentation teachpoint, and then record the value that appears in the **Stage Position** display.
- 5 Click the **Profiles** tab.
- 6 In the **Stage presentation height** box, type the value you recorded in [step 4](#).
- 7 Click **Update this profile**.



Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Troubleshooting errors	“Troubleshooting error messages” on page 84
Controls in the Control tab	“Labware Stacker Diagnostics—Control tab” on page 92



6 Maintaining the device

This chapter contains the following topics:

- “Routine cleaning and maintenance” on page 80
- “Replacing the fuse” on page 82
- “Troubleshooting error messages” on page 84
- “Reporting problems” on page 88

Note: The Control tab in Labware Stacker Diagnostics provides controls that you can use to help troubleshoot problems. For a description of each control, see “[Labware Stacker Diagnostics—Control tab](#)” on page 92

Routine cleaning and maintenance

Before you start



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

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.

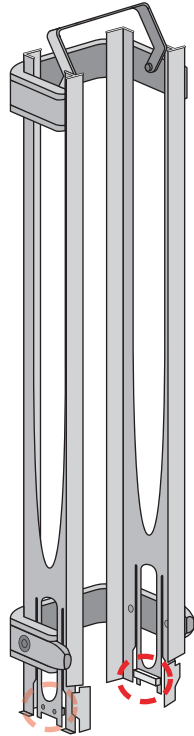
Routine cleaning

Clean the Labware Stacker weekly or as needed.

To clean the Labware Stacker:

- 1 Use standard laboratory wipes and a mild detergent or Ethanol to clean the exterior painted white surfaces and the metal surfaces of dust, grime, chemical deposits, and other debris.
- 2 Remove the rack and clean the Labware Stacker in the top four corners and inside the shelves. Remove any pieces of cracked labware.
- 3 Gently, clean the sensors on the device using a soft cloth dampened with water. For sensor locations, see [“Stacker sensors” on page 10](#).
- 4 Use a soft cloth dampened with water to clean the stacker gripper pads on the rack.

Figure Stacker gripper locations on front-loading rack



Periodic inspection and routine maintenance

Inspect the following components monthly, or as necessary.

Inspection task	Routine maintenance
Check the stacker gripper pads on the rack for dirt, damage, and wear.	Clean dirty or sticky gripper pads using a soft cloth dampened with water. Inspect for damaged or worn gripper pads. For replacement, contact Agilent Automation Solutions Technical Support.
Verify that the labware racks are in good condition.	Replace warped or damaged labware racks.
Verify that the air-supply tubing is in good shape and that the connection has no leaks.	Replace damaged or worn tubing.

Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36

For more information about...	See...
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46
Diagnostics controls	“Labware Stacker Diagnostics—Control tab” on page 92

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 more serious problems. If the new fuse blows after replacement, contact Agilent Automation Solutions Technical Support.

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

Ensure that you have the following:

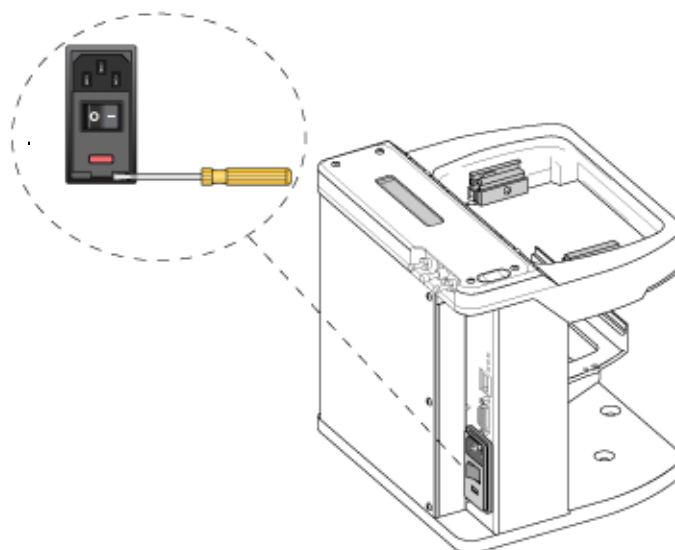
- Fuse of the specified type
See “Laboratory requirements” on page 18 for the fuse specifications.
- Flathead screwdriver

Procedure

To replace the fuse in the power switch:

- 1 Shut down the Labware Stacker and unplug the power cable.
- 2 At the control 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 Reconnect the power cord.

Related information

For more information about...	See...
Opening Labware Stacker Diagnostics	“Opening diagnostics software” on page 36
Initializing the Labware Stacker	“Initializing the Labware Stacker” on page 41
Filling a rack with microplates	“Filling or emptying a rack with labware” on page 43
Loading a rack on the Labware Stacker	“Loading and releasing a rack” on page 46

Troubleshooting 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 88.

Note: The Control tab in Labware Stacker Diagnostics provides controls that you can use to help troubleshoot problems. For a description of each control, see [“Labware Stacker Diagnostics—Control tab”](#) on page 92.

Error	Possible cause	Solution
Cannot perform operation without first loading rack. No rack present.	The rack is not properly positioned in the Stacker.	Verify that the rack is positioned correctly. For details, see “Loading and releasing a rack” on page 46.
	The Rack present sensor has failed.	Clean the Rack present sensor using a soft cloth dampened with water. In Labware Stacker Diagnostics, ensure that the Rack present sensor reads a value greater than 20 when a rack is loaded.
Could not perform operation with plate on stage.	A microplate is already on the plate stage.	Remove the microplate from the stage.
	The sensor threshold is set too low.	Adjust the orientation sensor thresholds to appropriate values for the microplate type, and then retry the operation. See “Setting up microplate orientation checking” on page 64.
	One or both of the notch sensors has failed.	Clean the notch sensors using a soft cloth dampened with water. In the Control tab, verify that values close to zero appear in the Notch sensor displays when no labware is present on the stage.

Error	Possible cause	Solution
No plate on stage.	The Labware Stacker failed to sense a plate when you clicked the Upstack button because no labware is on the plate stage.	Place a plate on the stage, and then retry the operation.
	The orientation sensor thresholds are set too high.	Adjust the orientation sensor values. See “Setting up microplate orientation checking” on page 64.
	One or both of the notch sensors has failed.	If the sensor intensity is set correctly, and the notch sensor values do not change when a plate is on the stage in the orientation sensor position, one or both of the notch sensors have failed. Clean the notch sensors using a soft cloth dampened with water. Retry the operation.
No plate available.	A rack is present (loaded or unloaded) but it contains no labware.	Fill the rack with labware. For details, see “Filling or emptying a rack with labware” on page 43.
	A rack is present and it contains labware, but it is not loaded at the time you press the Downstack button.	Load the rack. For details, see “Loading and releasing a rack” on page 46.
	The Labware Stacker is not correctly configured for your labware. For example, you are using a black microplate and the sensor intensity is set too low.	Ensure the properties in the labware definition are configured correctly. See “Setting up microplate orientation checking” on page 64.
	The plate present sensor has failed.	Clean the plate present sensor using a soft cloth dampened with water. Retry the operation.

Error	Possible cause	Solution
Plate is rotated 180°.	The notch is not in the specified location because the microplate is rotated by 180°.	Rotate the microplate to the specified position and then retry the operation.
	The notch orientation configuration is incorrect in the labware definition.	Verify that the Check Orientation feature is configured correctly for this labware definition. See “Setting up microplate orientation checking” on page 64 . <i>Note:</i> If the problem persists and the run must continue, turn off orientation checking.
	The orientation sensors are not configured properly.	Make sure that the Sensor Intensity and Orientation sensor threshold configurations are correct. See “Setting up microplate orientation checking” on page 64 .
	One or both of the notch sensors has failed.	Clean the notch sensors using a soft cloth dampened with water. Retry the operation. If the sensor values do not change with the presence or absence of a microplate in the orientation sensor position, one or more sensors may have failed.

Error	Possible cause	Solution
Plate on stage is the wrong type.	The labware selection is incorrect.	Ensure that the labware selection in the software corresponds with the physical microplate on the stage.
	The notch is not in the specified location because the microplate is rotated by 180°.	Rotate the microplate to the specified position and then retry the operation.
	The notch orientation configuration is incorrect in the labware definition.	Verify that the Check Orientation feature is configured correctly for this labware definition. See “Setting up microplate orientation checking” on page 64. <i>Note:</i> If the problem persists and the run must continue, turn off orientation checking.
	The orientation sensors are not configured properly.	Make sure that the Sensor Intensity and Orientation sensor threshold configurations are correct. See “Setting up microplate orientation checking” on page 64.
	One or both of the notch sensors has failed.	Clean the notch sensors using a soft cloth dampened with water. Retry the operation. If the sensor values do not change with the presence or absence of a microplate in the orientation sensor position, one or more sensors may have failed.
Stage position error.	Something is obstructing the plate stage and preventing it from reaching its commanded location.	Check for debris that may be blocking the stage.
	The labware stacking thickness is not set correctly in the labware definition.	Verify that the Thickness and Stacking thickness properties are set correctly for this labware type in the Plate Properties tab in the Labware Editor. For details, see VWorks Automation Control Setup Guide .
	The labware is not properly seated on the plate stage.	Reset the labware on the plate stage, and then retry the operation.
	A communications failure has occurred.	Retry the operation.

Reporting problems

Contacting Automation Solutions Technical Support

If you find a problem with the Labware Stacker, 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:

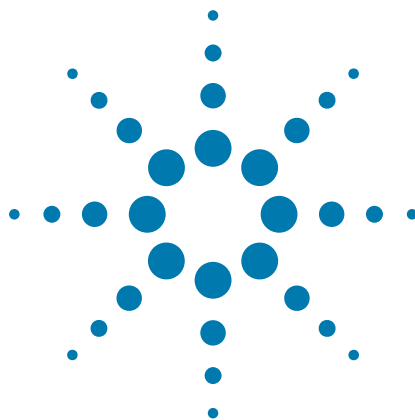
- Short description of the problem
- Relevant software version number (for example, automation control software, diagnostics software, and firmware)
- Error message text (or screen capture of the error message dialog box)
- Relevant files, such as log files

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...
Maintenance	“Routine cleaning and maintenance” on page 80
Error messages	“Troubleshooting error messages” on page 84



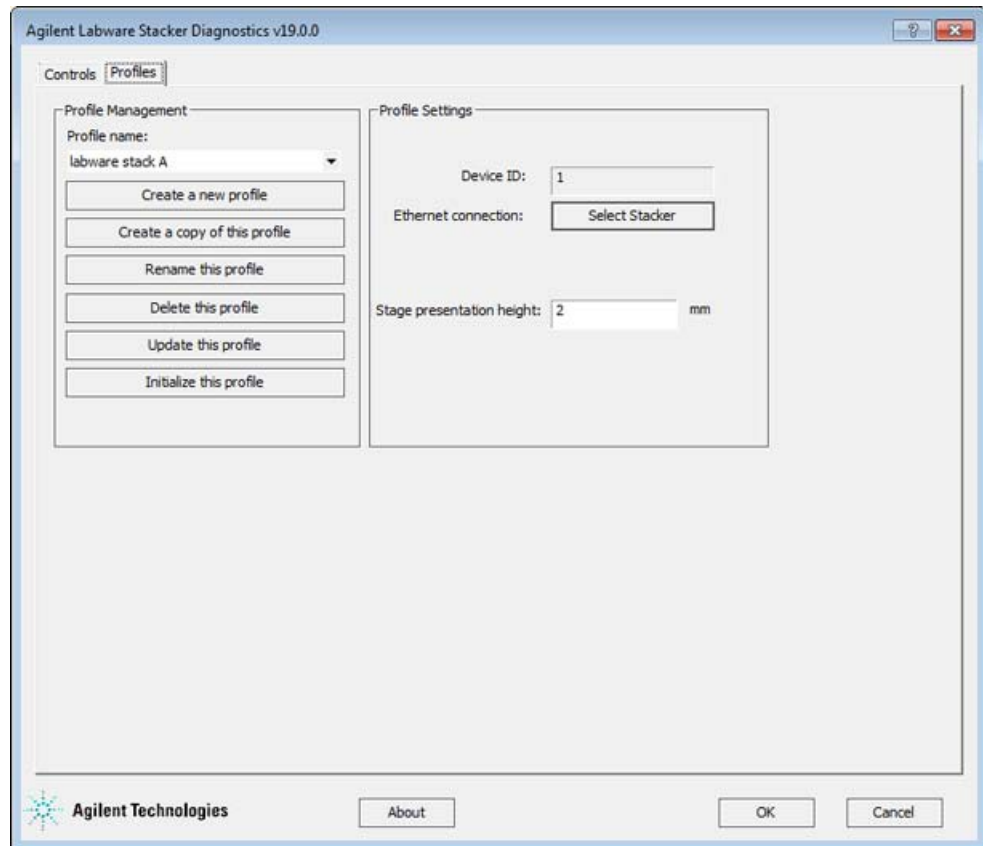
A Quick reference

This appendix provides a quick reference of the commands, selections, and parameters in the Labware Stacker Diagnostics dialog box.

The topics are:

- “Labware Stacker Diagnostics—Profiles tab” on page 90
- “Labware Stacker Diagnostics—Control tab” on page 92

Labware Stacker Diagnostics—Profiles tab



Profile Management area

Command	Description
Profile name	Displays the selected profile. Also allows you to select from the list of available profiles.
Create a new profile	Creates a new profile.
Create a copy of this profile	Creates a duplicate copy of the selected profile.
Rename this profile	Renames the selected profile.
Delete this profile	Deletes the selected profile.
Update this profile	Saves changes to the selected profile.
Initialize this profile	Initiates communication with the Stacker using the selected profile.

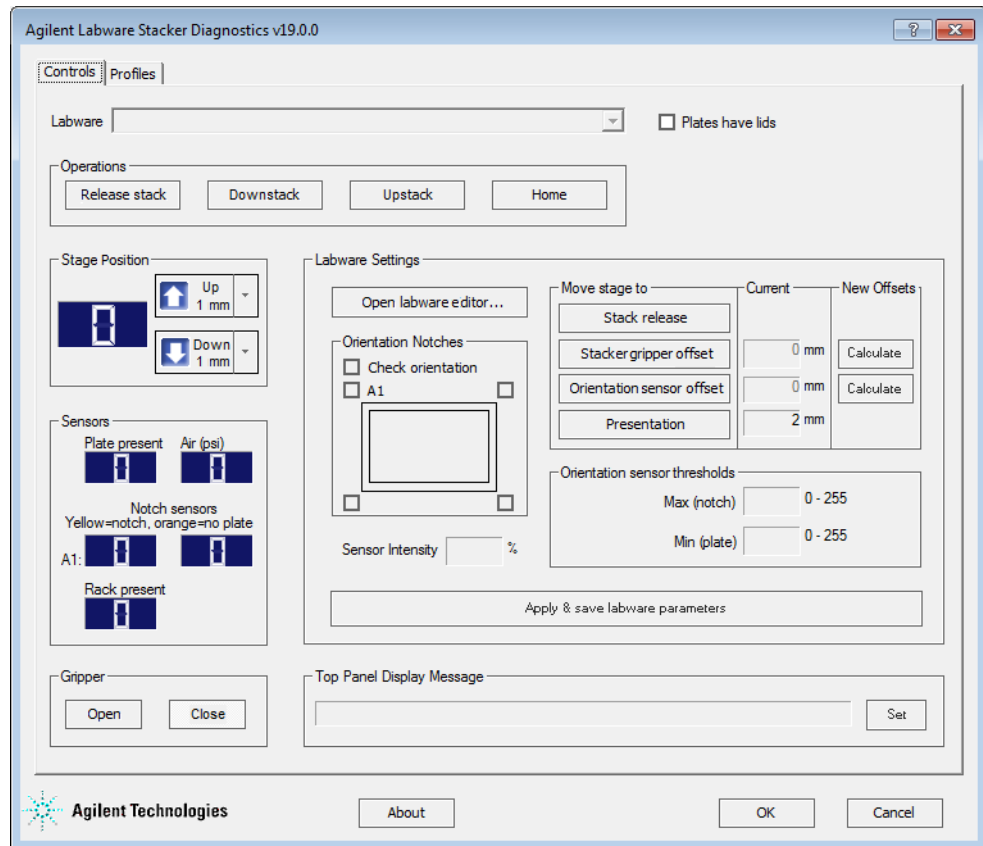
Profile Settings area

Selection or command	Description
Device ID	Displays the device number of the Labware Stacker that is communicating with the computer.
Ethernet connection Select Stacker	Opens the Discovered BioNet Devices dialog box, which lists the connected devices that the software found. To successfully communicate with the device, the Status column must display New or Matched.
Stage presentation height (mm)	<p>Specifies the teachpoint to which the Stacker plate stage moves to enable a robot to pick up or place a microplate at the plate stage.</p> <p><i>Note:</i> This teachpoint should only be changed if a configuration requires a Presentation teachpoint that is different from the 2.00 mm default. For example, you might set a lower Stage presentation height to allow robots to place tall 250-μL tip boxes onto the Stacker plate stage.</p> <p><i>Note:</i> The Stacker tab in the VWorks Labware Editor includes a property called Presentation offset, which is used by the BioCel Automation System. For more information, see the <i>VWorks Automation Control Setup Guide</i>.</p>

Related information

For more information about...	See...
Opening diagnostics	“Opening diagnostics software” on page 36
Creating a profile	“Creating and editing profiles” on page 38
Establishing communication with the device	“Initializing the Labware Stacker” on page 41
Adjusting the Stage presentation height	“Changing the Presentation teachpoint” on page 77
Control tab	“Labware Stacker Diagnostics—Control tab” on page 92

Labware Stacker Diagnostics—Control tab



Labware area

Selection or command	Description
Labware	Specifies the type of labware that the Labware Stacker will handle. <i>Note:</i> If your labware is not in the list, use the VWorks Labware Editor to create the labware definition and add it to the list. To start the Labware Editor, under Labware Settings , click Open labware editor .
Plates have lids	Indicates that the labware selected for processing have lids. This property is unavailable if the labware definition does not specify lids. For details on how to specify lids in the labware definition, see the VWorks Automation Control Setup Guide .

Labware Settings area

The labware properties are linked to the properties of the same names in the Stacker tab of the Labware Editor. Saving the changes in either location updates the selected labware definition.

Property or command	Description
Open labware editor	Starts the VWorks Labware Editor. You use the Labware Editor to create and manage the labware definitions that appear in the Labware list.
Orientation Notches	<ul style="list-style-type: none"> • Check orientation. Turns on microplate-orientation checking based on the selected notch locations for your microplate. The notch locations are ignored when this check box is cleared. • Notch location check boxes. Specifies whether a notch is present in the corresponding corner of the microplate. <p>IMPORTANT The Labware Stacker has only two orientation sensors for detecting notches. If the wrong microplate is loaded, the sensors will not flag an incorrect microplate.</p>
Sensor Intensity %	<p>Sets the percentage of maximum sensor intensity for all sensors. If the sensor intensity is set too low, a microplate will not be detected even though one is present. If it is set too high, the sensors might become saturated and fail to detect the orientation of a microplate.</p> <p>This parameter adjusts for the fact that clear, black, and white microplates reflect light differently. For example, white microplates generally reflect more light so the sensor intensity should be set lower.</p>
Move stage to	<p>Moves the plate stage to the specified teachpoint:</p> <ul style="list-style-type: none"> • Stack release. The position to which the plate stage moves during a stack release operation. • Stacker gripper offset. The distance (mm) above the Stacker grip teachpoint at which the plate stage stops for the grippers to grip the microplate. • Orientation sensor offset. The distance (mm) the plate stage will move below the standard sensor teachpoint to detect the microplate when the Check orientation option is enabled. • Presentation. The plate stage height (mm) above the home position at which a robot picks up or places a microplate on the plate stage. <p><i>Note:</i> This value is set in the Profiles tab.</p>

Property or command	Description
Current	<p>Display the current values (mm) for the following plate stage locations:</p> <ul style="list-style-type: none"> • Stacker gripper offset. Displays the current value, which you can edit. • Orientation sensor offset. Displays the current value, which you can edit. • Presentation. Displays the current value, which you can edit in the Profiles tab.
New Offsets	<p>Calculates a new value based on the current location of the plate stage:</p> <ul style="list-style-type: none"> • Stacker gripper offset • Orientation sensor offset
Orientation sensor thresholds Max (notch)	<p>Specifies the highest value that an orientation sensor can register when sensing a notch. Any sensor reading above this value indicates that a solid microplate wall is present. Any sensor value below this threshold indicates that either a notch, or no microplate is present.</p> <p><i>Note:</i> If the stacker does not sense a notch when it should, a “wrong plate type” or a “plate rotated 180 degrees” error message appears. In this case, adjust the sensor threshold value.</p>
Orientation sensor thresholds Min (plate)	<p>Specifies the lowest value that an orientation sensor can register and still consider a notch to be present.</p> <p>If the orientation sensor returns a value below this threshold, an error message appears stating that no microplate is present on the stage.</p> <p><i>Note:</i> If the stacker does not sense a notch when it should, a “wrong plate type” or a “plate rotated 180 degrees” error message appears. In this case, adjust the sensor threshold value.</p>
Apply & save labware parameters	Saves any changes to the labware parameters.

Operations area

Selection or command	Description
Load stack/ Release stack	<p>Loads or releases the stack of labware in the Stacker.</p> <ul style="list-style-type: none"> Load stack. Moves the bottom microplate in the stack down onto the plate stage, where it is held on the sides by the rack's stacker grippers. Locks the rack in place on the Stacker. <p><i>Note:</i> The Labware Stacker will not operate until the rack is loaded.</p> Release stack. Moves the bottom microplate up in the stack so that it rests on the rack's stacker grippers, and the rack can be removed from the Stacker. <p><i>Note:</i> Alternatively, you can press the load/release button on the Stacker instead of clicking Load stack or Release stack.</p>
Downstack	Moves the bottom microplate from the labware rack onto the plate stage. The rack remains held in place on the Stacker.
Upstack	Moves a microplate from the plate stage into the labware rack. The rack remains held in place on the Stacker.
Home	Moves the plate stage to its home position, and then to the Presentation teachpoint.

Stage Position area

Selection or command	Description
display	Indicates the current location of the plate stage, measured as the distance (mm) from the home position, which is at the bottom of the plate stage travel.
Up	Moves the plate stage up in 1-mm increments.
Down	Moves the plate stage down in 1-mm increments.

Sensors area

Sensor	Description
Plate present	<p>A white number indicates that a microplate is in the grippers.</p> <p>An orange number indicates that no microplate is present in the grippers.</p>

Sensor	Description
Air (psi)	Indicates the grip pressure (psi) when the grippers are closed. A positive number indicates that the grippers are closed. When the grippers are open, the value is zero.
Notch sensors (left)	Detects the presence of a notch in the left corner of microplate when the plate stage is at the Orientation Sensor teachpoint. A white number indicates the absence of a notch. An orange number indicates the presence of a notch.
Notch sensors (right)	Detects the presence of a notch in the right corner of the microplate when the plate stage is at the Orientation Sensor or Grip teachpoint. A white number indicates the absence of a notch. An orange number indicates the presence of a notch.
Rack present	A white number indicates that a rack is loaded. An orange number <20 indicates no rack is loaded.

Gripper area

Selection or command	Description
Open	Opens the grippers.
Close	Closes the grippers.

Top Panel Display Message

Enables you set a text message that appears in the display on top of the Labware Stacker.

Related information

For more information about...	See...
Opening diagnostics	“Opening diagnostics software” on page 36
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