Notices

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96AM Wash Station Maintenance Guide

This guide contains the following topics:

• “About this guide” on page 2
• “About the 96AM Wash Station” on page 4
• “Required resources and workflow” on page 4
• “Determining if the chimneys are in good condition” on page 5
• “Emptying the 96AM Wash Station” on page 6
• “Uninstalling the 96AM Wash Station” on page 10
• “Replacing damaged chimneys” on page 11
• “Installing the wash station and connecting the tubing” on page 12
• “Testing the 96AM Wash Station” on page 17
About this guide

Who should read this guide

The instructions in this guide assume that you have the following:

- An understanding of the AssayMAP Bravo Platform
- Familiarity with the Protein Sample Prep Workbench
- Experience in working on mechanical equipment

What this guide covers

This guide describes how to inspect and replace chimneys in the 96AM Wash Station.

*Figure* 96AM Wash Station

The 96AM Wash Station is a component of the AssayMAP autofilling station, as the following figure shows.

*Figure* AssayMAP autofilling station, including 96AM Wash Station, Pump Module, tubing, and carboys
Related user guides and where to find them

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<th>See...</th>
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<tr>
<td>Using the Protein Sample Prep Workbench</td>
<td>Literature Library in the Protein Sample Prep Workbench</td>
</tr>
<tr>
<td>Setting up, operating, maintaining, and troubleshooting the Bravo Platform</td>
<td><em>Bravo Automated Liquid Handling Platform User Guide</em></td>
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<td>Replacing a defective syringe in the Bravo 96AM Head</td>
<td><em>AssayMAP Bravo Syringe Replacement User Guide</em></td>
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**To access the product user guides, do one of the following:**

- Go to the Agilent Automation Solutions Knowledge Base web pages at [www.agilent.com/chem/askb](http://www.agilent.com/chem/askb) and click the link for PDF user guides.
- 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**.

**Accessing the user documentation**

You can access the user documentation in the Protein Sample Prep Workbench as follows:

- **Application user guides.** In the **Protein Sample Prep Workbench**, click **Utility Library**, locate the utility of interest, and then click **Instructions**.
- **Utility instructions.** In the **Protein Sample Prep Workbench**, click **Literature Library**, locate the topic of interest, and then click **Open**.

Alternatively, you can access the user documentation in the **VWorks Knowledge Base** using either of the following methods:

- On the Windows desktop, click **Start > All Programs > Agilent Technologies > VWorks > User Guide > VWorks Knowledge Base**.
About the 96AM Wash Station

CAUTION  Ensure that you use only the 96AM Wash Station on the AssayMAP Bravo Platform. Using a model of the Tip Wash Station other than the 96AM Wash Station can result in a potential crash with the Bravo 96AM Head.

The 96AM Wash Station has 96 chimneys and is scaled to work with the syringe probes in the Bravo 96AM Head. The wash station is used for washing the syringes and washing cartridges or pipette tips that are seated on the syringe probes.

Figure  Chimney detail in the 96AM Wash Station

Fresh wash liquid enters the 96AM Wash Station through two inlet ports (1), shown in the following figure. The wash liquid flows up through the chimneys, and the waste overflows from the chimneys and is removed through two outlet ports (2).

Figure  Inlet ports (1) and outlet ports (2) in the 96AM Wash Station

Required resources and workflow

WARNING  The probes of the Bravo 96AM Head are sharp and can scratch you if they brush across your hand. A probe scratch can expose you to any contaminants remaining on the probes. Wear gloves and use extreme caution to avoid brushing against the probes.

Ensure that you have the following tools and materials:
- Replacement Wash Station Chimneys: large internal diameter, pack 100, Agilent part number 15586-002
- Hex driver to uninstall and install 2-mm hex screws
- 1 needle-nose pliers to remove the bad chimneys from the 96AM Wash Station
- Small rubber pad or foam to protect your thumb when seating a new chimney in the 96AM Wash Station.
Perform the following steps in the order given.

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<th>Step</th>
<th>For this task...</th>
<th>See...</th>
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<td>2</td>
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<td>4</td>
<td>Replace the damaged chimneys.</td>
<td>“Replacing damaged chimneys” on page 11</td>
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<tr>
<td>5</td>
<td>Install the wash station.</td>
<td>“Installing the wash station and connecting the tubing” on page 12</td>
</tr>
<tr>
<td>6</td>
<td>Verify the wash station teachpoint and adjust it, as necessary:</td>
<td>Bravo Automated Liquid Handling Platform User Guide</td>
</tr>
<tr>
<td></td>
<td>a In the VWorks software, start the AssayMAP Teachpoint Update protocol.</td>
<td>Note: Agilent field service can refer to the AssayMAP Bravo Platform Installation Guide.</td>
</tr>
<tr>
<td></td>
<td>b In the AssayMAP 1 profile, adjust the teachpoint for the 96AM Wash Station.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c In the AssayMAP Teachpoint Update protocol, apply the teachpoint update to the remaining profiles in the Protein Sample Prep Workbench automatically.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Start up the AssayMAP Bravo Platform and verify that all the chimneys work consistently.</td>
<td>“Testing the 96AM Wash Station” on page 17</td>
</tr>
</tbody>
</table>

**Determining if the chimneys are in good condition**

During normal operation of the 96AM Wash Station, the fluid flow out of the top of each chimney and the shape of the fluid dome at the top of each chimney must consistent. To ensure consistency in the fluid flow from each chimney, the chimneys must be:

- Clean and free of any debris.
- Free of deformities or irregularities.
See the good condition chimneys in the following figure. The chimneys must not be damaged, such as those shown in the figure (possibly from a head collision).

- Equal in height and installed in the same orientation.

**Figure** Close up views of 96AM Wash Station chimneys

Chimney irregularities or damaged chimneys can cause large droplets to cling to the syringe probes, which can introduce variability in the assay.

### Emptying the 96AM Wash Station

This topic describes how to use the Pump Reagent task in Bravo Diagnostics to empty any fluid from the wash station.

**Before you start**

**WARNING** The probes of the Bravo 96AM Head are sharp and can scratch you if they brush across your hand. A probe scratch can expose you to any contaminants remaining on the probes. Wear gloves and use extreme caution to avoid brushing against the probes.

**WARNING** When you initialize the Bravo Platform, the head and tie bar can move. To prevent potential injury, keep clear of the device while it is in motion.

**CAUTION** To prevent potential equipment damage, ensure that the deck is clear of any obstacles before initializing the AssayMAP Bravo Platform.

**CAUTION** Using an incorrect profile can cause equipment damage. Ensure that the profile is correct for the head type and deck configuration.
Running the Pump Reagent task to empty the wash station

To empty the wash station using the Pump Reagent task:

1. At the carboy that contains the wash solution, remove the lid and lift it so that the tubing is above the liquid level.

2. Ensure that the Protein Sample Prep Workbench is closed, and then start the VWorks software.
   
   You can use the VWorks desktop icon or the Start menu on the Windows desktop to start the VWorks software.

3. Ensure that Simulation is off.

4. In the VWorks window, open the AssayMAP Bravo device file (AssayMAP Bravo.dev).
   
   To do this, click File > Open. In the Open dialog box, ensure the file type is Device Files (*.dev), select the file, and then click Open.

   The device files are installed in the following default location:

   C:\VWorks Workspace\Workbench\Device Files

5. Click No when the Would you like to initialize devices now? message appears.

6. In the AssayMAP Bravo.dev tab, click Device diagnostics. The Bravo Diagnostics dialog opens.
Click the Profiles tab, select the Profile name AssayMAP 1, and then click Initialize this profile.

If the There appears to be a plate present error message appears, click Ignore and Continue to continue the homing process.

When the Verify that it is safe to home the W-axis message appears, click Retry to continue homing the w-axis.
10 Click the **Processes** tab and run the **Pump Reagent** task as follows:

### Setting | Value
--- | ---
Location | 1
Labware at selected location | 96AM Tip Wash Station
Command to execute | Pump Reagent
Pump Reagent properties
- Reservoir mode | Fill
- Pump speed (0–100%) | 50%
- Pump on time (1–600 s) | 60 seconds
- How often | 1
- Run second pump | Yes
- Second pump speed (0–100%) | 60%
- Use weigh station | No

b Click **Execute command**. The wash station empties.
Uninstalling the 96AM Wash Station

**WARNING**

To prevent potential injury, turn off the Bravo Platform before you install or remove any accessory.

*To uninstall the 96AM Wash Station:*

1. On the side of the Bravo Platform, press the power switch to the off (o) position.
2. Gently, move the Bravo head manually to position it over deck location 6, which will provide unobstructed access to the wash station at deck location 1.

*Figure*  AssayMAP Bravo Platform with head positioned at deck location 6

3. On the left side as you face the front of the AssayMAP Bravo Platform, loosen the two 2-mm screws using a hex driver. Uninstall the bracket that secures the wash station to the platepad.

*Figure*  96AM Wash Station secured with platepad brackets

4. On the opposite side of the platepad, guide the wash station horizontal slot off the platepad inner bracket.
5. Lift the wash station off of the platepad.

For ease of handling, you may disconnect the tubing from the wash station.
Replacing damaged chimneys

To replace the damaged chimneys:

1. Using needle-nose pliers, pull out the defective chimneys from the wash station.

   **IMPORTANT** Ensure that you discard any chimneys that you remove. Using pliers on a chimney will permanently damage the chimney.

2. Inspect the wash station hole in which the chimney was seated. Ensure that the hole is empty and clean.
   If necessary, clean the hole.

3. Orient the new plastic chimney so that the end with the little dot is at the top, and then insert the chimney into the hole in the wash station.

   **Figure** Dot on chimney oriented at top end for installation

4. Using your thumb, press down on the chimney so that the chimney touches the bottom surface of the wash station and is fully seated.
   You can insert a rubber pad between your thumb and the chimney to protect your thumb.
5 Ensure that all the chimneys in the wash station are oriented so that the dots are at the top end of the wash station. Ensure that the tops of the chimneys are level with each other.

*Figure* Chimney dots oriented at top and tops of chimneys aligned

6 Repeat steps 1 to 5 to replace any other defective chimneys.

---

**Installing the wash station and connecting the tubing**

**Installing the 96AM Wash Station**

**Before you start**

*WARNING* To prevent potential injury, turn off the Bravo Platform before you install or remove any accessory.

Ensure that you have the following:

- 96AM Wash Station and the platepad with brackets
- Pump Module 2.0
- Tubing kit with inline filter
- Hex driver for 2-mm screws

Ensure that you install the 96AM Wash Station at deck location 1.
To install the wash station:

1. At deck location 1, ensure the bracketed platepad is installed, and ensure the platepad crosshairs are oriented towards the northwest corner of the deck, as the following figure shows.

Figure 96AM Wash Station installed at deck location 1

2. On the platepad side that is next to the crosshairs, use a hex driver to uninstall the two 2-mm screws, and then remove the bracket.

Note: The wash station is easier to install if you remove the outer bracket, and then replace the bracket after the wash station is in position.
3 Install the wash station on the platepad as follows:

a. Ensuring that the inlet and outlet ports are towards the rear of the deck, place the wash station on the platepad.

b. Guide the platepad’s inner bracket into the wash station’s horizontal slot.

c. Re-install the bracket that you removed in step 2 on the outer side of the platepad. Ensure that you guide the bracket into the corresponding horizontal slot on the wash station. Ensure that both brackets remain engaged as you tighten the bracket screws.

d. Ensure that the wash station sits level on the platepad and that both brackets are holding the wash station securely in place.

Tubing connections for 96AM Wash Station

The following figure shows the AssayMAP Bravo tubing connections for the 96AM Wash Station. As the figure shows, the upper pump (A) is for the fill line and the lower pump (B) is for the empty line.
To ensure proper chimney filling and waste emptying characteristics for the 96AM Wash Station, ensure that you use the proper tubing combination for the Pump Module. The following table gives two recommendations: one for conservative buffer usage, and one for inducing higher volume flow through the chimneys.

<table>
<thead>
<tr>
<th>Fill-and-empty characteristics</th>
<th>Tubing recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High volume flow in chimneys</td>
<td>• Fill line (A) Marprene tubing, 6.4 mm (1/4-in) ID, 1.6 wt</td>
</tr>
<tr>
<td>(recommended)</td>
<td>• Emptying line (B) Marprene tubing, 8 mm (5/16-in) ID, 1.6 wt</td>
</tr>
<tr>
<td></td>
<td>The 5/16-in diameter tubing is too large for the quick-disconnect fittings and the wash station ports. You use this larger tubing only in the pump head and splice it to the 1/4-in tubing to enable connections with the other fittings and wash station ports. See the following figure and table for a tubing example and a description of the tubing components.</td>
</tr>
<tr>
<td>Conservative buffer usage</td>
<td>• Fill line (A) Marprene tubing, 4.8 mm (3/16-in) ID, 1.6 wt</td>
</tr>
<tr>
<td></td>
<td>• Emptying line (B) Marprene tubing, 6.4 mm (1/4-in) ID, 1.6 wt</td>
</tr>
</tbody>
</table>
Installing the wash station and connecting the tubing

**Figure**  Tubing example and components for high volume flow in the chimneys

<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Source bottle</td>
<td>Supplies the fill liquid for the wash station.</td>
</tr>
<tr>
<td>2</td>
<td>Waste bottle</td>
<td>Collects the waste liquid that is pumped from the reservoir.</td>
</tr>
<tr>
<td>3</td>
<td>Tubing, 8-mm (5/16-in)</td>
<td>For high volume flow in the chimneys, use the 5/16-in diameter Marprene tubing for the length of tubing in the pump head.</td>
</tr>
<tr>
<td>4</td>
<td>Tubing, 6.4-mm (1/4-in)</td>
<td>The 1.4-in Marprene tubing is for the input and output tubing connections to the wash station and the source and waste bottles. The 5/16-in diameter tubing is too large for the quick-disconnect fittings and the wash station ports. So, you use a union connector (5) to splice the 5/16-in tubing to the 1/4-in tubing.</td>
</tr>
<tr>
<td>5</td>
<td>Connector, union</td>
<td>Joins two sizes of tubing, such as the 5/16-in tubing to the 1/4-in tubing.</td>
</tr>
<tr>
<td>6</td>
<td>Quick-disconnect fitting</td>
<td>Enables easy removal of the wash station. The quick-disconnect fittings include an automatic-close valve. Fluid can flow only if a positive connection is made.</td>
</tr>
<tr>
<td>7</td>
<td>Inline pump filter</td>
<td>Removes the particulates that can clog the chimneys in the wash station.</td>
</tr>
<tr>
<td>8</td>
<td>3-way connector</td>
<td>Enables one tube to branch into two tubes at the input and output ports on the wash station.</td>
</tr>
</tbody>
</table>
Testing the 96AM Wash Station

Before you start

**CAUTION** Any time that you uninstall and reinstall the wash station, the wash station teachpoint can shift. To prevent a potential crash, verify the wash station teachpoint in all the profiles any time you reinstall the wash station.

For the teachpoint verification workflow, see “Required resources and workflow” on page 4.

Starting up the AssayMAP Bravo Platform

To test the performance of the wash station, you run the Startup utility in the Protein Sample Prep Workbench. During the Startup protocol, carefully observe the fluid as it flows out of the top of the chimneys in the wash station. Ensure that the fluid flow out of the top of each chimney and the shape of the fluid dome at the top of each chimney is consistent.

- If fluid does not flow out of a chimney, run the Startup protocol again to remove any bubble that might be blocking the flow.
- If a fluid dome shape is different than the others, carefully examine the top of the chimney for irregularities.

*Note:* Chimney irregularities can result from a collision between the head and the wash station.

**To start up the system:**

1. Check the levels of the wash station source and waste carboys, and fill or empty as required.
2. Turn on the AssayMAP Bravo Platform, Pump Module, and the Peltier Thermal Station Controller, if included.
3. Start the **Protein Sample Preparation Workbench**, and open the **Utility Library**.
4. Open the **System Startup/Shutdown utility**.
5. Click **Run Startup** to initialize the AssayMAP Bravo Platform and accessories.

**WARNING** When you initialize the Bravo Platform, the head and tie bar can move. To prevent injury, keep clear of the device while it is in motion.

6. During the Startup protocol, verify that all the wash station chimneys have liquid flowing through them.
Troubleshooting problems with the wash station

Locate your problem in the following table and try the solution. If the problem persists after you try the solutions, contact Automation Solutions Technical Support.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Potential cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid flow is constricted or insufficient in all the chimneys of the wash station.</td>
<td>The tubing is kinked or blocked, or the pump head clamp is too tight for the tube size.</td>
<td>Ensure the tubing is not kinked or blocked. Replace the tubing as necessary. If necessary adjust the pump head clamp, see the Agilent <em>Pump Module User Guide</em>.</td>
</tr>
<tr>
<td></td>
<td>The inline filter is clogged.</td>
<td>Replace the inline filter. See “Tubing connections for 96AM Wash Station” on page 14.</td>
</tr>
<tr>
<td></td>
<td>The tubing diameter of the fill line is too small.</td>
<td>Replace the tubing on the fill line using larger diameter tubing. See “Tubing connections for 96AM Wash Station” on page 14.</td>
</tr>
</tbody>
</table>
| Liquid is not flowing through a subset of the chimneys in the wash station. | The chimneys are blocked or damaged.                                            | To resolve the problem chimneys:  
1 Use a plastic Pasteur pipette to quickly aspirate liquid through the chimneys.  
2 Run the Pump Reagent task in Bravo Diagnostics to pump liquid through the chimneys at a maximum rate to dislodge any clogs.  
3 If the problem persists, replace the problematic chimneys. See “Replacing damaged chimneys” on page 11 |
| Waste is accumulating in the wash station.                             | The tubing is kinked or blocked, or the pump head clamp is too tight for the tube size. | Ensure the tubing is not kinked or blocked. Replace the tubing as necessary. If necessary adjust the pump head clamp, see the Agilent *Pump Module User Guide*. |
|                                                                        | The tubing diameter is too small for the required flow.                         | Replace the tubing on the empty line, using larger diameter tubing for the section that routes through the pump head (active section). See “Tubing connections for 96AM Wash Station” on page 14. |
| Tubing creeps through the pump head instead of being secured in place.  | The pump head clamp is too loose for the tube size.                             | Adjust the tubing clamp for the tube size. See the Agilent *Pump Module User Guide*.            |
| The tubing is crushed or damaged in the pump head.                     | The pump head clamp is too tight for the tube size.                             | Adjust the tubing clamp for the tube size. See the Agilent *Pump Module User Guide*.            |