

Automated Plate Sealing

Protocol Guide

**For Research Use Only. Not for use in
diagnostic procedures.**

Original Instructions



Agilent Technologies

Notices

© Agilent Technologies, Inc. 2017

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

User Guide Part Number

G5590-90002

Edition

Revision A, October 2017

Contact Information

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

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

Customer Service: 800-227-9770 (US and
Canada)
By country: <http://www.agilent.com/en-us/contact-us/page>

Documentation feedback:
documentation.automation@agilent.com

Web:
<http://www.agilent.com/en-us/products/automation-solutions>

Acknowledgements

Adobe® and Acrobat® are trademarks of Adobe Systems Incorporated.

Microsoft® and Windows® are either registered trademarks or trademarks of the Microsoft Corporation in the United States and other countries.

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses


The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

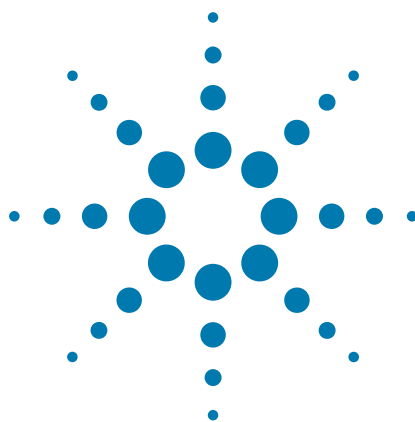
If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14

(June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

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.

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.



Automated Plate Sealing Protocol Guide

This guide contains the following topics:

- “About this guide” on page 2
- “Protocol description” on page 4
- “Before you start” on page 4
- “Starting and setting up the workstation” on page 7
- “Setting up the protocol” on page 11
- “Running the protocol” on page 12



About this guide

This guide describes how to run the Automated Plate Sealing protocol using an Agilent G5590A BenchCel Workstation that includes the PlateLoc Thermal Microplate Sealer. This guide describes how to open the protocol and run it using a VWorks form. For details on the task parameters or how to create a different protocol, see the [VWorks Automation Control User Guide](#).

Assumptions

This guide assumes the following:

- The Agilent G5590A BenchCel Workstation with PlateLoc Sealer has been installed and is operating correctly.
- The device teachpoints have been set and verified.
- You are familiar with the devices in the workstation and the VWorks Automation Control software.

Safety information

Ensure that you are properly trained in:

- General laboratory safety
- The correct and safe operation of the workstation
- Emergency stops

For general safety precautions, intended product use statement, and the list of safety labels, see the [Automation Solutions Products General Safety Guide](#).

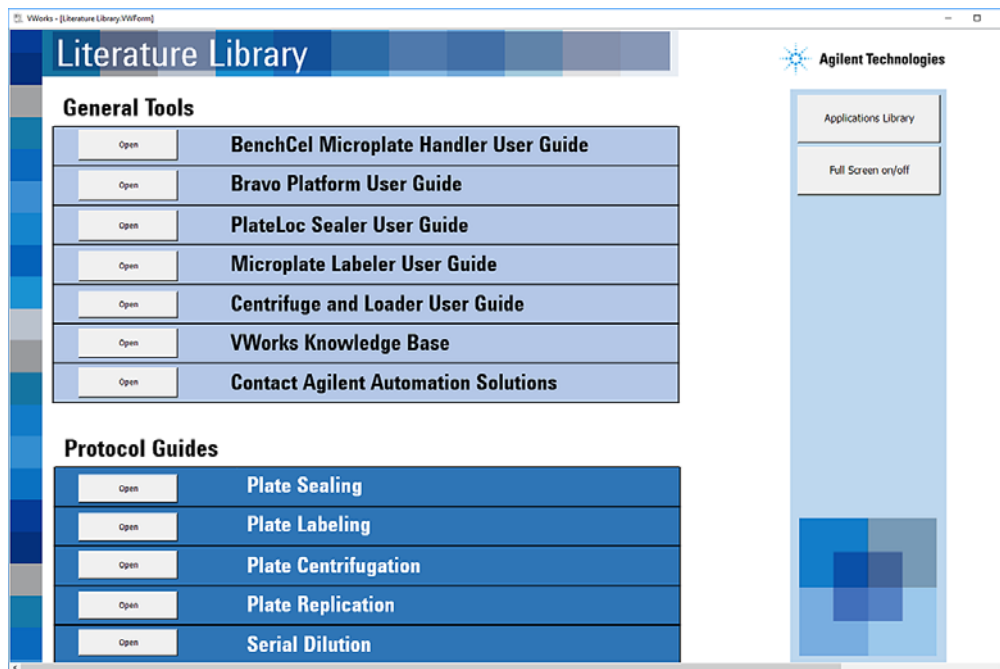
For detailed safety information, see the [BenchCel Microplate Handler User Guide](#) and the [PlateLoc Thermal Microplate Sealer User Guide](#).

Related user guides and where to find them

You should use this guide in conjunction with the following guides:

- [Automation Solutions Products General Safety Guide](#). Provides general safety information and describes potential safety hazards that you might encounter when using Agilent Automation Solutions products.
- [BenchCel Microplate Handler User Guide](#). Contains the safety guidelines and describes the installation, setup, operation, and maintenance procedures for the BenchCel Microplate Handler.
- [PlateLoc Thermal Microplate Sealer User Guide](#). Contains the safety guidelines and describes the installation, setup, operation, and maintenance procedures for the PlateLoc Sealer.
- [VWorks Automation Control User Guide](#). Describes how to create, run, import, and export protocols.
- [VWorks Automation Control Setup Guide](#). Explains how to define labware, specify pipetting speed and accuracy, manage labware in storage, and manage user accounts.

You can access these guides in the **Literature Library** page of the BenchCel Workstations software interface.



You can find the user guides for all the Automation Solutions products in the VWorks knowledge base. You can open the knowledge base in the following ways:

- In the BenchCel Workstations software, go to the **Literature Library** page, and then click **Open** for the **VWorks knowledge base**.
- Within the VWorks software, select **Help > Knowledge Base** or press F1.
- From the Microsoft Windows 10 **All Apps** menu, select **Agilent Technologies > VWorks Knowledge Base**.

You can also find these guides in the online VWorks knowledge base at www.agilent.com/chem/askb.

Protocol description

Plate Sealing protocol. The Automated Plate Sealing protocol seals up to n microplates in a single automated protocol run.

Note: The number (n) of microplates that a protocol can process depends on the number of labware racks on the BenchCel Microplate Handler. Depending on the model, the BenchCel Microplate Handler can have two, four, or six labware racks (BenchCel 2R, 4R, or 6R).

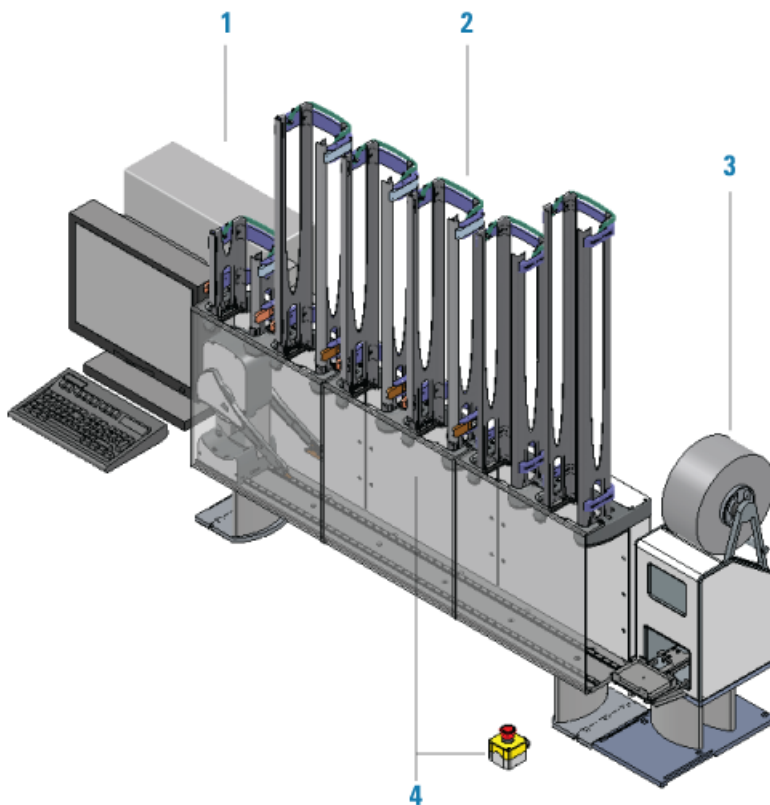
Before you start

Hardware requirements

The following figure and table describes the components used in the Plate Sealing protocol. The BenchCel Microplate Handler in the workstation can be a BenchCel 2R, 4R, or 6R model.

IMPORTANT If your workstation includes additional devices and you want to use this protocol, the VWorks device file that is linked to the protocol must be edited to include all the workstation devices before you can run the protocol successfully. For instructions on how to modify a device file and link to the protocol, see the [VWorks Automation Control User Guide](#).

Figure G5590A BenchCel Workstation (BenchCel6R) including PlateLoc Sealer



Item	Name	Description	See...
1	Computer and monitor	The controlling computer that runs the VWorks Automation Control software.	<i>VWorks Automation Control User Guide</i>
2	BenchCel Microplate Handler	The device that stores stacks of labware and moves labware to and from the other devices in the workstation. Depending on the BenchCel model, two, four, or six labware racks are installed on the stackers. <ul style="list-style-type: none"> • BenchCel 2R has two stackers for labware racks. • BenchCel 4R has four stackers for labware racks. • BenchCel 6R has six stackers for labware racks. The labware rack height can be 250-, 660-, or 860- mm.	<i>BenchCel Microplate Handler User Guide</i>
3	BenchCel safety equipment	An emergency-stop pendant and a shield in front of the BenchCel robot protect operators from moving-parts hazards.	<i>BenchCel Microplate Handler User Guide</i>
4	PlateLoc Thermal Microplate Sealer	The robot-accessible automated microplate sealer (PlateLoc Sealer) that applies a sealing material on top of microplates to seal individual wells.	<i>PlateLoc Thermal Microplate Sealer User Guide</i>

Software requirements

The minimum software requirements for running the protocol are as follows:

- Microsoft Windows 10 64-bit operating system
- VWorks Automation Control software 13.1
- BenchCel Workstations software 1.0

The BenchCel Workstations software includes the device profiles for connecting to your devices and the files required to run the BenchCel Workstation protocols.

Consumables and labware

Ensure that the appropriate Agilent seal is loaded on the PlateLoc Sealer for your labware and application. For loading instructions, see the [PlateLoc Thermal Microplate Sealer User Guide](#).

The following table lists the labware options that you can choose when running this protocol.

CAUTION Use only the labware specified, and place them at the locations specified in the instructions. Using different labware or placing labware at an unapproved location can cause a collision resulting in equipment damage.

Table Labware options

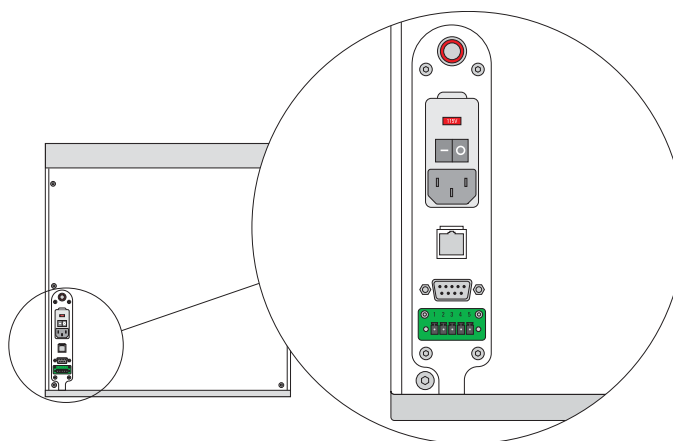
Labware entry in VWorks list*	Labware name	Manufacturer part number
96 Costar 3961 PP 2ml assay block	96-Well Clear V-Bottom 2mL Polypropylene Deep Well Plate	Corning Costar 3961
96 Greiner 655101 PS Clr Rnd Well Flat Btm	96-Well Microplate, Polystyrene, Round Well, Flat Bottom	Greiner 655101
96 EK 2460 PP Rnd Well U Btm	96 Target Well Plates, 500 µL, U-Bottom, Clea	E&K Scientific EK-2460
96 Nunc Deep Well 1 mL	Nunc 96 DeepWell plate, sterile, 1.3- mL volume	Thermo Scientific 260251
96 Seahorse Storage Plate 2ml Square Pyramid	Seahorse 96-well PD-702 polypropylene storage microplate, 2ml/square well, pyramid bottom	Agilent Technologies 201379100
384 Greiner 781101 PS clr flt btm	Greiner 384 well plate, polystyrene, clear flat bottom	Greiner 781101
1536 Greiner 782076 blk sqr well flt btm	Greiner FLUOTRAC 200 1536-well plate, black polystyrene, flat bottom	Greiner 782076
*The labware that you use must have a corresponding labware definition in the VWorks software. In the labware definition, the BenchCel properties should specify the Stack holding method: Hold with stacker grippers. For detailed instructions on how to create or edit labware definitions, see the VWorks Automation Control Setup Guide .		

Starting and setting up the workstation

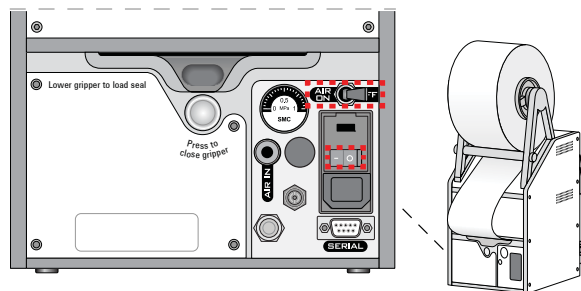
Starting up the workstation

To start the workstation:

- 1 Start up the BenchCel Microplate Handler as follows:
 - a Position the BenchCel robot head underneath a stacker, and place the gripper arms to the right, facing the PlateLoc Sealer. See previous figure.
 - b Turn on the BenchCel air supply.
 - c Turn on the BenchCel power.



- d Wait for the BenchCel head to finish the homing routine.
- 2 Start up the PlateLoc Sealer as follows:
 - a Press the on/off switch to the on position (I).
 - b Push the **AIR ON/OFF** switch to the **ON** position.



When you turn on the air, the PlateLoc Sealer door opens. The door remains open while the device is in idle mode, until you load a microplate.

- 3 At the PlateLoc Sealer, load the appropriate plate insert, if applicable, for your labware.

Note: During the run, the BenchCel robot loads the microplates automatically.
- 4 Turn on the computer and monitor. Wait for the Microsoft Windows operating system to finish starting up.

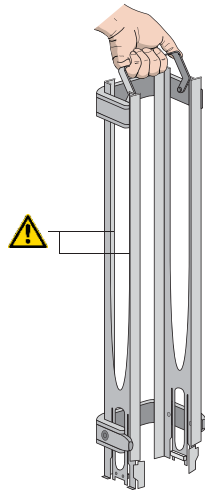
1 Automated Plate Sealing Protocol Guide

Starting and setting up the workstation

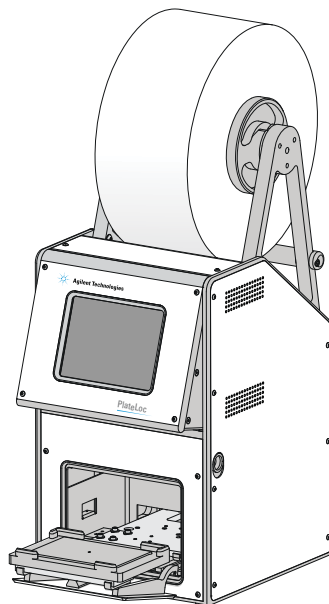
- 5 At the BenchCel Microplate Handler, install the labware racks on the stackers. See the [BenchCel Microplate Handler User Guide](#).

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

Figure Labware rack, front-load



- 6 Ensure the PlateLoc Sealer has sufficient seal loaded for the number of plates to be processed. For instructions, see the [PlateLoc Thermal Microplate Sealer User Guide](#).



Opening the protocol

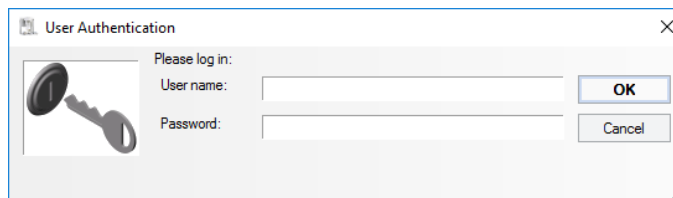
IMPORTANT Ensure that the VWorks software is closed before you start the BenchCel Workstations software.

To open the protocol:

- 1 Start the BenchCel Workstations software .



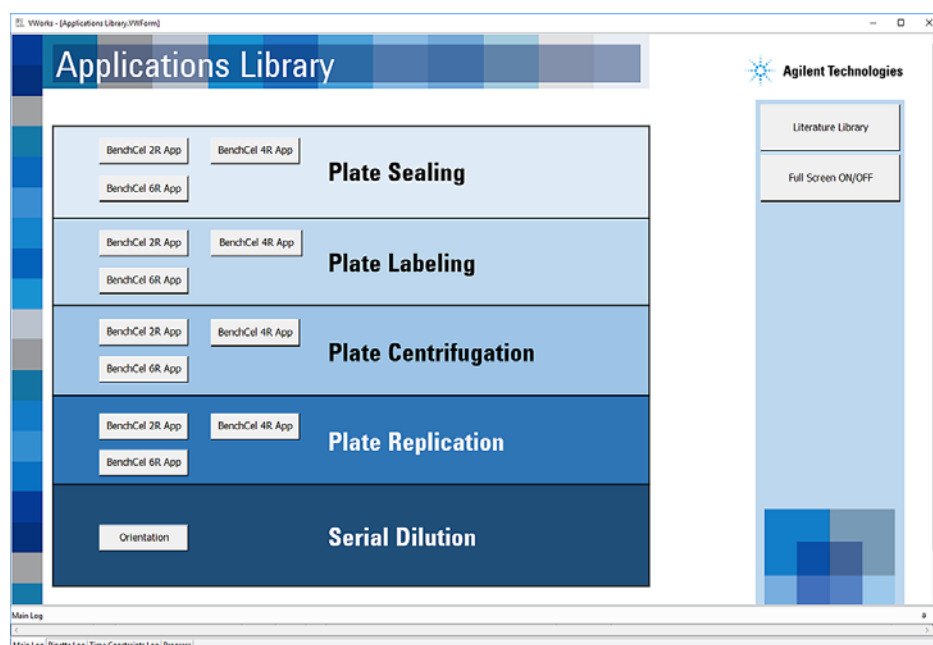
- 2 Click **App Library**. The VWorks software starts.
- 3 When the **User Authentication** dialog box opens, type your VWorks user name and password, and then click **OK**.



The Applications Library form opens.

1 Automated Plate Sealing Protocol Guide

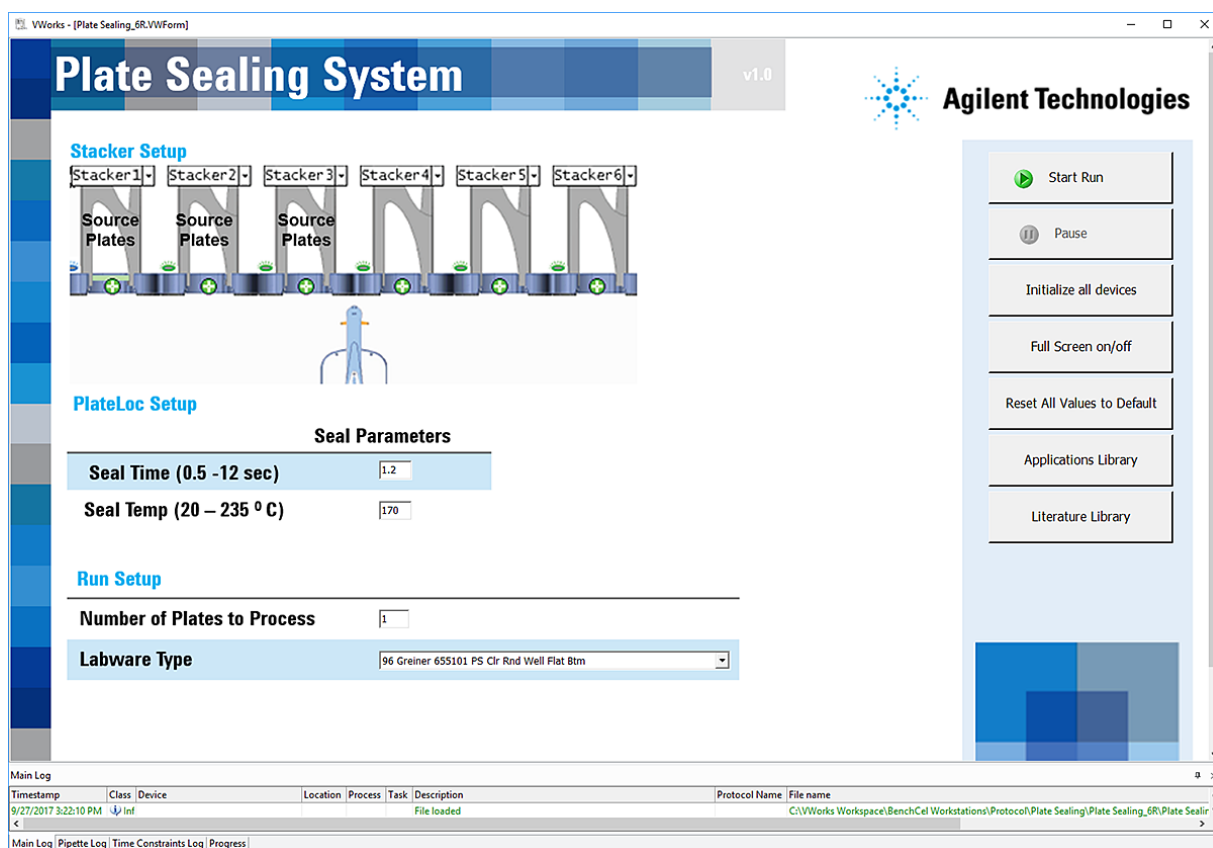
Opening the protocol



- 4 In the **Plate Sealing** area, click the button that corresponds to your BenchCel stacker configuration: BenchCel 2R, BenchCel 4R, or BenchCel 6R.

The Plate Sealing form opens in the VWorks window.

Figure VWorks window displaying the Plate Sealing form for BenchCel 6R



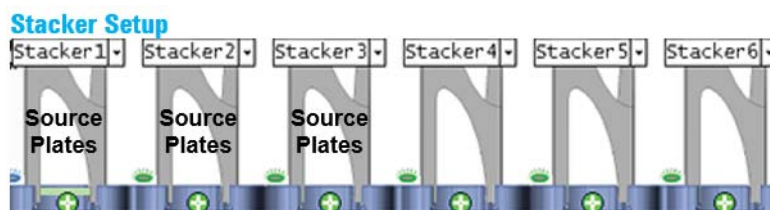
Setting up the protocol

To set up the protocol:

- 1 *Optional.* In the form, click **Reset All Values to Default** to set all the form settings to their defaults.
- 2 *Optional.* If you want to view the VWorks toolbars and menus, click **Full Screen on/off** to change the scale of the form display within the VWorks window.
- 3 Set up the BenchCel stackers as follows:
 - a In the **Stacker Setup** area of the form, determine which stackers are designated for source microplates.

For example, the protocol for the BenchCel 6R designates the first three stackers for source plates. In this case, if you are using fewer than three stackers of labware, fill Stacker 1 before you fill Stacker 2, and so forth.

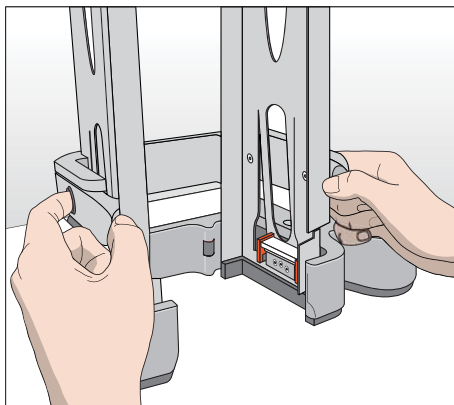
Figure Stacker Setup area for the BenchCel 6R



- b Fill the labware racks on the corresponding BenchCel stackers with the source microplates. For instructions, see the [BenchCel Microplate Handler User Guide](#).

CAUTION Improperly seated labware can cause a hardware collision, resulting in equipment damage. Ensure that all labware are properly seated and in the correct orientation within the labware racks.

Figure Opening a labware rack, front-load



- 4 Specify the seal parameters for a seal cycle in the **PlateLoc Setup** area:
 - a In the **Seal Time** box, type the duration of time (seconds).
 - b In the **Seal Temp** box, type the temperature (°C).
- 5 In the **Run Setup** area:
 - a Enter the **Number of Plates to Process**.
 - b In the **Labware Type** list, select the labware that matches the source plates in the stacker on the BenchCel device.
- 6 Confirm that the physical layout of the hardware and labware matches the selections in the form.

CAUTION Improperly seated labware can cause a hardware collision, resulting in equipment damage. Ensure that all labware are properly seated within the stacker.

Running the protocol

Before you start the run



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

CAUTION A collision can occur if an object is placed in the path of the moving gripper. To prevent potential equipment damage, ensure that the path is clear of objects, such as extra labware, that could cause a potential collision.

About performing a mock run (optional)

If you are unfamiliar with the protocol and would like to see how it operates and troubleshoot problems before running it with valuable samples and reagents, you can perform a mock run. A mock run uses empty or water-filled labware.

You prepare for a mock run the same way you would prepare for a real protocol run, except that you use empty labware for a totally dry run or labware containing water for a wet run.

Starting and monitoring the protocol run

To start and monitor the protocol run:

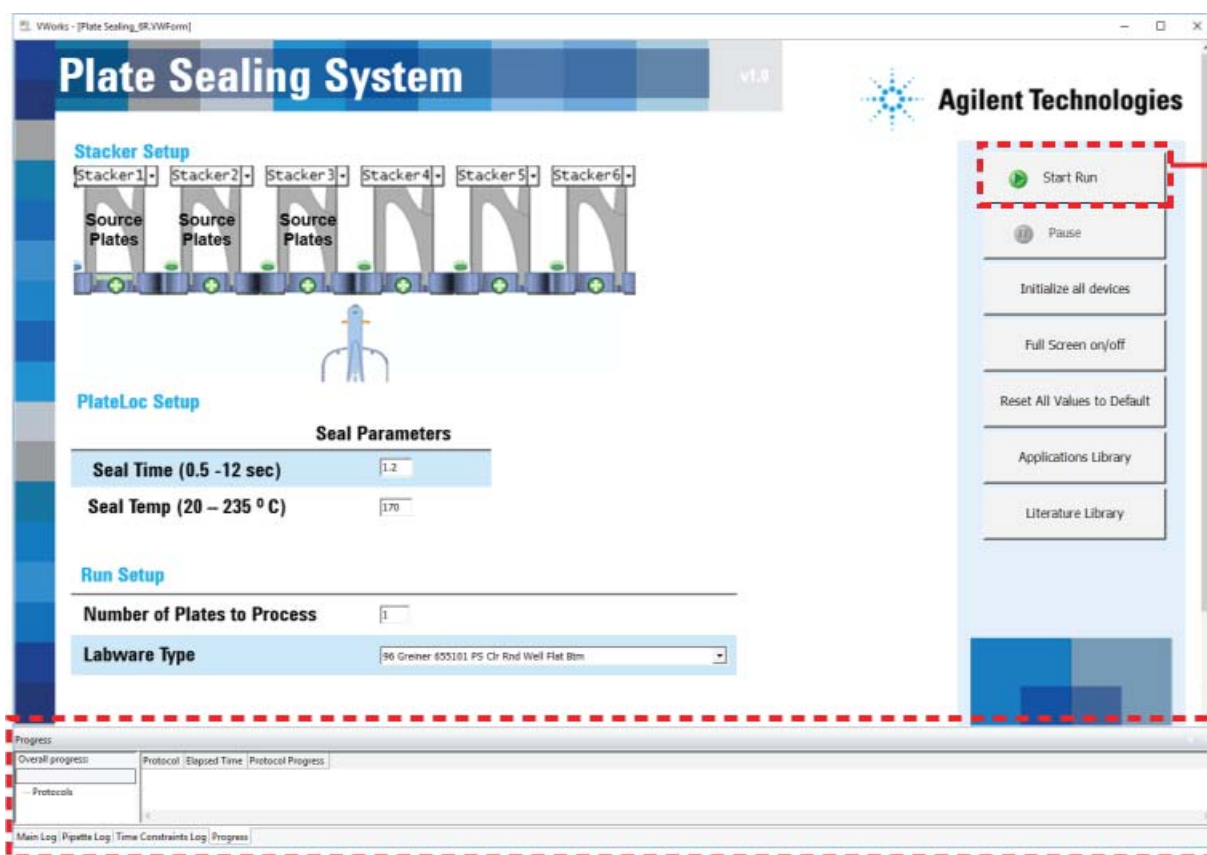
- 1 *Optional.* In the form, click **Initialize all devices**. If you skip this step, the software will prompt you to initialize the devices in the next step.

The initialization process establishes communication with the BenchCel Microplate Handler and the PlateLoc Sealer and homes the devices.

- 2 Click **Start Run** .

If you have not already initialized the devices, a message appears asking you to initialize the devices.

The protocol run starts. To monitor the progress of the run, check the **Progress** tab at the bottom of the VWorks window.



At the end of the run, the BenchCel stacker grippers automatically release the labware so that you can unload the labware.

A protocol complete message appears.


If you close the protocol form, a message asks if you would like to save changes to the form:

- Click **Yes** to save the parameter settings in the form.
- Click **No** to keep the previously saved parameter settings in the form.

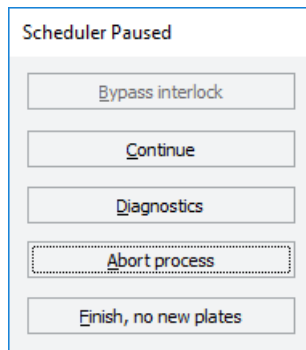
The next time you open the form, it displays the last set of saved parameter settings. If you want to return to the default values, click **Reset All Values to Default**.

Pausing and continuing the run

To pause and continue the run:

- 1 In the **Plate Sealing** form, click  **Pause**.

The task currently in progress finishes before the protocol pauses. The Scheduler Paused dialog box opens.



- 2 When you are ready to resume the run, click **Continue** in the **Scheduler Paused** dialog box.

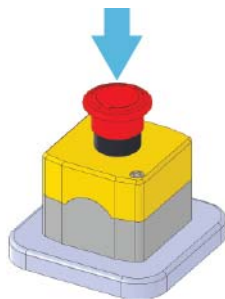
For details about the other options in the Scheduler Paused dialog box, see the [VWorks Automation Control User Guide](#).

Stopping in an emergency

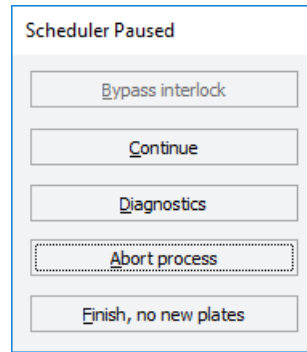
CAUTION You might not be able to resume a protocol after an emergency stop. Do not use an emergency stop to pause a run. To pause and continue a run, use the Pause button.

To stop in an emergency:

- 1 Press the red button on one of the emergency-stop pendants.



The Scheduler Paused dialog box opens.



- 2** To reactivate the emergency-stop, turn the red button clockwise. The spring-loaded button pops up.



- 3** In the Scheduler Paused dialog box, select the appropriate command. For details, see the [VWorks Automation Control User Guide](#).
Depending on the state of the workstation when the emergency stop was activated, the run may not be recoverable.



Protocol Guide

G5590-90002 Revision A

October 2017