Automated Plate Sealing

Protocol Guide

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Original Instructions
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Automated Plate Sealing Protocol Guide

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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
Before you start

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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
<th>See...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer and monitor</td>
<td>The controlling computer that runs the VWorks Automation Control software.</td>
<td>VWorks Automation Control User Guide</td>
</tr>
</tbody>
</table>
| 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.  
- 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. | BenchCel Microplate Handler User Guide |
| 3    | BenchCel safety equipment        | An emergency-stop pendant and a shield in front of the BenchCel robot protect operators from moving-parts hazards. | BenchCel Microplate Handler User Guide      |
| 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. | PlateLoc Thermal Microplate Sealer User Guide |
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>
<thead>
<tr>
<th>Labware entry in VWorks list*</th>
<th>Labware name</th>
<th>Manufacturer part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 Costar 3961 PP 2ml assay block</td>
<td>96-Well Clear V-Bottom 2mL Polypropylene Deep Well Plate</td>
<td>Corning Costar 3961</td>
</tr>
<tr>
<td>96 Greiner 655101 PS Clr Rnd Well Flat Btm</td>
<td>96-Well Microplate, Polystyrene, Round Well, Flat Bottom</td>
<td>Greiner 655101</td>
</tr>
<tr>
<td>96 EK 2460 PP Rnd Well U Btm</td>
<td>96 Target Well Plates, 500 µL, U-Bottom, Clea</td>
<td>E&amp;K Scientific EK-2460</td>
</tr>
<tr>
<td>96 Nunc Deep Well 1 mL</td>
<td>Nunc 96 DeepWell plate, sterile, 1.3-mL volume</td>
<td>Thermo Scientific 260251</td>
</tr>
<tr>
<td>96 Seahorse Storage Plate 2ml Square Pyramid</td>
<td>Seahorse 96-well PD-702 polypropylene storage microplate, 2ml/square well, pyramid bottom</td>
<td>Agilent Technologies 201379100</td>
</tr>
<tr>
<td>384 Greiner 781101 PS clr flt btm</td>
<td>Greiner 384 well plate, polystyrene, clear flat bottom</td>
<td>Greiner 781101</td>
</tr>
<tr>
<td>1536 Greiner 782076 blk sqr well flt btm</td>
<td>Greiner FLUOTRAC 200 1536-well plate, black polystyrene, flat bottom</td>
<td>Greiner 782076</td>
</tr>
</tbody>
</table>

*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.
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.
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.

   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.
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.

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**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 button](image).

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

![Scheduler Paused dialog box](image)

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.