Agilent

AssayMAP Bravo Platform

Installation Guide

Protein Sample Prep Workbench 4.0.2

Original Instructions

Notices

Manual Part Number

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1 Before you start

- "About this guide" on page 2
- "Related guides and where to find them" on page 2
- "Safety information" on page 4

About this guide

Intent

This installation guide is intended for use by qualified and authorized Agilent Technologies service personnel who possess an in-depth service background and have received training in the installation of the AssayMAP Bravo Platform.

Software versions

This guide describes the following software versions for the AssayMAP Bravo Platform:

- Protein Sample Prep Workbench 4.0.2
- VWorks Automation Control 14.4

Related guides and where to find them

Title	Part number	Description	Where to find it
Site Prep and installation checklists for Protein Sample Prep Workbench 4.0.2			
Agilent G5571AA, G5572AA AssayMAP Bravo Platform Site Preparation Checklist	D0021058	Specifies the site requirements that must be met before installing the AssayMAP Bravo Platform, including lab bench space, environmental conditions, electrical outlets, and computer and software requirements.	https://www.agilent.com/en/products/automation-solutions/protein-sample-preparation/assaymap-bravo-platform
Agilent G5571AA, G5572AA AssayMAP Bravo Platform Installation Checklist	D0021060	Provides an outline of the tasks to be performed to install the AssayMAP Bravo Platform and verify the installation.	
Unpacking, safety, and installation guides			
Bravo Platform Unpacking Guide	G5523-90000	Describes how to unpack the Bravo Platform.	Printed copy ships with the platform.
Bravo Platform Safety and Installation Guide	G5563-90002	Provides safety guidelines, site specifications, and installation procedures for the Bravo Platform.	Printed copy ships with the platform. PDF in UserGuides folder*
General Safety Guide	G5500-90015	Provides safety label descriptions and guidelines, including a list of known compatible chemicals.	Printed copy ships with the platform. PDF in UserGuides folder*
VWorks Automation Control 14.4 Installation Guide	D0005579	Provides detailed software installation instructions.	PDF in UserGuides folder*

Title	Part number	Description	Where to find it
VWorks Plus Version 14.4 Configuration and Administration Guide	D0004030	Describes how to configure OpenLab Control Panel for VWorks Plus.	PDF in UserGuides folder*
VWorks Standard Version 14.4 Configuration and Administration Guide	D0004031	Describes how to configure OpenLab Control Panel for VWorks Standard.	PDF in UserGuides folder*
VWorks Automation Control Version 14.4 Setup Guide	D0004377	Describes how to set up the VWorks software, including how to configure and connect the VWorks databases.	PDF in UserGuides folder*
User and maintenance guides			
Bravo Platform User Guide	D0004797	Provides instructions for setting up, operating, maintaining, and troubleshooting the Bravo Platform.	Literature Library and PDF in UserGuides folder*
AssayMAP Bravo Platform Error Recovery Guide	D0021233	Describes how to handle common error messages.	Literature Library and PDF in UserGuides folder*
AssayMAP Bravo Platform Labware Reference Guide	D0012628	Provides a photo reference and descriptions of the labware options in the apps and utilities of the Protein Sample Prep Workbench.	Literature Library and PDF in UserGuides folder*
AssayMAP Bravo Syringe Replacement User Guide	G5409-90021	Describes how to replace a defective syringe in the Bravo 96AM Head.	Literature Library and PDF in UserGuides folder*
96 Channel Wash Station Maintenance Guide	SD-V1000098	Describes how to replace chimneys in a 96 channel wash station and how to troubleshoot wash station problems.	Literature Library and PDF in UserGuides folder*
AssayMAP Syringe Test Utility User Guide	–	Describes how to run a syringe test of the Bravo 96AM Head.	Literature Library
App and utility user guides for Protein Sample Prep Workbench	–	Includes user guides for each app and utility in the Protein Sample Prep Workbench.	Literature Library
VWorks Knowledge Base	–	Includes VWorks user guides and user guides for the devices that VWorks controls.	Literature Library

* PDFs are installed at C:\Program Files (x86)\Agilent Technologies\VWorks\UserGuides. The Literature Library in the Protein Sample Prep Workbench contains links to the guides in this folder.

Service documentation

In addition to the syringe replacement and wash station maintenance guides listed in the preceding table, Agilent field service engineers can find instructions on how to maintain and repair the Bravo Platform in the *Bravo Platform Service Guide* (part number G5562-90002, revision E or later).

Changes to existing procedures and additional service procedures are published as service bulletins and posted in the Agilent Field Portal.

Safety information

Before installing and using the Bravo Platform, make sure you are aware of the potential hazards and understand how to avoid being exposed to them. You must be properly trained in the correct and safe installation and operation of the device. For details, see the *Bravo Platform Safety and Installation Guide*.

Do not substitute parts or make any unauthorized modifications to the Bravo Platform or the supplied safety equipment.

WARNING

Changing or modifying the Bravo Platform safety equipment may prevent the safe operation of the device, invalidate its safety compliance, and lead to personal injury or property damage. Any customer who does not use the supplied safety equipment or who modifies the supplied safety equipment assumes full responsibility for providing an appropriate level of safety for its operators and for providing the applicable safety compliance marking and documentation.

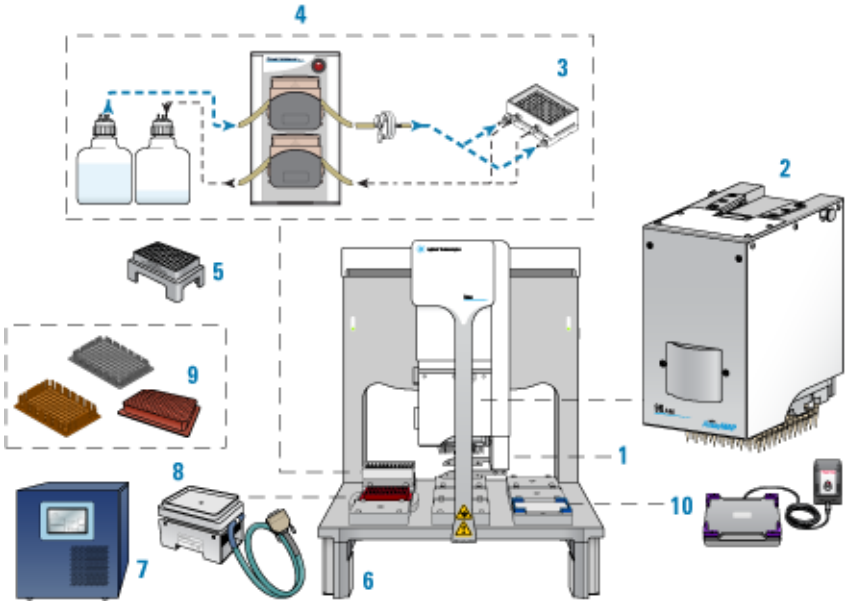
2 Installing the platform

- "Overview of the hardware components" on page 6
- "Computer requirements" on page 7
- "Installation workflow for standard configuration" on page 8
- "Installing the Bravo risers" on page 9
- "Before you install the AssayMAP head" on page 12
- "Installing the Wash Station and Pump Module" on page 15
- "Installing the standard platepads" on page 26
- "Installing the Peltier Thermal Station" on page 28
- "Installing and connecting the Orbital Shaking Station" on page 33

Overview of the hardware components

The following figure and table show the components of the AssayMAP Bravo Platform, which are required for running the AssayMAP protocols.

Figure AssayMAP Bravo Platform components



Item	Required hardware
1	Gripper upgrade
2	Bravo 96AM Head
3	96AM Wash Station or the later model 96 Channel Wash Station
4	Pump Module 2.0 and two carboys
5	96AM Cartridge & Tip Seating Station
6	Risers, 146 mm
7	STC controller
8	Peltier Thermal Station with custom plate nest
9	Thermal plate insert
10	Orbital Shaking Station with Control Unit

CAUTION **To avoid a hardware crash and equipment damage, ensure that the wash station contains the white wide-bore chimneys when using the 25 µL cartridges.**

Note: Agilent has been shipping the wash station with the wide-bore chimneys since 2020. These chimneys can be used with both 5 and 25 µL cartridges and are a requirement for 25 µL cartridges to avoid equipment damage.

In addition to the components listed in the preceding table, the AssayMAP Bravo Platform includes:

- Bravo Standard Light Curtain and the emergency-stop pendant shown in the following figures
- Computer workstation

Figure Standard configuration with Light Curtain

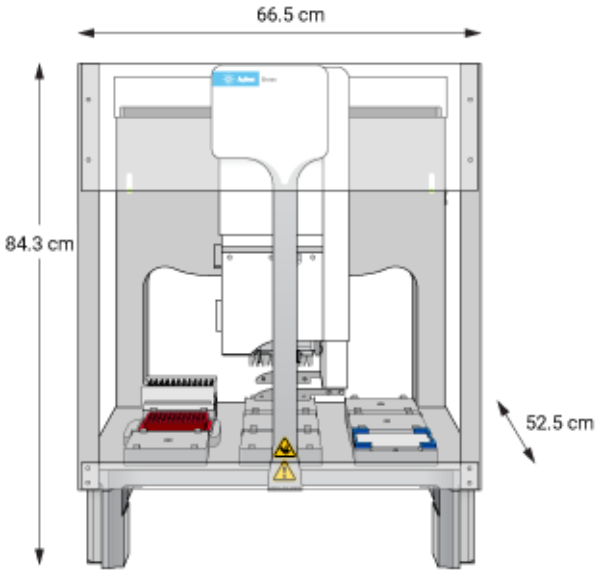
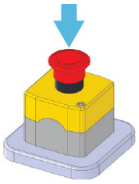


Figure Emergency-stop pendant



Computer requirements

The software user interface for the AssayMAP applications is optimized for a monitor with a resolution of 1920 x 1080 (full HD).

For a full list of the computer requirements, see the *AssayMAP Bravo Platform Site Preparation Checklist.*

Installation workflow for standard configuration

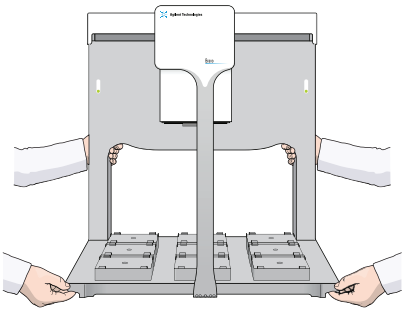
Step	For this task...	See...
1	Verify that the installation site meets the site requirements. **IMPORTANT** Ensure that the laboratory table is not bowed and is perfectly flat and rigid. A bowed or wobbly table will cause placement errors during protocol execution. Clear the table of all material that might interfere with the installation.	*AssayMAP Bravo Platform Site Preparation Checklist*
2	Unpack the computer and ensure that it meets the computer specifications.	*AssayMAP Bravo Platform Installation Checklist*
3	Unpack the Bravo Platform and accessories. **IMPORTANT** Do not remove the y-axis shipping stop from the head mount until after you have installed the risers ("Installing the Bravo risers" on page 9).	*Bravo Platform Unpacking Guide*
4	Install the Bravo deck risers.	"Installing the Bravo risers" on page 9
5	Connect the Bravo Platform power cord, communications cable, and pendant cable. *Note:* You will install and connect the Light Curtain after setting the teachpoints.	*Bravo Platform Safety and Installation Guide*
6	Install the Bravo 96AM Head.	"Before you install the AssayMAP head" on page 12
7	Install the 96AM Wash Station and Pump Module.	"Installing the Wash Station and Pump Module" on page 15
8	Install the standard platepads at the specified Bravo deck locations.	"Installing the standard platepads" on page 26
9	Install the Peltier Thermal Station and the Inheco STC Controller.	"Installing the Peltier Thermal Station" on page 28
10	Install the Orbital Shaking Station.	"Installing and connecting the Orbital Shaking Station" on page 33
11	Set up the computer, install the software, and verify the device files.	"Setting up the computer and software" on page 37
12	Set the AssayMAP head teachpoints and the gripper *y*-axis offset.	"Setting the teachpoints" on page 93
13	Install the Bravo shields and Light Curtain.	*Bravo Platform Safety and Installation Guide*
14	Verify the installation and setup.	"Verifying the installation and setup" on page 119

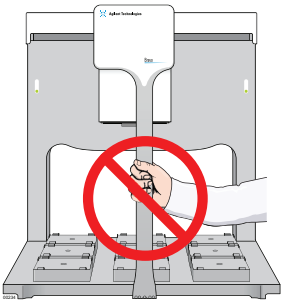
Installing the Bravo risers

Before you start

WARNING **The Bravo device weighs approximately 52 kg (115 lb). Attempting to move the Bravo device without assistance could cause personal injury. Request assistance and use proper lifting techniques when moving the Bravo device.**

CAUTION **Tugging on the tie bar or using it to lift the Bravo Platform can damage the device. Do not grab the tie bar when lifting the Bravo Platform.**





IMPORTANT The following procedure is intended only for fully qualified and trained Agilent service engineers.

Ensure that you have the following:

- Two people to lift the Bravo Platform
- Foam pad (3-inch thick) or similar cushioning material to use when you tilt the Bravo Platform onto its back plate

  Note: EPE foam is preferred due to its firmness.
- Risers
- Hex drivers

Procedure

CAUTION **When tilting the Bravo Platform backwards to rest on its back plate, the head mount can slide back rapidly along the y-axis and collide with the back plate. To prevent potential equipment damage, ensure that the y-axis shipping stop remains installed on the head mount until after you install the risers.**

To install the risers:

1. Place the foam pad on the work table behind the Bravo Platform.
2. Ensure that the head mount is resting against the Bravo back plate. With a person positioned on each side of the Bravo Platform, slowly tilt the device backwards until the back plate rests on the foam.

3 Remove the four rubber feet from the base of the Bravo deck.

Figure Bottom view of Bravo deck

4 On the bottom of the Bravo deck, install the two risers, one on each side. Use the four screws and washers provided to install each riser. Install the screws as follows:

a Install the screws, but do not fully tighten them yet. First install the top screws and then the bottom screws.

b Ensure that the risers are flush to the base of the Bravo deck, and then tighten all the screws.

Figure Top screw located at inner hole

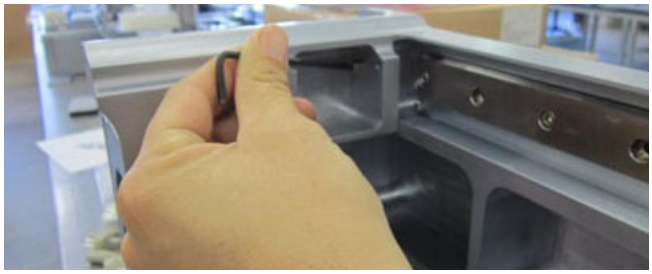
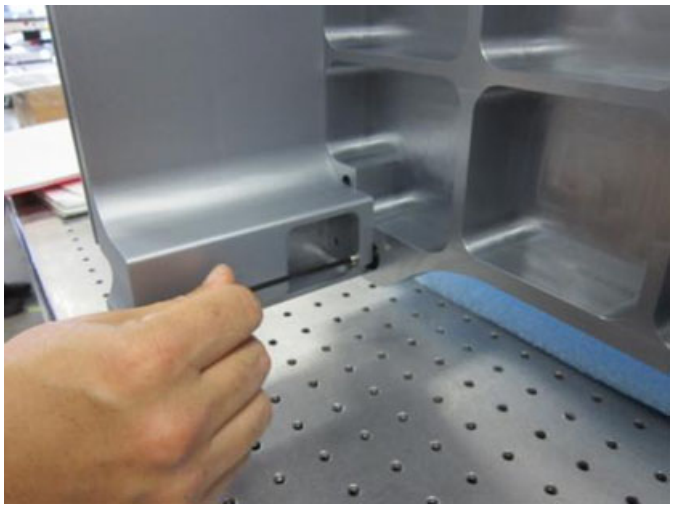


Figure Bottom screw located at outer hole

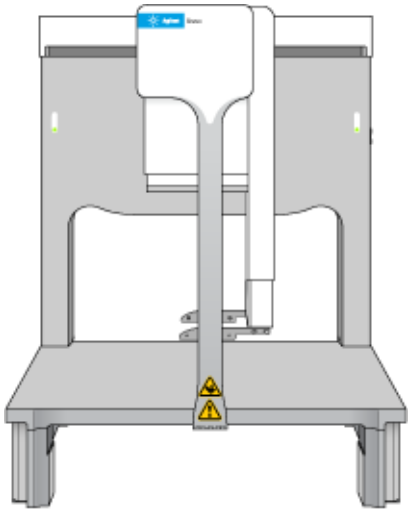


5 Ensure the risers are installed securely, and the outside edges of the risers are flush with the Bravo base.

6 Lift the Bravo Platform up onto the risers using proper lifting techniques.

WARNING **Attempting to lift the Bravo device without assistance could cause personal injury and result in equipment damage. Request assistance and use proper lifting techniques when lifting the Bravo device.**

Figure Bravo Platform on risers with no deck platepads



Ensure that the instrument and riser assembly does not wobble and that it sits flat on the table. If the Bravo Platform has any wobble or the risers have uneven seating, replace or realign and tighten the risers.

Ensure that you provide at least 31-cm (12-inch) clearance behind the Bravo Platform.

IMPORTANT Make sure that you remove the *y*-axis shipping stop from the Bravo head mount. For instructions, see the *Bravo Platform Unpacking Guide*.

IMPORTANT Before you install any platepads or accessories, use a clean lint-free cloth to wipe the Bravo deck and ensure that it is clean.

Before you install the AssayMAP head

CAUTION **If the tip-box stripper pins are extended, the pins will crash into the wash station during syringe washing. To prevent potential equipment damage, ensure that the pins are always retracted during use.**

Workflow

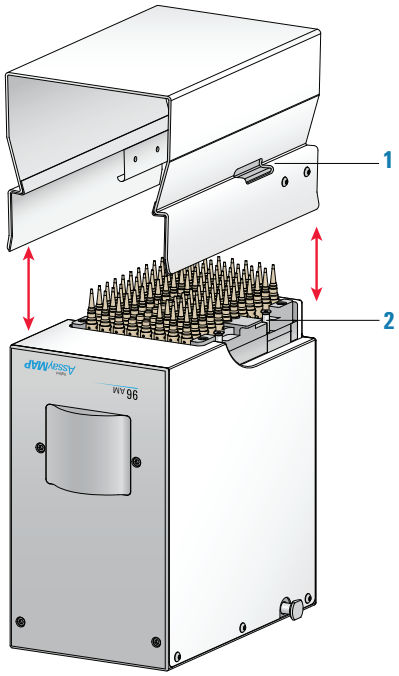
Step	For this task...	See...
1	Remove the Bravo 96AM Head from the storage stand.	"Removing the head from storage stand" on page 12
2	Check the position of the tip-box stripper pins in the head.	"Checking the tip-box stripper pins" on page 13
3	If necessary, retract the tip-box stripper pins.	"Retracting the tip-box stripper pins" on page 14
4	Install the Bravo 96AM Head.	*Bravo Platform Safety and Installation Guide*

Removing the head from storage stand

To remove the head from the storage stand:

1 Ensure that the top of the head is resting on a clean, stable surface. The probes should be facing upward, as the following figure shows.

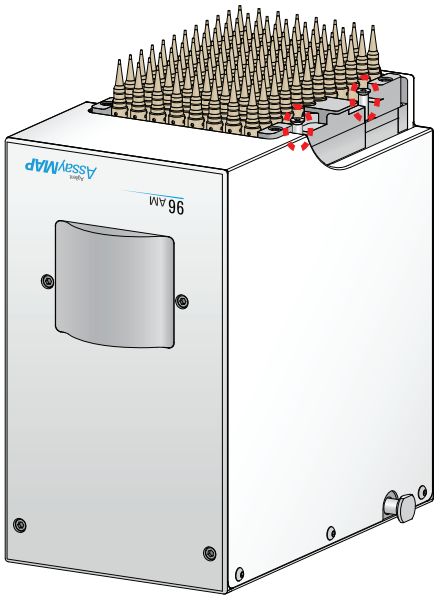
2 Using both hands, carefully lift the stand off of the head while guiding the stand's side cutouts (1) off the head side tabs (2). Use care to avoid touching the probes.



Checking the tip-box stripper pins

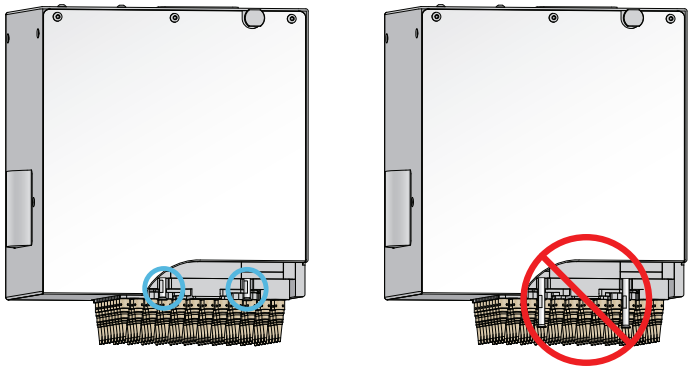
The Bravo 96AM Head has four retractable tip-box stripper pins, two on each side of the probes, as the following figure shows. Before you install the Bravo 96AM Head, ensure that the tip-box stripper pins are retracted, as the following figure shows.

Figure Bravo 96AM Head (upside down) with stripper pins retracted



If necessary, perform the following procedure to retract the stripper pins.

Figure Bravo 96AM Head with tip-box stripper pins retracted (left) and extended (right)



Retracting the tip-box stripper pins

To retract the tip box stripper pins:

CAUTION **If you apply too much force when pressing down or rotating the pin to retract it, the locking mechanism at the tip of the pin can bend or break. A damaged pin cannot lock in the retracted position. Use only gentle pressure to push down and rotate the pin to lock it into place.**

1. Ensure that the top of the head is resting on a clean, stable surface. The probes should be facing upward, as the preceding figure shows.

   If directional arrows appear on the pins, gently rotate the pins so that the arrows are facing you.
2. Insert the end of a 2-mm hex wrench into the head of one of the pins, and very gently push the pin down into the pipette head until you feel the pin stop.

   Verify that the pin is properly seated. If the pin has an arrow, the square end of the arrow should disappear or be barely visible.

IMPORTANT If the pin hits a stop before it retracts completely, the pin locking mechanism is above instead of below the locking dowel. While removing any downward pressure on the pin head, gently rotate the pin in quarter-turn increments until you feel the pin drop into the seated position.

3. When the pin is properly seated, rotate it counterclockwise no more than 180° until it locks.
4. Repeat this procedure for the other pins.

CAUTION **Always turn off the Bravo Platform before installing or uninstalling a liquid-handling head. Failure to do so can damage the head electronics.**

See *Bravo Platform Safety and Installation Guide* for instructions on how to install the head.

Installing the Wash Station and Pump Module

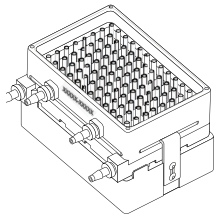
Workflow

Step	For this task...	See...
1	Ensure that the wash station chimneys are in good condition.	"Wash station requirements" on page 15
2	Install the bracketed platepad and the wash station at deck location 1.	"Installing the Wash Station and Pump Module" on page 15
3	Set up the tubing configuration.	"Tubing connections for wash station" on page 19
4	Connect the tubing and the Pump Module power and communication cables.	"Routing the tubing" on page 21

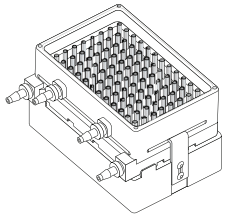
Wash station requirements

Wash station model

The AssayMAP Bravo Platform requires one of the following Agilent wash stations:



96 Channel Wash Station
G5498B#90
(G5409-60125)



96AM Wash Station
G5498B#57
(11961-311)

The wash station is equipped with 96 white, wide-bore chimneys and a bracketed platepad to secure it. For more details on the wide-bore chimneys, see the *96 Channel Wash Station Maintenance Guide.*

CAUTION **To prevent a potential collision, ensure that the wash station has the wide bore chimneys when using the 25 µL cartridges.**

Note: Agilent has been shipping the wash station with the wide-bore chimneys since 2020. These chimneys can be used with both 5 and 25 µL cartridges and are a requirement for 25 µL cartridges to avoid equipment damage.

Wash station inspection

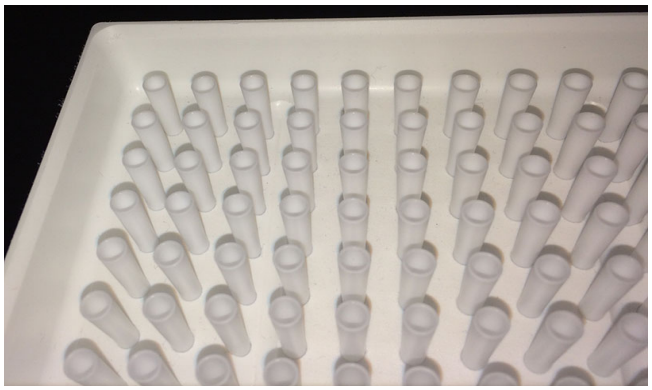
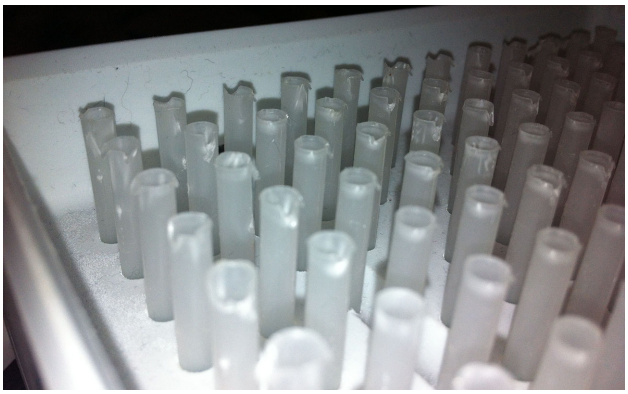
Carefully inspect the chimneys in the wash station to ensure that they are:

- In good condition and free of deformities. The chimneys must not be damaged, such as those shown in the figure (possibly from a head collision).
- Of equal height. When the chimneys are fully seated in the wash station their height should be consistent (less than 1 mm difference in height).

  If any chimney is taller than the others, use your thumb (or place a coin on top of the chimney) and carefully press straight down on the chimney so that it touches the bottom surface (hard stop) of the wash station. Be careful to avoid damaging the chimney.

Good condition chimneys and consistent chimney height are critical for proper wash station function. To replace damaged chimneys, see the *96 Channel Wash Station Maintenance Guide*.

Figure Close up views of wash station chimneys

Good condition chimneys	Damaged chimneys
Wide-bore chimneys	Standard-bore chimneys
	

Installing the wash station

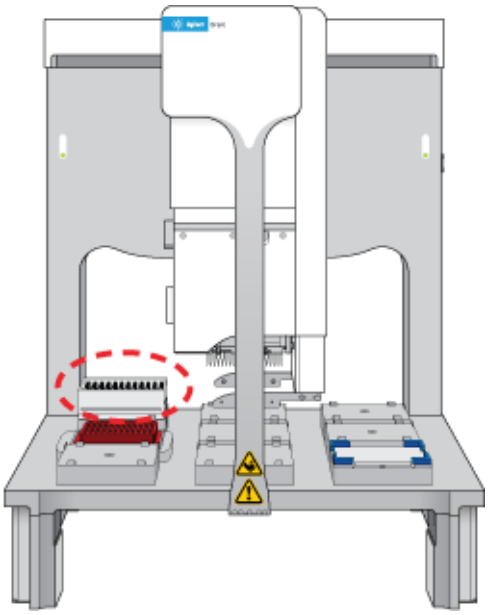
Before you start

Ensure that you have the following:

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

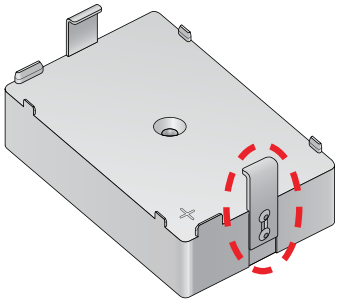
Ensure that you install the wash station at deck location 1.

Figure Wash station installed at deck location 1



To install the wash station:

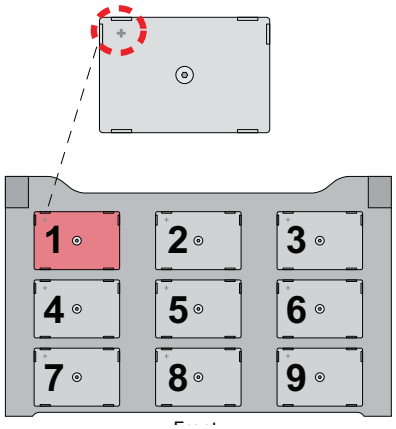
1 Remove the wash station from the bracketed platepad. To do this, loosen or uninstall the two 2-mm screws that attach the outer bracket next to the crosshairs.



2 At deck location 1, install the bracketed platepad. Use the supplied screw to secure the platepad to the deck.

Ensure the platepad crosshairs are oriented towards the northwest corner of the deck, as the following figure shows.

Figure Deck location 1 (top view) showing crosshairs orientation



3 Install the wash station on the platepad as follows:

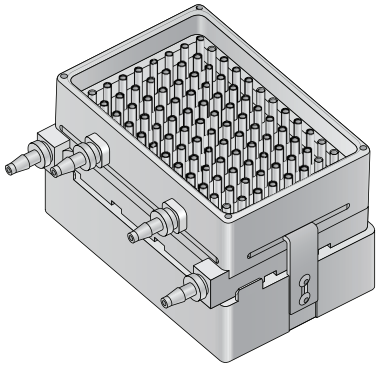
a Ensuring that the inlet and outlet ports are towards the rear of the deck, place the wash station on the platepad at deck location 1.

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

c Re-install the bracket that you removed or loosened 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.

Figure Wash station secured with platepad brackets

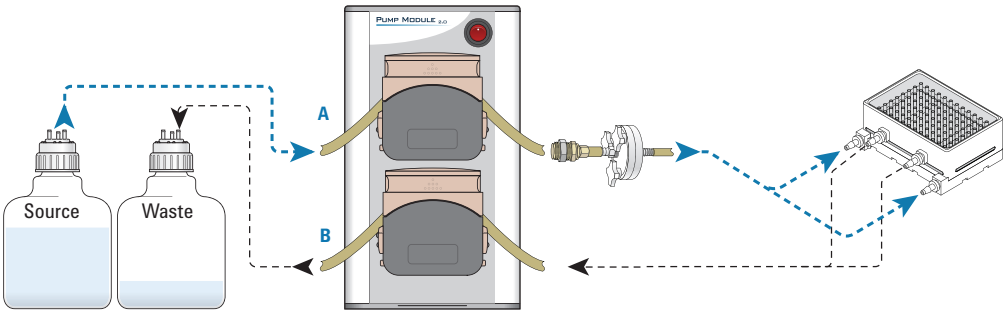


Tubing connections for wash station

The following figure shows the AssayMAP Bravo tubing connections for the 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.

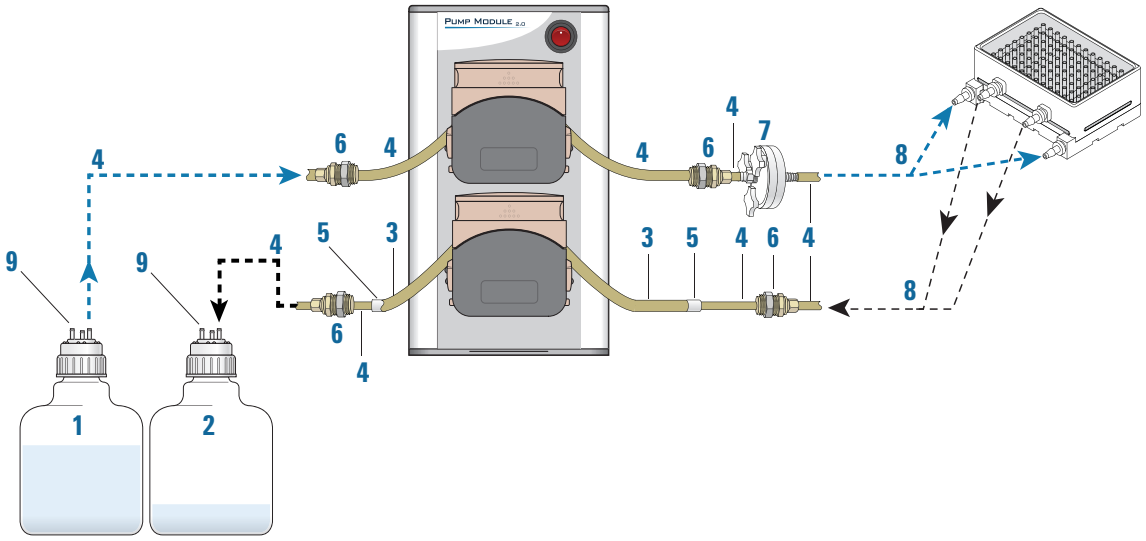
Note: You specify which pump is for filling and which pump is for emptying in Bravo Diagnostics. You can ignore the directional arrows that appear on the pump heads.

Figure Wash station fill line (A) and empty line (B)



To ensure proper chimney filling and waste emptying characteristics for the wash station, ensure that you use the proper tubing combination for the Pump Module. See the following figure and table.

Figure Tubing configuration



Item	Component	Description
1	Source bottle	The carboy that supplies the fill liquid for the wash station.
2	Waste bottle	The carboy that collects the waste liquid that is pumped from the reservoir.
3	Tubing, 8-mm (5/16-in)	The length of tubing in the lower pump head, which is used for emptying the wash station. The larger diameter tubing ensures that the fluid is removed efficiently from the wash station. *Note:* 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.
4	Tubing, 6.4-mm (1/4-in)	The tubing in multiple locations, including the upper pump head, the fill-line tubing from the source bottle to the wash station, the empty-line tubing connections on either side of the 5/16-in diameter tubing, and the tubing that connect to the wash station inlet and outlet ports.
5	Connector, union	The connector that joins the two sizes of tubing.
6	Quick-disconnect fitting	The fitting that enables easy removal of the wash station and quick replacement of the tubing in the pump heads. These fittings include an automatic-close valve. Fluid can flow only if a positive connection is made.
7	Inline pump filter	A filter that removes the particulates that can clog the chimneys in the wash station.
8	3-way connector	A connector that enables one tube to branch into two tubes at the input and output ports on the wash station.
9	Quick-disconnect fitting	The fitting that acts as a vent to prevent pressure or vacuum from building up inside the bottle. Plug a quick-disconnect in the open hole in each bottle. If an extra quick-disconnect fitting is not available, loosen the lid to allow air to vent.

Routing the tubing

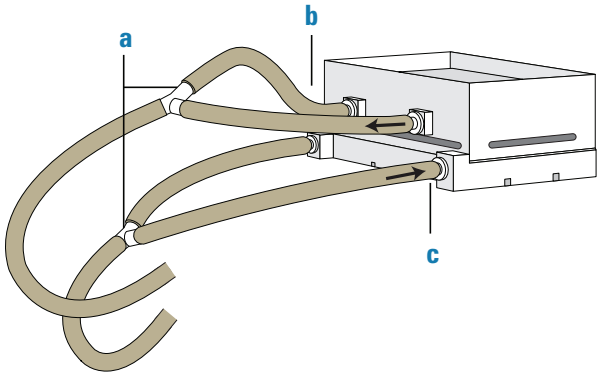
Refer to the preceding table and figure, and use the following procedure to route the wash station tubing.

To route the tubing:

1 Prepare two 3-way (Y-connector) tubing assemblies and connect them to the wash station, as follows:

a Cut two 10.16-cm (4-inch) lengths of the 1/4-inch tubing, and place one length each on two of the three barbed ends of a 1/4-inch 3-way connector (**a**). Cut a third length of tubing to attach to the third barbed end of the 3-way connector.

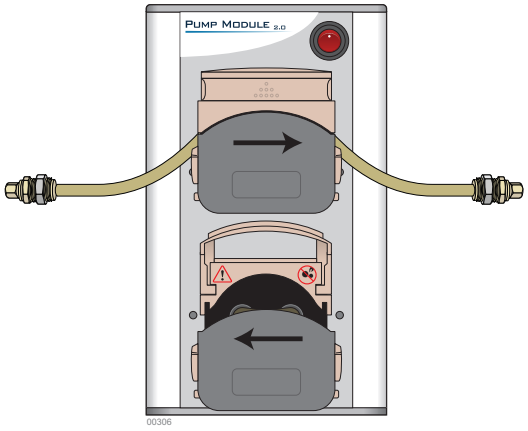
b Attach the two free ends of the prepared 3-way tubing assembly to the wash station outlet ports, as the following figure (**b**) shows.



c Repeat step a to create a second 3-way tubing assembly, and attach it to the wash station inlet ports (**c**). Secure the tubes on the inlet ports using tubing clamps.

2 For the top pump, prepare an approximately 20- to 25-cm (8- to 10-inch) length of 1/4-inch tubing, and insert quick-connect fittings on both ends.

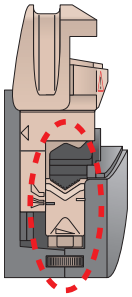
3 Place this tubing assembly within the top pump head, as follows:



a Lift up the flip-top cover on the pump head so that it is fully open.

b On each side of the open pump head, turn the dial to open the clamps (V-grooves) fully to accommodate the diameter of the tubing.

Figure Open pump head (side view) with fully open clamp and clamp dial



c Insert the length of tubing so that it gently arches over the rollers. Ensure the tubing is located in the center of the tube clamps (V-grooves) on either side of the pump head, and then carefully lower the cover.

CAUTION

Incorrectly adjusted clamps and improperly positioned tubing can constrict the flow or damage the tubing when the pump head is closed.To ensure that the tubing is not pinched by the pump head clamp, leave the clamps wide open and only tighten them if necessary. Make sure you push the tubing to the back of the pump head while closing the flip-top cover.

IMPORTANT

If any creeping of the tubing occurs during operation, tighten the clamps slightly using the clamp dials. Ensure that the pump head clamps are set properly for the diameter of the tubing.

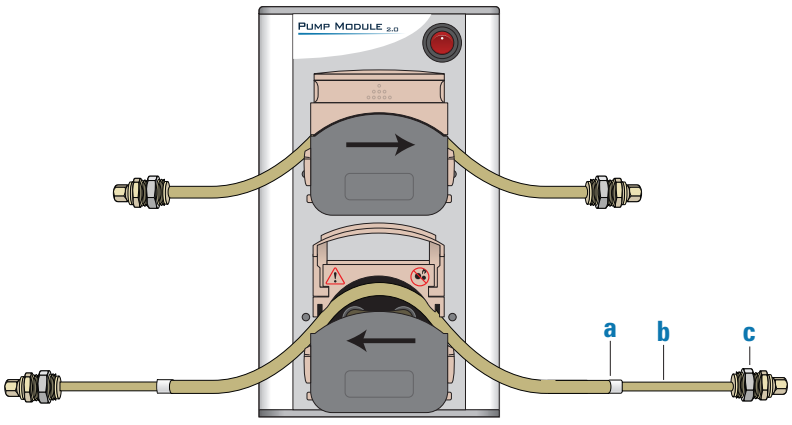
4 For the bottom pump:

a Prepare an approximately 20- to 25-cm (8- to 10-inch) length of 5/16-inch tubing, and insert a union connector (figure, **a**) on each end.

b Connect a 10.16-cm (4-inch) length of 1/4-inch tubing (**b**) to each of the union connectors.

c Connect quick-disconnect fittings (**c**) to the free end of each 1/4-inch tubing section.

d Place this tubing assembly within the bottom pump head. Refer to step 3 for the detailed procedure.



5 Connect the tubing from the Pump Module to the wash station tubing as follows:

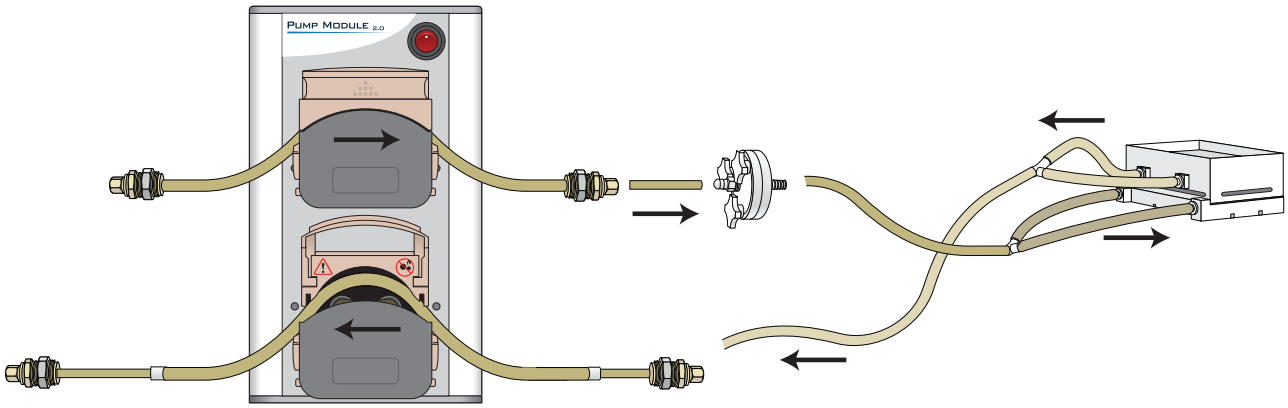
a Cut two lengths of the 1/4-inch tubing, approximately 61- to 91-cm (2- to 3-foot) long each.

b Connect one of these tubing sections to the tubing assembly from the bottom pump (outlet line).

c Ensure the inline pump filter is assembled per manufacturer instructions.

d Cut the remaining length of tubing (from step a) in the middle, and install the inline pump filter onto the cut ends. Connect this tubing assembly to the top pump (inlet line).

IMPORTANT Ensure that the filter is oriented so that the three thumbscrews face toward the Pump Module.



e Connect the inlet and outlet lines from the Pump Module to the corresponding lines on the wash station.

6 Connect the tubing from the Pump Module to the source and waste carboys as follows:

a Prepare the source carboy:

Tubing size	Connection
1/4-inch	*Exterior tubing to carboy*. Cut a length of tubing measured for the distance from the source carboy to the Pump Module. Allow some slack in the tubing. Connect one end of the tubing to one of the ports in the cap of the source carboy and connect the other end to the tubing assembly in the top pump (inlet line).
5/16-inch	*Interior tubing in the carboy*. Cut a length of tubing approximately 35 cm (14 inch) long. Attach this tubing to the fitting on the inside of the carboy cap that is connected to tubing on the top of the carboy. *Note:* The interior tubing should end at the bottom of the carboy so that liquid can be drawn up from the bottom of the carboy to maximize the usable volume.

b Prepare the waste carboy:

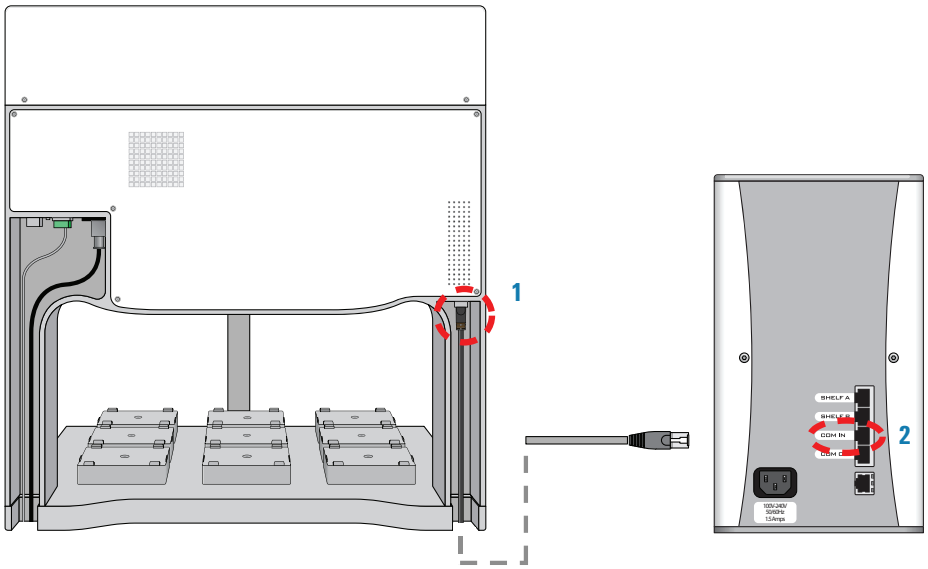
Tubing size	Connection
1/4-inch	*Exterior tubing to carboy*. Cut a length of tubing measured for the distance from the waste carboy to the Pump Module. Allow some slack in the tubing. Connect one end of the tubing to one of the ports in the cap of the waste carboy, and connect the other end to the tubing assembly in the bottom pump (outlet line).
5/16-inch	*Interior tubing in the carboy*. Cut a length of tubing approximately 13 cm (5 inch) long. Attach this tubing to the fitting on the inside of the carboy cap that is connected to tubing on the top of the carboy. *Note:* This interior tubing should end near the top of the carboy so that liquid can be dispensed into the top the carboy to maximize the usable volume in the carboy.

c Use the fitting provided in the tubing kit to vent the carboys as the following figure shows. The vent prevents pressure or vacuum from building up inside the bottle.

Connecting the Pump Module

To connect the Pump Module:

1 At the Bravo rear connector panel, connect the Pump Module RJ-45 cable to the Pump I/O port (1), as the following figure shows. Connect the other end of the cable to the COM IN port (2) on the rear of the Pump Module.

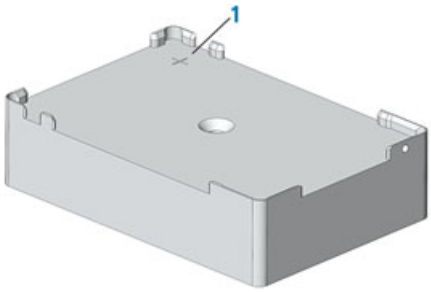


2 Connect the Pump Module power cord between the AC connector on the Pump Module and an AC outlet with a grounded circuit.

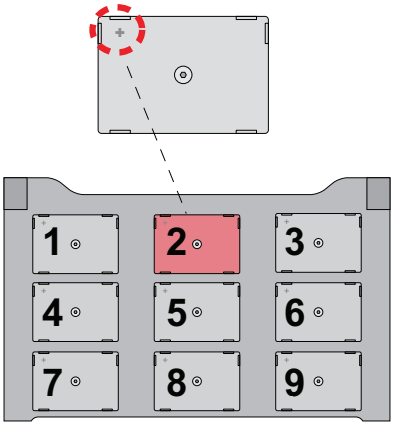
For detailed installation instructions, see the *Pump Module User Guide*.

Installing the standard platepads

The platepad has a crosshairs for setting the pipette head teachpoints in one corner, as the following figure (1) shows.



Install the standard platepads at deck locations 2, 3, and 5–8.



Before you start

Make sure you have the following:

- Platepad
- Flathead star cap screw, M6 x 40 mm

Procedure

To install a platepad:

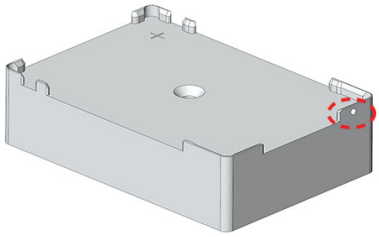
1. With the crosshairs toward the back side of the device, align the pins in the bottom of the platepad with the holes on the deck.

   Make sure the pins are inserted correctly and the accessory sits level on the deck.
2. Secure the platepad to the deck using the screw provided.
3. Ensure that the setscrews in the platepad tabs are recessed and not protruding into the plate nest. Use a 1.5-mm hex wrench to back out any protruding setscrews.

IMPORTANT

A protruding setscrew will prevent proper seating of the labware in the platepad.

Figure Setscrew in platepad tab

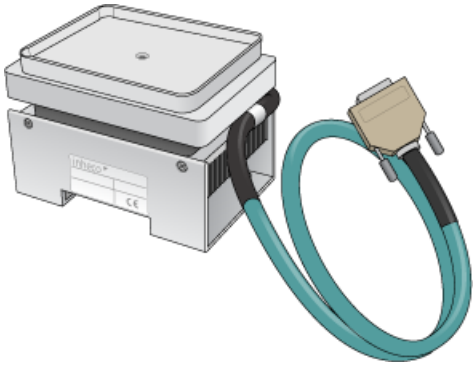


Note: You will verify the deck configuration in the corresponding Bravo profile and set the teachpoint for the deck location in a subsequent procedure.

Installing the Peltier Thermal Station

The Peltier Thermal Station is too tall to sit at deck level and must be installed in a deck cutout on a Bravo that has deck risers installed. The following figure shows the assembled Peltier Thermal Station with the custom plate nest.

Figure Assembled Peltier Thermal Station with custom plate nest



Before you start

CAUTION

Ensure that the connector end of the cable on the Peltier Thermal Station does not knock against the metallic table top or other areas as it could get permanently damaged. Handle the Peltier Thermal Station cable with care during all stages of installation.

Ensure you have the following:

- Peltier Thermal Station assembly (including four M2.5 bolts and one M3 flathead cap screw)
- Hex drivers
- Inheco STC Controller, power and communication cables, and Inheco user documentation for the STC Controller

Carefully handle the cable of the Peltier Thermal Station during removal from the box, as the following figure shows.

Use the following workflow.

Step	For this task...	See...
1	Install the Peltier Thermal Station.	"Installing the Peltier Thermal Station in the Bravo deck" on page 29
2	Connect the STC Controller.	"Connecting the STC controller" on page 32

Installing the Peltier Thermal Station in the Bravo deck

Use the following procedure to install the Peltier Thermal Station at deck location 4.

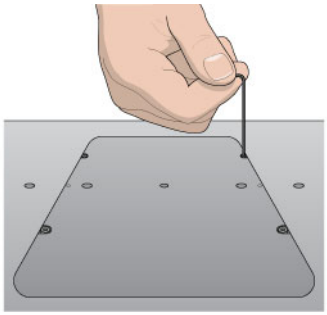
To install the Peltier Thermal Station:

1. Uninstall the platepad, if applicable, from deck location 4.

   To uninstall a platepad, remove the M6 flathead screw from the center of the platepad. Remove the platepad from the deck.

2. Remove the cutout cover. Use a hex driver to uninstall the four M3 screws that attach the cutout cover to the deck.

Figure Cutout cover on the Bravo deck



3 Uninstall the plastic interface from the top of the Peltier Thermal Station by removing the four screws located at the four corners.

Figure Plastic interface on the top of the Peltier Thermal Station assembly

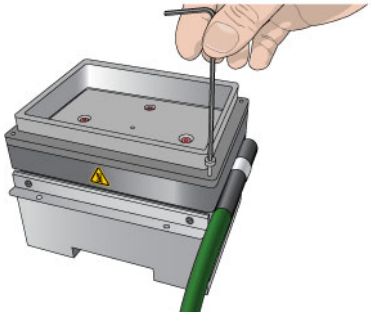
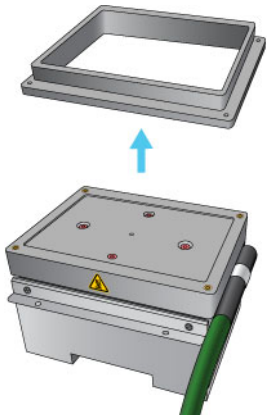
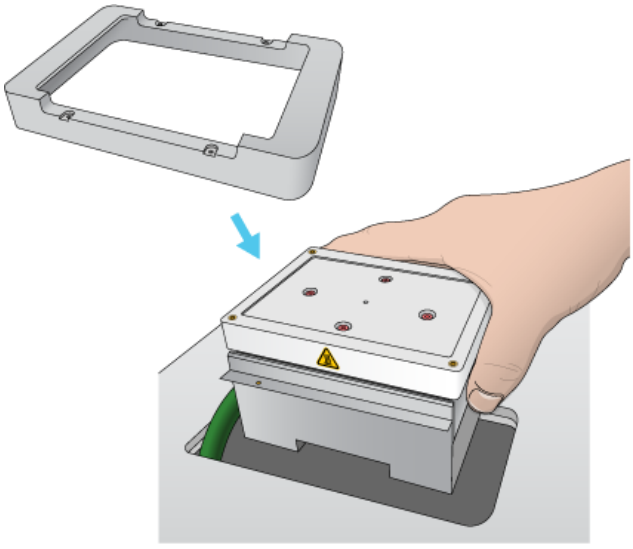


Figure Peltier Thermal Station assembly with plastic interface removed



4 Perform the following steps to place the Peltier Thermal Station assembly into the cutout hole, and then position the bracket:

Figure Bracket, Peltier Thermal Station assembly, and deck cutout



a Carefully slide the cable into the cutout hole first before you place the Peltier Thermal Station assembly into the cutout.

b Ensure that the safety label  faces the front of the Bravo deck.

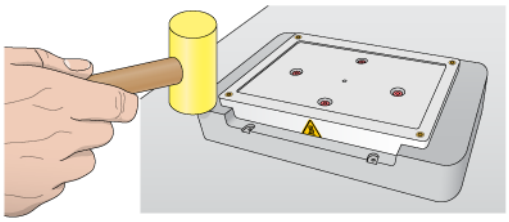
c Press and hold from the bottom to squeeze in the metal as you insert the Peltier Thermal Station assembly into the hole.

d Position the bracket over the top of the assembly, and ensure the bracket is seated on the deck surface.

e If there is slight resistance when fitting the assembly into the cutout or when positioning the bracket, you may use a rubber mallet to tap the metallic base or bracket into place.

CAUTION **Using too much force with a rubber mallet can damage the Peltier Thermal Station.**

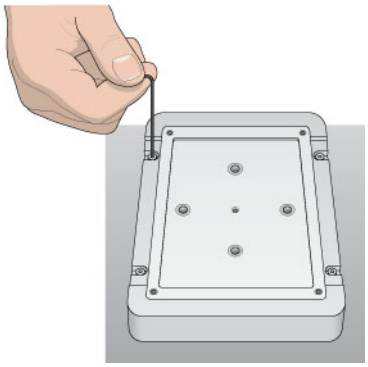
Figure Tapping the Peltier Thermal Station bracket in place



f Ensure that the Peltier Thermal Station sits flush in the cutout and that the bracket is seated on the Bravo deck.

5 Use a hex driver to install the four M2.5 bolts that secure the bracket to the deck.

Figure Securing the Peltier Thermal Station to the deck



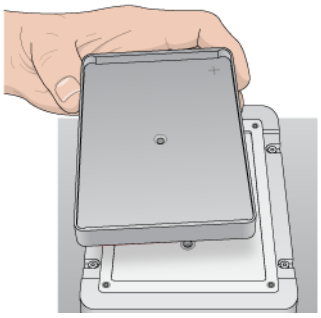
6 Install the custom plate nest on the top of the Peltier Thermal Station as follows:

a Orient the plate nest so that the crosshairs (+) is towards the back of the deck.

b Position the plate nest and ensure that it is fully seated.

c Install the M3 screw in the center of the plate nest to secure it to the Peltier Thermal Station.

Figure Installing the custom plate nest

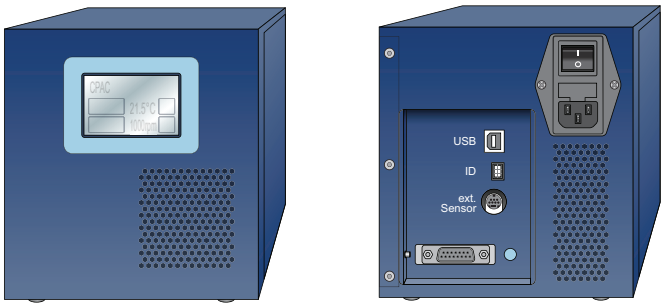


7 Connect the cable from the Peltier Thermal Station to the Inheco STC controller.

Connecting the STC controller

The following figure shows the Inheco STC Controller.

Figure STC Controller front and rear views



To connect the STC Controller:

1 Install the CPAC communications board in the STC Controller.

CAUTION

The communication boards can be damaged by electrostatic discharge. Only individuals qualified to handle ESD devices should perform this procedure. Ensure that you follow all antistatic precautions while installing the boards in the controller.

Three screws secure the access panel cover to the STC Controller. Ensure that the board locks into its slot connector in the STC Controller. For more details on the STC Controller, see the Inheco user documentation.

2 Connect the STC Controller to the computer using the provided USB-to-USB cable.

3 Connect the STC Controller power cable to an AC outlet.

4 Set the controller power switch to the **On** (*I*) position.

Installing and connecting the Orbital Shaking Station

The following figure shows the Orbital Shaking Station, which has its own control module.

Figure Orbital Shaking Station with control module and adapter pad

For a full description of the Orbital Shaking Station, see the manufacturer's documentation.

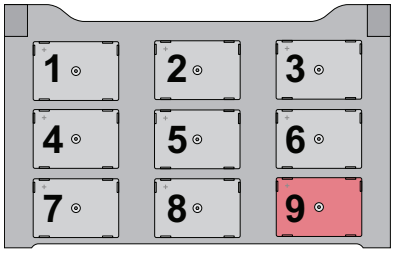
Before you start

Make sure you have the following:

- Orbital Shaking Station and the control module
- Adapter pad (supplied with the Orbital Shaking Station)
- Hex drivers
- M6 x 12-mm flathead screw that holds the adapter pad to the deck (supplied with the Orbital Shaking Station)
- Two M3 x 18-mm socket-head cap-screws that attach the Orbital Shaking Station to the adapter pad (supplied with the Orbital Shaking Station)

Use the following procedure to install the Orbital Shaking Station at deck location 9. Ensure that no platepad is installed at deck location 9. If necessary, uninstall the platepad by removing the M6 screw in the center of the platepad.

Figure Deck locations (top view)



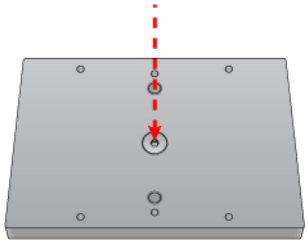
Installing the Orbital Shaking Station

To install the Orbital Shaking Station:

1. Position the adapter pad at the designated deck location, aligning the dowel pins with the corresponding holes in the deck.

   Make sure the adapter pad sits level on the deck.

2. Insert the M6 x 12-mm flathead screw into the center of the adapter pad and tighten the screw.



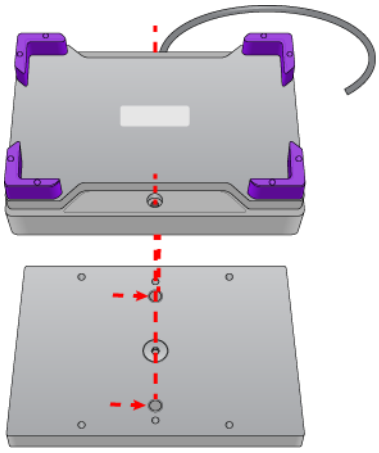
3. Place the Orbital Shaking Station atop the adapter pad so that the cable is towards the back of the Bravo deck.

   Make sure the station is completely centered on top of the adapter pad and sits level.

4. Insert the two M3 x 18-mm socket-head cap screws into the holes at the front and back end of the adapter pad and use a 2.5-mm hex driver to tighten the screws.

   Tighten the screws evenly to ensure the feet on the bottom of the Orbital Shaking Station are pressed evenly into the adapter pad, and the station remains level.

   Note: The feet of the Orbital Shaking Station are compressible, and these screws do not reach a hard stop as a result.



CAUTION **The Orbital Shaking Station can shift slightly when tightening. Ensure that the sides of the Orbital Shaking Station are parallel to the sides of the adapter plate. If the Orbital Shaking Station is rotated, it could cause the Bravo gripper to collide with the accessory.**

Connecting an Orbital Shaking Station

To connect an Orbital Shaking Station with its own control module:

1 Route the Orbital Shaking Station cable off the deck and connect it to the control module that contains the power plug. See following figure, item 1.

2 Connect the serial cable with the red stripe to the leftmost port on the control module (figure, item 2). Connect the other end of the cable to the serial port, if available, on the controlling computer.

IMPORTANT

Connecting the Orbital Shaking Station to a serial port on the computer provides more reliable communication than using a USB-to-serial adapter. If a serial port is not available, use a USB-to-serial adapter.

3 On the control module, ensure that the knob is turned fully counterclockwise so that the red arrow (3) is pointing to the RS-232 setting.

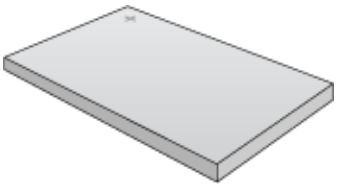
4 Connect the control module power connector (4) to an AC outlet with a grounded circuit.

5 Turn on and test the Orbital Shaking Station as follows:

- **a** On the control module, turn the knob clockwise to the maximum position, and verify that the Orbital Shaking Station vibrates.
- **b** Slowly, turn the knob back fully counterclockwise.

6 Place the pipettor teaching plate on the Orbital Shaking Station. Verify that the plate fits within the four corner tabs but has no extra space.

Figure Pipettor teaching plate



If necessary, use the supplied hex driver to adjust the fit of the four corner tabs. Do not overtighten.

Alternatively, you may use a sample microplate instead of the teaching plate.

Note: Before the accessory is ready for use, you will verify the deck configuration in the corresponding Bravo profile and set the teachpoint for the accessory location.

Using a USB-to-serial connection

If you are using a USB-to-serial connection, complete the set up as follows.

To complete the set up for the USB-to-serial connection:

1. If a driver is required, install the appropriate driver. Follow the instructions supplied with the USB adapter.
2. Write down the COM port assignment for the Orbital Shaking Station. See the following procedure for instructions.

   The computer auto assigns the COM port for the connection, which may be different than the COM port specified in the AssayMAP profiles. To resolve conflicts, you may do either of the following:

   - Update the settings in the AssayMAP profiles to match the new COM port assignment.
   - Use the Device Manager to reassign the COM port so that the number matches the settings in the AssayMAP profiles.

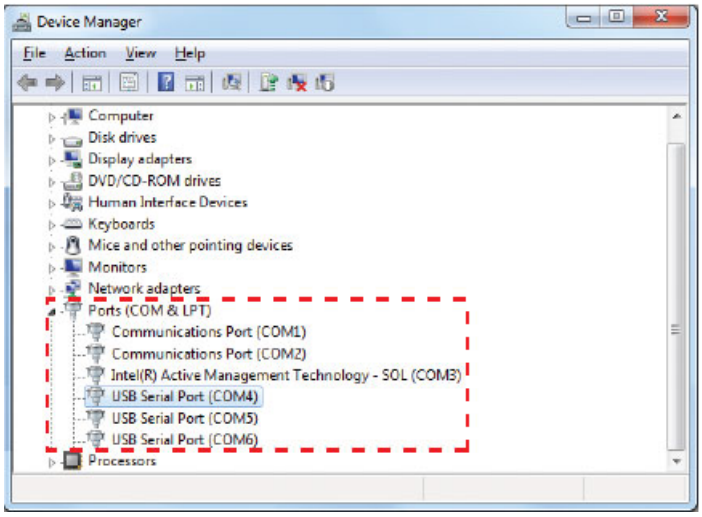
IMPORTANT

The COM port assignment must be 9 or lower. Otherwise, the AssayMAP Bravo Platform will not recognize the connection.

To view the current COM port assignments:

1. From the **Microsoft Windows** desktop, open the **Device Manager**. The Device Manager can be accessed from the Control Panel. For detailed instructions, see the Microsoft Windows user documentation.
2. In the **Device Manager**, expand **Ports (COM & LPT)**. The list of COM ports appear.

Figure Ports (COM & LPT) area of the Device Manager window



3 Setting up the computer and software

- "Setting up the computer" on page 38
- "Software requirements and architecture" on page 41
- "Installing OpenLab for VWorks and VWorks 14.4" on page 43
- "Configuring OpenLab Control Panel" on page 52
- "Setting up and connecting to the VWorks databases" on page 56
- "Installing Protein Sample Prep Workbench 4.0.2" on page 57
- "Verifying Excel VWorksMethodSetupTool add-in" on page 62
- "Turning on the platform and understanding the profiles" on page 64
- "Verifying the profile settings and configuration" on page 68
- "Verifying the Autofill Station configuration (wash station)" on page 75
- "Verifying the Peltier Thermal Station configuration" on page 77
- "Verifying the Orbital Shaking Station configuration" on page 79
- "Verifying the Lid Hotel configuration" on page 81
- "Verifying Plate Pad Offset for AssayMAP Normalization" on page 82
- "Verifying Plate Pad Offset for Evosep_96AM Bravo" on page 84
- "Testing the accessories" on page 86

Setting up the computer

IMPORTANT

Verify that the computer meets all prerequisites outlined in the *AssayMAP Bravo Platform Site Preparation Checklist*.

Setting up an Agilent-supplied computer

If the Agilent-supplied computer is being set up for the first time, you must set up the Microsoft Windows operating system.

To set up a new Agilent-supplied computer:

1. Turn on the computer and monitor. An automated setup procedure runs to prepare the computer.
2. When the **Set Up Windows** wizard opens, enter the requested information in each screen based on the customer's preferences.
3. Ensure that the correct Microsoft Excel version is installed.

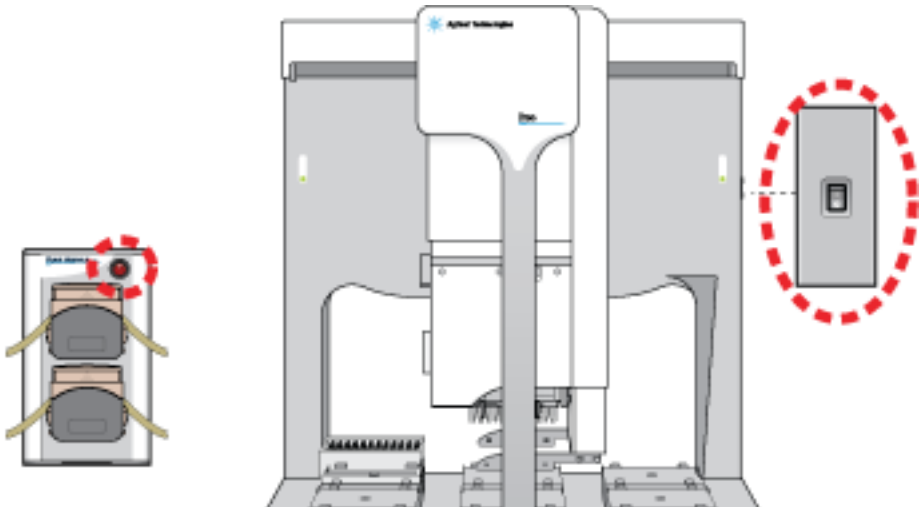
   Note: Agilent Technologies does not supply Microsoft Excel.

Turning on the instrument

To turn on the AssayMAP Bravo Platform:

1. Ensure that the Ethernet cable, pendant cable, power cord, and Pump Module cable are properly connected to the Bravo rear connection panels.

   For details, see the *Bravo Platform Safety and Installation Guide*.
2. If you have not already done so, turn on the computer.
3. To turn on the Bravo instrument, press the power switch to the **on (|)** position.



The green light on the switch is illuminated when the Bravo Platform is on.

Setting up the computer LAN

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

IMPORTANT Verify the LAN connection to the Bravo instrument ***before*** connecting to any other networks, including any wireless networks.

To set up the computer LAN for the Bravo:

1 On the computer, ensure that the only available network is the one that you are going to connect to the Bravo instrument.

- Confirm that the only Ethernet cable connect to the computer is the one for the AssayMAP Bravo.
- Turn off any wireless connection to the computer

Note: If the computer will be connected to the house LAN as well as the Bravo, the computer must have a second network adapter. The second network adapter can have a dynamic IP address and may be connected only after successfully connecting the first network adapter to the Bravo instrument.

2 Display the Ethernet Properties for the AssayMAP Bravo network:

a Go to **Settings > Network & Internet > Change adapter settings**.

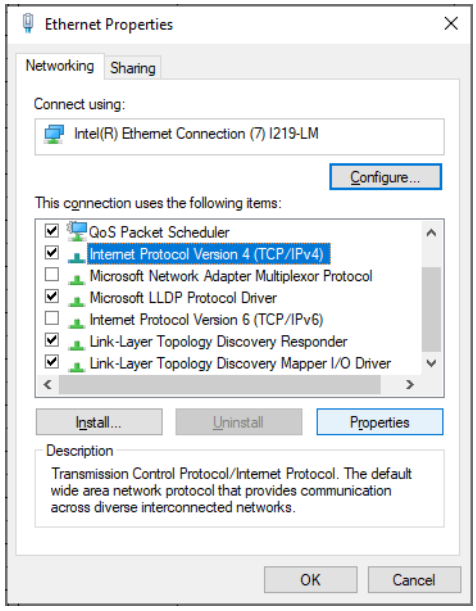
b Right-click the Ethernet icon, and then click **Properties**.

Note: If you are not sure which Ethernet icon is connected, unplug the Ethernet cable and note which connection changes to *cable unplugged*.

3 In the **Ethernet Properties** dialog box:

a Clear the check box of **Internet Protocol Version 6 (TCP/IPv6).**

b Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties.**



Note: The name of the Ethernet adapter can vary depending on the computer model.

4 In the **Internet Protocol Version 4 (TCP/IPv4)** dialog box:

a Select **Use the following IP address**.

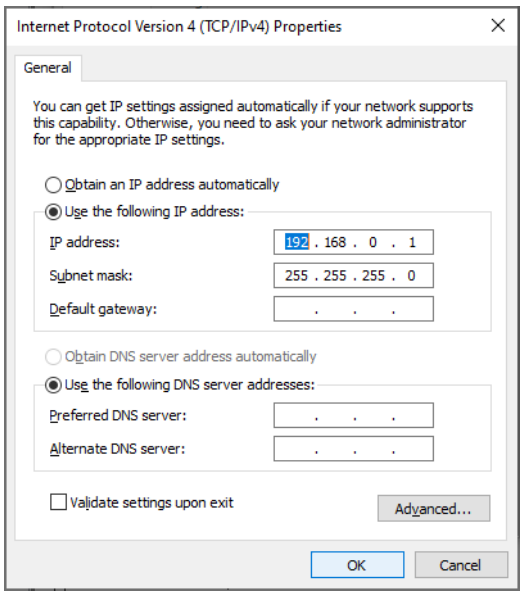
b In the **IP address** boxes, type the following:

192.168.0.1.

c Press the TAB key. The subnet mask populates automatically to display the following:

255.255.255.0

d Click **OK**.



IMPORTANT

The specified static IP address is required for the Bravo LAN connection.

Software requirements and architecture

Software requirements

The following table lists the minimum software requirements.

Software	Version
Agilent VWorks Plus (compliance-enabled edition) or VWorks Standard	14.4
Agilent Protein Sample Prep Workbench	4.0.2
Microsoft Excel Required for the reagent volume calculators and method setup tools.	Microsoft Office 365 32-bit edition

Note: If you are installing PSPW 4.0 on a system with VWorks 14.1.1 or 14.2, refer to the VWorks Installation Guides for those versions.

Software architecture overview

The required software runs on a single computer workstation. The following table lists the VWorks software editions and the following figures show the architecture of each edition.

VWorks edition	File storage type	Compliance enabled?
VWorks Plus	Content Management *Note:* A system or VWorks administrator can use the Content Browser to view and edit the project structure and contents at /VWorks Projects/VWorks/	Yes
VWorks Standard	Local file system *Note:* Any user can access the project files directly using the Windows File Explorer at C:\OLSS Projects\VWorks Projects\VWorks\	No

The VWorks files, such as device files, profiles, labware, protocols, and the like are stored as .roiZip archives. All file modifications are handled within the VWorks software.

IMPORTANT

The VWorks software cannot reload files (.roiZip extension) that have been modified or renamed outside of the VWorks software.

Figure Architecture of VWorks Plus and Protein Sample Prep Workbench

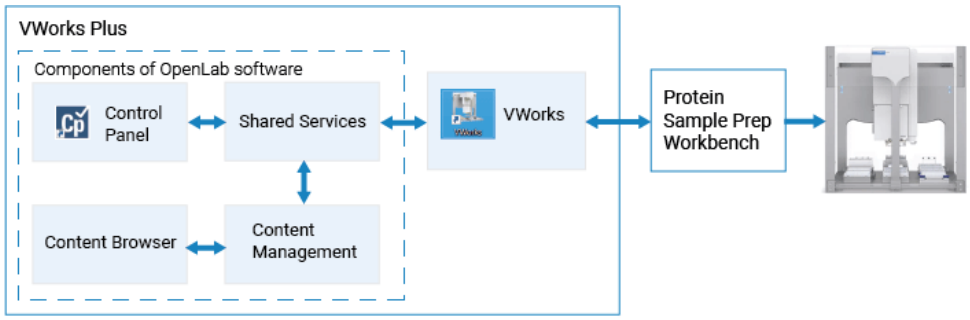
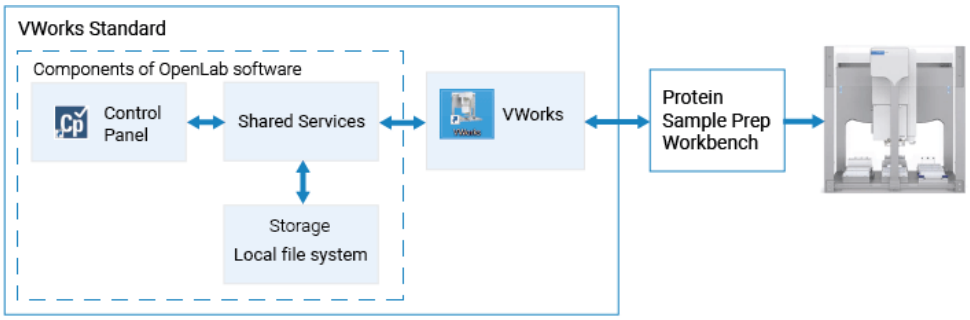


Figure Architecture of VWorks Standard and Protein Sample Prep Workbench



- **Protein Sample Prep Workbench**. A collection of simple form-based user interfaces for running the applications and utilities that control the AssayMAP Bravo Platform. Each application and utility has default methods that can be altered and saved.

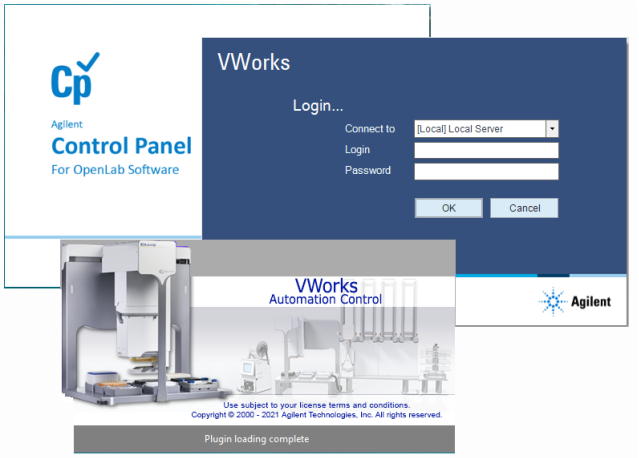
  Microsoft Excel is required for the method setup tools and reagent volume calculators.

  The Protein Sample Prep Workbench runs within the VWorks software.
- VWorks Plus **and** VWorks Standard. A combination of OpenLab and VWorks software that provides the user management and instrument control for the AssayMAP Bravo Platform.

  As the figures show, the OpenLab components include a Control Panel, which is the user interface for the Shared Services. The Shared Services, such as user access, software licenses, and storage are configured initially when the software is installed.

  For more details on the OpenLab for VWorks components, see the *Configuration and Administration Guide* for the VWorks edition.

Installing OpenLab for VWorks and VWorks 14.4



IMPORTANT Ensure that you perform the tasks in the order given in the following workflow.

Workflow

Step	For this task...	See...
1	Ensure that the computer meets the prerequisites.	"Before you start" on page 44
2	Install Agilent OpenLab for VWorks.	"Installing Agilent OpenLab for VWorks" on page 46
3	Check the OpenLab Control Panel installation .	"Checking the Agilent OpenLab Control Panel installation" on page 49
4	Install the VWorks software.	"Installing the VWorks software" on page 50
5	Check the VWorks installation .	"Checking the VWorks installation" on page 50
6	Restart the computer.	–
7	Configure the OpenLab Control Panel .	"Configuring OpenLab Control Panel" on page 52
8	Set up the VWorks databases and establish a connection.	"Setting up and connecting to the VWorks databases" on page 56

Before you start

IMPORTANT

Verify that the Windows OS build and the .Net are the same ones specified in the *AssayMAP Bravo Platform Site Preparation Checklist.* These versions have been verified to work with VWorks 14.4.

In addition to verifying the hardware and software requirements, ensure that you complete the following prerequisite checklist.

Prerequisite checklist

Item	Task
1	Ensure the computer name contains only approved characters (alphanumeric and hyphen). **IMPORTANT** Do not use an underscore! Installation is not possible if the computer name contains an underscore.
2	Ensure that the Microsoft Windows power management setting does not allow the computer to turn off the device to save power. 1 In the Microsoft Control Panel, open the **Network and Sharing Center**. *Note:* View the items by icon to see a list of all items 2 Select **Change adapter settings**. Right-click the Local Area Connection and click **Properties.** 3 In the **Ethernet Properties** dialog box, click **Configure**. 4 In the **Power Management** tab, ensure the **Allow the computer to turn off this device to save power** check box is cleared.
5	To enable the successful installation and activation of all components, ensure the following: • Ethernet cable is connected from the computer to the AssayMAP Bravo Platform. If installing on a second computer, ensure the Ethernet cable is physically connected to a LAN. **IMPORTANT** If you install Agilent OpenLab for VWorks using a wireless connection, the installation may fail. • Windows **Sleep mode** is set to **Never**.
6	Ensure the following: • No Windows updates are performed during the installation. • No system reboot is pending. *Note:* The System Preparation Tool that runs as part of the installation wizard will indicate any pending reboots.
7	If applicable, uninstall any previous versions of the VWorks software. See "Uninstalling previous versions of VWorks software" on page 45.

Uninstalling previous versions of VWorks software

You must uninstall any previous versions of the VWorks and the Protein Sample Prep Workbench software before installing the new software.

Note: The VWorks 14 Migration Wizard enables the migration of protocols and associated files from VWorks 12.3, 13.0, or 13.1.x. However, the protocols and forms in Protein Sample Prep Workbench 4.0.2 have a different structure than previous versions and are not backwards compatible.

To uninstall VWorks 13.x or earlier versions:

1. If any custom methods were created in the Protein Sample Prep Workbench, take screenshots of the settings in the corresponding apps and utilities to use for future reference.
2. Create backup copies of the following items for safekeeping before starting any installation procedures:
   - Copy the C:\VWorks Workspace\ folder.
   - Export the full set of Velocity11 registry keys to a file (.reg):

     In the **Registry Editor** window, right-click the following, and then click **Export**.

     Computer\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Velocity11

     In the **Export Registry File** dialog box, specify a file name and storage location, and click **Save**.
3. In Microsoft Windows, go to **Settings > Apps > Apps & features** and uninstall any previous versions of the following in the order given:
   - Agilent Bravo IQOQ Test Utilities
   - Agilent Protein Sample Prep Workbench
   - Agilent VWorks software
   - Agilent Software Verification Tool
4. Ensure that the following folder is not present:

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

To uninstall VWorks 14.x or later versions:

1. Create backup copies of the following items before starting any installation procedures:
   - In VWorks, use **File>Export VZP File** to export backups of current protocols. See the *VWorks Automation Control User Guide*.
   - If applicable, export experiment IDs. See the *VWorks Automation Control Setup Guide*.
2. In Microsoft Windows, go to **Settings > Apps > Apps & features** and uninstall any previous versions of the following in the order given:
   - Agilent Bravo IQOQ Test Utilities
   - Agilent Protein Sample Prep Workbench
   - Agilent VWorks software

Installing Agilent OpenLab for VWorks

This section outlines the OpenLab for VWorks installation section of the Installation Checklist. For detailed instructions, see the *VWorks Automation Control 14.4 Installation Guide.*

If the computer is already running OpenLab for VWorks software (v2.5, 2.6, or 2.7), then you will need to perform an upgrade to OpenLab for VWorks 2.8. See the *VWorks Automation Control 14.4 Installation Guide* for instructions.

During the software installation, you will be prompted for system administrator login credentials. If this is a new installation, use the following system administrator credentials:

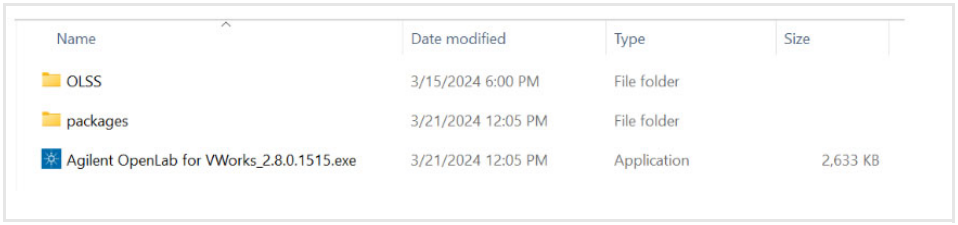
User name/Login: admin

Password: openlab

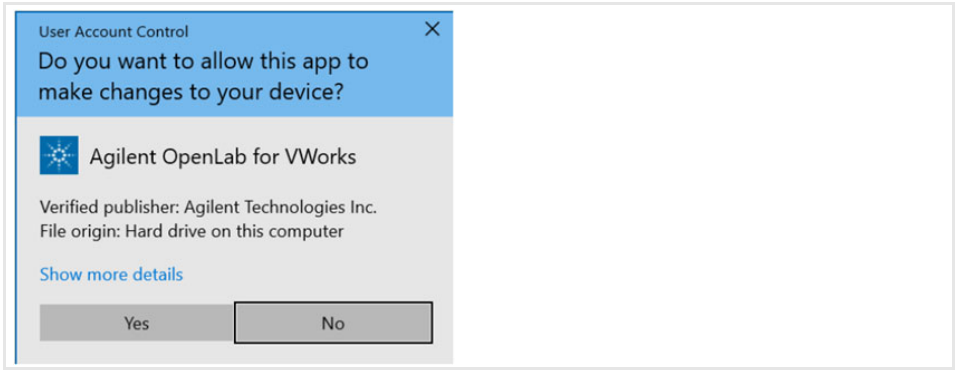
To install Agilent OpenLab for VWorks:

1. Log on to Microsoft Windows as a local administrator.
2. Copy the entire contents of the supplied USB drive to the **C:\Temp** folder on the computer, and then remove the USB drive from the computer.
3. Unzip the **OpenLabForVWorks_2.8.0.1515.zip** archive to **C:\Temp**.
4. To run the OpenLab for VWorks installer, double-click the **Agilent OpenLab for Vworks_2.8.0.1515.exe** file.

   Note: If you have an antivirus software on your computer, it may block or quarantine this installer. If that occurs, either disable the antivirus or restore the file from the antivirus' quarantine to continue with the installation.

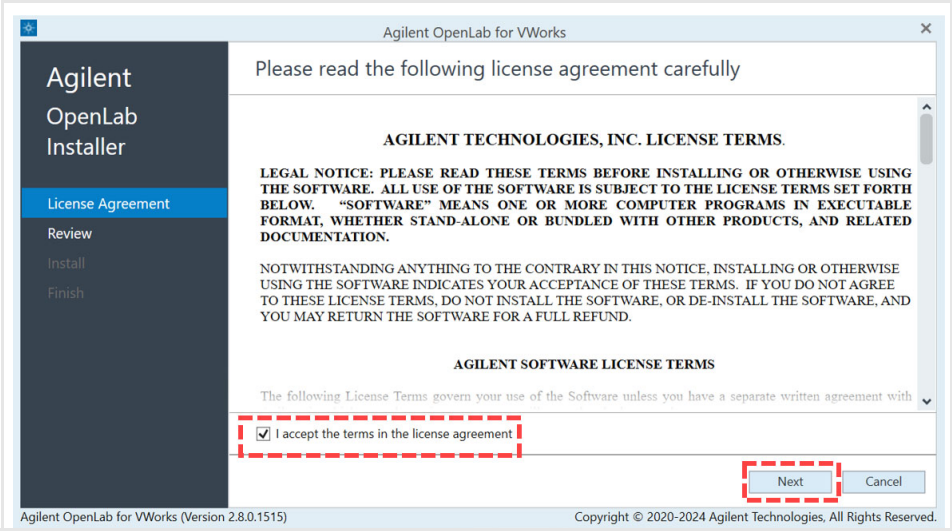


5. Click **Yes** to the message asking you for permission to proceed.



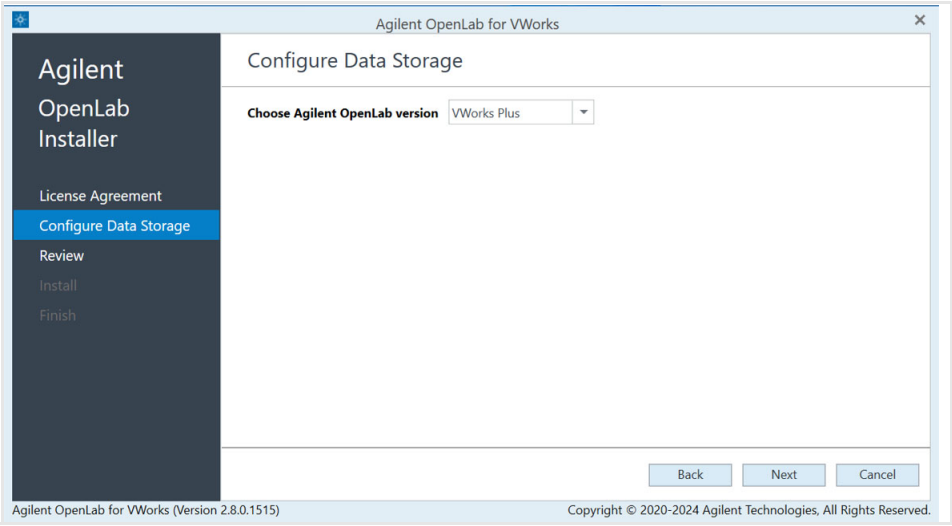
When the Agilent OpenLab for VWorks wizard opens, the License Agreement page is displayed.

6. Accept the terms of the license agreement and click **Next**.



7 In the **Configure Data Storage** page, choose the edition for which you have a valid license, and then click **Next**:

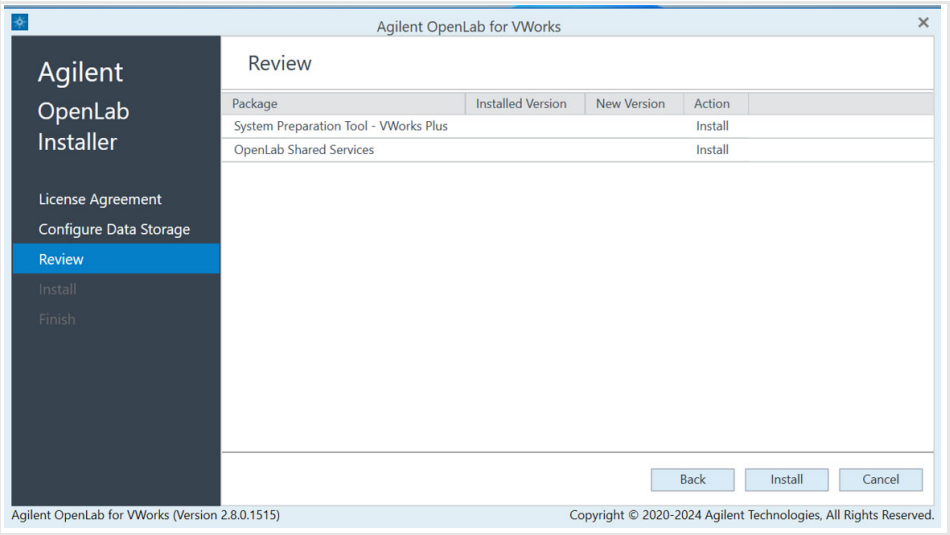
- VWorks Plus
- VWorks Standard



The review page showing the components for the selected edition is displayed.

8 Ensure the correct components for the installation have been selected.

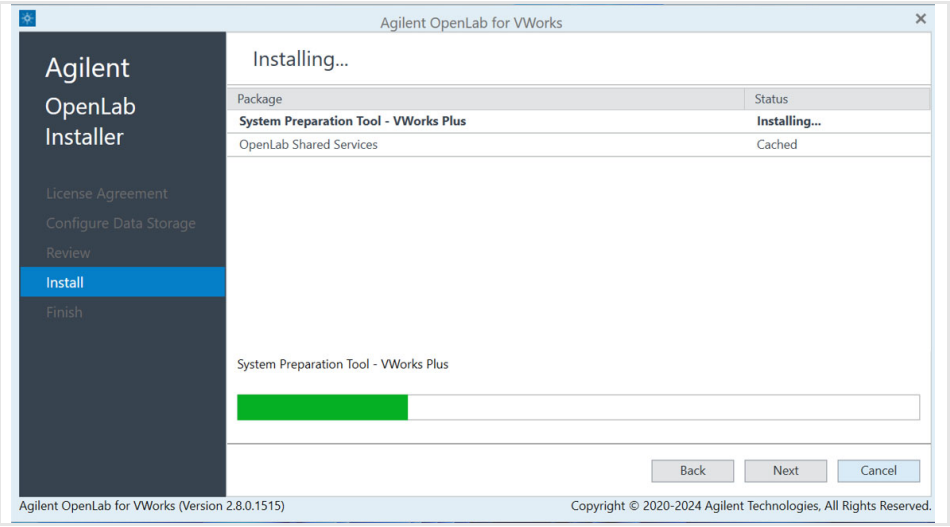
- System Preparation Tool - VWorks *<edition>*
- OpenLab Shared Services



Note: The pages of the wizard can vary slightly depending on which edition you are installing. The following examples show the VWorks Plus installation.

9 Click Install to start the installation of the listed components in the given order.

A progress bar will appear in green color, indicating the progress of installation of OpenLab software.



10 Follow the installation wizard instructions to restart the computer when prompted to do so.

Wait for the installation wizard to resume after the restart before continuing.

Note: If you do not select to restart the computer now, the installation wizard will resume the next time the computer is restarted.

After the system preparation tool is installed, OpenLab server specific UI will be displayed, indicating the installation progress of various sub-components of OpenLab Shared Services.

11 In the wizard **Finish** page, verify that the following message appears:

Complete the Agilent OpenLab for VWorks Setup

Click **Finish** to close the wizard.

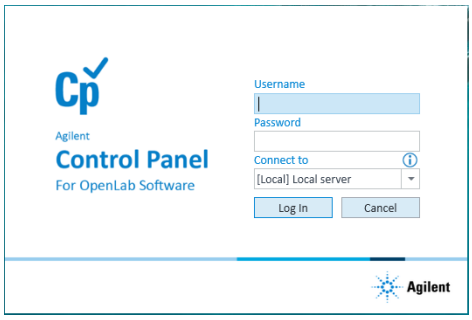
Checking the Agilent OpenLab Control Panel installation

To check the Control Panel installation:

1 On the Windows desktop, double-click the Control Panel shortcut  .

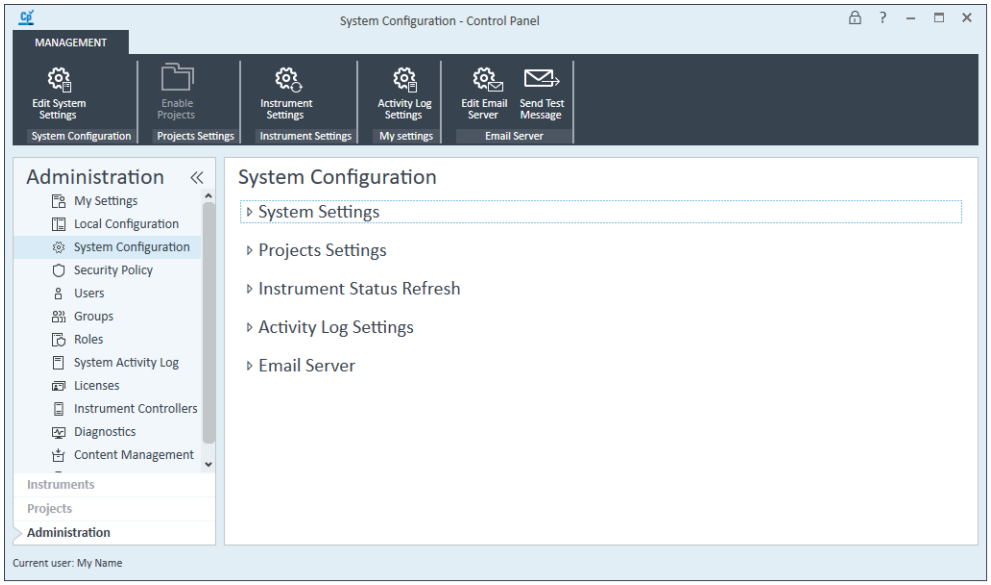
2 In the Login window, enter the user name and password, and click **Log In**.

- Login: admin
- Password: openlab



Later, after installing the software license, the system administrator should configure user accounts in the OpenLab Control Panel and change the password for this login. For instructions, see the *Configuration and Administration Guide* for the customer's VWorks edition.

3 Verify that the Control Panel window opens:



4 Verify the customer's choice of authentication provider.

Authentication type	Description
Internal (default)	Users are created in the Control Panel and Shared Services provides the user authentication.
Windows Domain	Users are imported from the active Windows directory into OpenLab Control Panel. Microsoft Windows performs the user authentication.

- If Internal (default) is desired, close OpenLab Control Panel and proceed with Installing the VWorks software.
- If Windows Domain is desired, go to step 5 and change the authentication setting in the OpenLab Control Panel before proceeding with the VWorks installation.

5 To change the authentication to Windows Domain:

Note: For detailed instructions, see the *Configuration and Administration Guide* for the customer's VWorks edition.

a In the Control Panel, go to **Administration > System Configuration** page, click **Edit System Settings** on the ribbon. The Edit System Settings dialog box opens.

b Select the authentication provider Windows Domain from the list, and follow the instructions to confirm your settings. When complete, the Control Panel will restart.

Note: You can wait to configure the remaining settings until after installing the VWorks software.

c Close the OpenLab Control Panel before you install the VWorks software.

IMPORTANT The VWorks installer publishes VWorks user groups in the Control Panel. Changing the Authentication setting to Windows Domain after installing VWorks will erase these VWorks user groups, which are associated with all the required roles and privileges for the VWorks software.

Installing the VWorks software

This section outlines the VWorks installation section from the Installation Checklist. For detailed instructions, see the *VWorks Automation Control 14.4 Installation Guide.*

To install Agilent OpenLab for VWorks:

1 Double-click the VWorks_14.4.0.xxxx.exe file (where xxx is the build number).

Note: The VWorks_14.4.0.xxxx.exe file is included in the files that you copied to the C:\Temp\ folder in the previous procedure.

2 Follow the wizard prompts to install Bravo IQOQ Test Utilities.

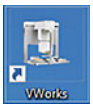
3 When the VWorks Login window opens, log in using the same credentials as those for installing OpenLab for VWorks.

4 Follow the wizard prompts to finish installing Bravo IQOQ Test Utilities, and then install VWorks 14.4.

5 When the VWorks Login window opens, log in using system administrator credentials, and then finish the VWorks installation.

Checking the VWorks installation

To check the VWorks installation:

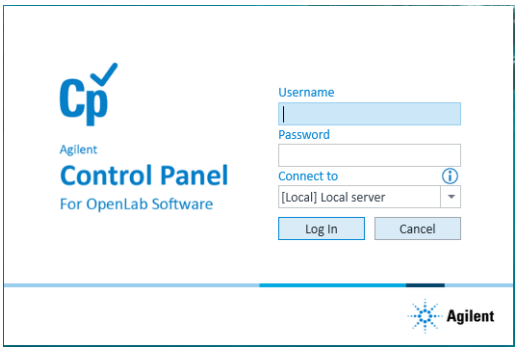
1 Right-click the VWorks shortcut 

on the Windows desktop, and then click **Run as administrator** in the shortcut menu.

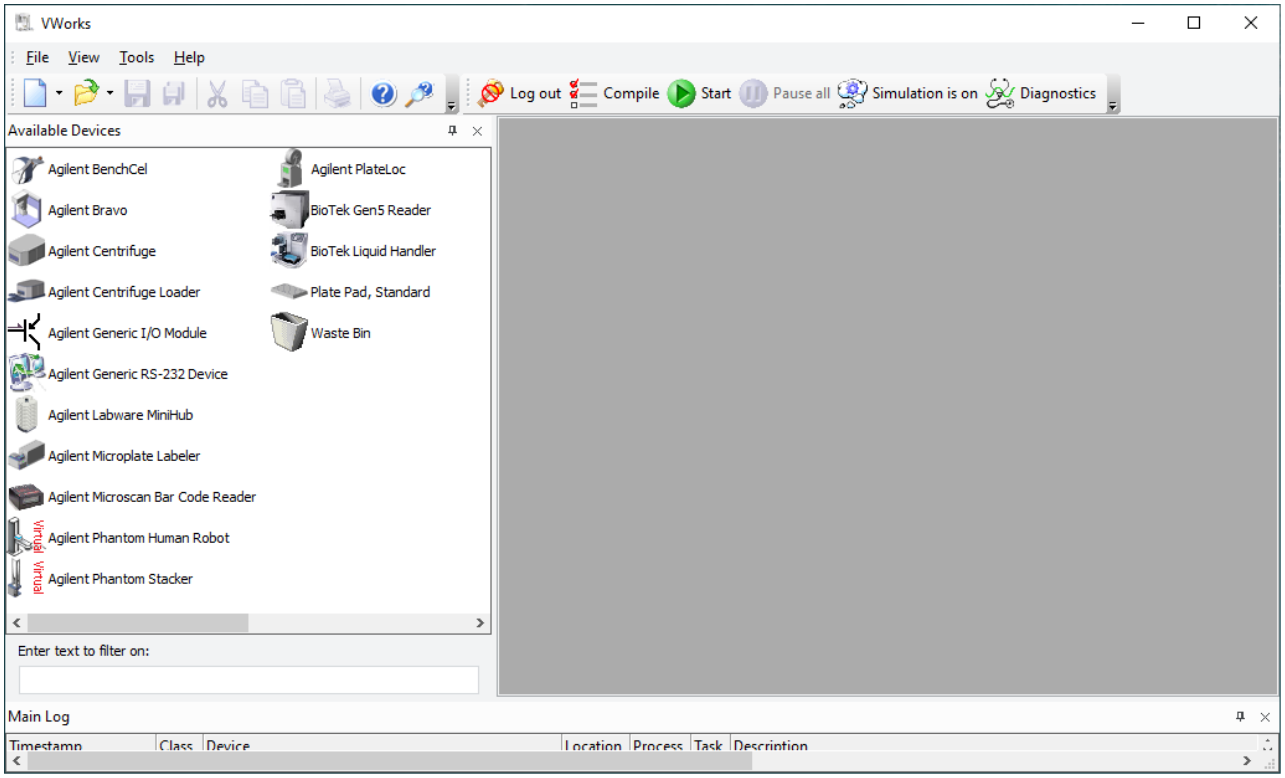
IMPORTANT

You must Run as administrator the first time you start the software after installation. Otherwise, an error message informs you that not all the devices registered properly. After successful installation of VWorks and after launching the Works application as Run as administrator, i.e. with Windows administrator privileges, you must close the application before performing any tasks in VWorks. You can then relaunch VWorks (not as Windows administrator) and begin using the application.

2 In the Login window, log in using system administrator credentials.



3 Ensure that the VWorks window opens. The following figure shows an example.



4 Ensure that the VWorks menubar, standard toolbar, and control toolbar appear. If necessary, right-click the window, and select these view options from the shortcut menu.

5 Close the VWorks software and restart the computer.

Configuring OpenLab Control Panel

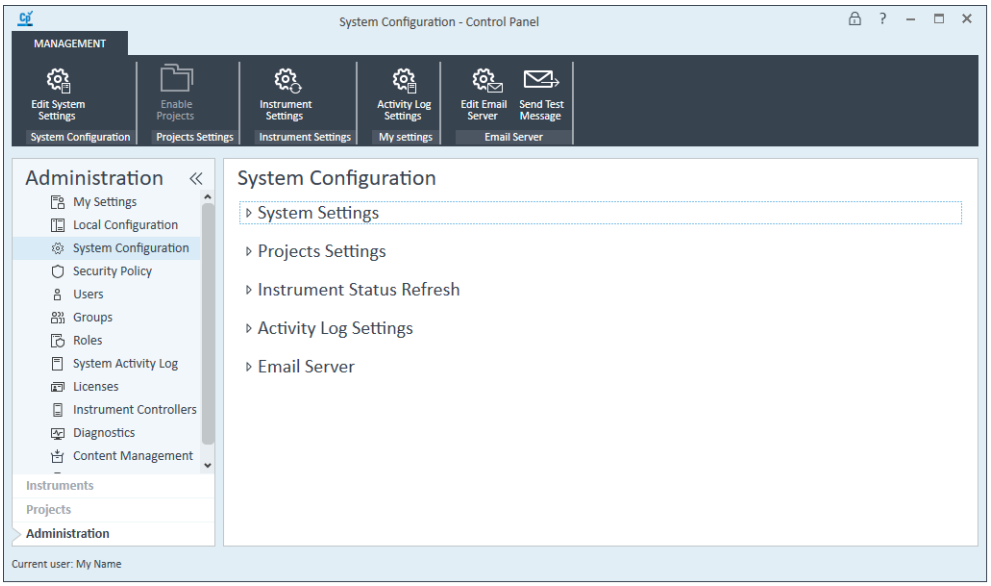
This section outlines the configuration steps from the Installation Checklist. For detailed instructions, see one of the following guides:

- *VWorks Plus Configuration and Administration Guide*
- *VWorks Standard Configuration and Administration Guide*

Start the OpenLab Control Panel

To start Control Panel:

1 On the Windows desktop, double-click the Control Panel shortcut , and then log in using the system administrator credentials.



Configure and install the software license

Explain that the 60-day start-up license starts at first launch of the software and ends 59 days later. A final license must be installed to continue using the software.

Review with the customer the steps to obtain a software license from SubscribeNet using their software authorization code.

In OpenLab Control Panel , review with the customer the steps to install the license.

Confirm the authentication and security policy settings

Authentication

- Internal (default). No changes are required if the customer wants to use Control Panel authentication.
- Windows Domain. If the authentication is changed to Windows Domain after running the VWorks 14.4 installer, you need to reinstall VWorks 14.4 to republish the predefined VWorks user groups to ensure that users imported from Windows have all the required roles and privileges.

Configure Security Policy

- If using Internal authentication. You set all security policy parameters in the Control Panel.

  For detailed instructions, refer to the applicable *Configuration and Administration Guide* for VWorks Plus or VWorks Standard.
- If using Windows Domain authentication. You set only the inactivity time in the Control Panel. All other parameters are defined by the Windows operating system. See the Microsoft Knowledge Base for instructions.

Configure users, groups and roles

In OpenLab Control Panel  , explain the following. Refer to the applicable *Configuration and Administration Guide* for VWorks Plus or VWorks Standard.

IMPORTANT

In addition to a VWorks role, instrument and project privileges are required to log in to VWorks. The VWorks installer publishes predefined VWorks Groups that are already associated with the corresponding VWorks roles, VWorks project privileges, and instrument privileges.

Item	Task
1	Explain that the Everything role is for a system administrator who can use all software features in OpenLab Control Panel and VWorks. Advise that a primary and a backup be assigned the Everything role.
2	Explain the VWorks roles and privileges: VWorks Administrator, VWorks Technician, VWorks Operator, and VWorks Guest.
3	Configuring users and groups for the selected authentication type: • Internal authentication. Explain how to create users in OpenLab Control Panel and assign users to VWorks groups. • Windows Domain authentication. Explain how to: – Import users into OpenLab Control Panel and assign users to VWorks groups. – Import groups, assign groups to VWorks roles and Instrument roles. – Assign project and instrument privileges to imported Windows groups, if applicable.

Configure VWorks project settings

In OpenLab Control Panel, display the **Projects** page. Explain the following:

1. The VWorks project is created automatically.
2. The predefined VWorks groups include project privileges, which are required for the VWorks login. If using Windows Domain, project privileges must be granted to any imported groups.
3. Viewing the project structure for the VWorks edition.

VWorks Standard

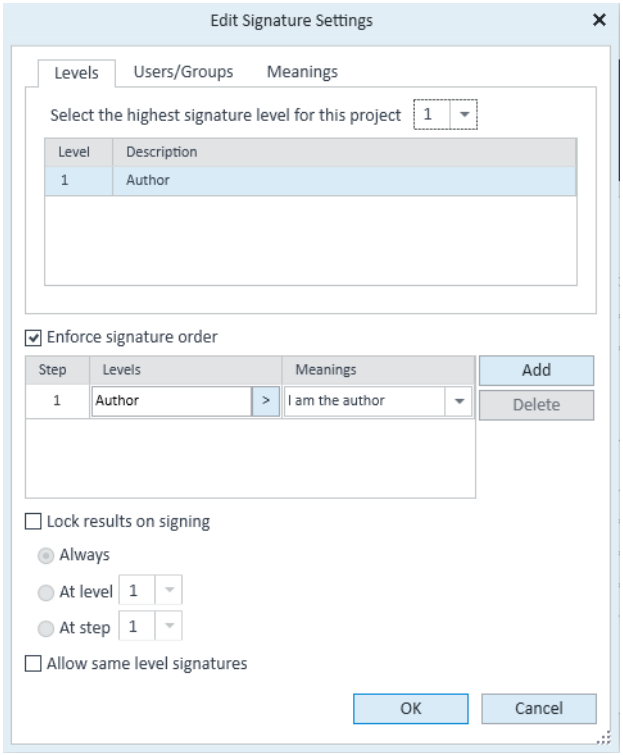
Refer to the *VWorks Standard Configuration and Administration Guide*. No additional project settings are required for VWorks Standard.

Explain that for VWorks Standard, the project files are stored on the local drive at:
`C:/OLSS Projects/VWorks Projects/VWorks/`

VWorks Plus

Refer to the *VWorks Plus Configuration and Administration Guide*. Perform the following tasks:

1. Explain how to set Audit Trail Comments.
2. Set the Signature Levels as follows:
   a. Select the highest signature level as **1.**
   b. Set the description to **Author.**
   c. Select the **Enforce signature order** check box and specify:
      – Step: **1**
      – Levels: **Author**
      – Meanings: **I am the author**



Note: These signature settings enable the VWorks administrator or technician who closes an experiment ID to post a signature from the Workbench without having to navigate to the VWorks window.

3 Explain that for VWorks Plus, the project files are stored in Content Management at `/VWorks Projects/VWorks/`

A system administrator or VWorks administrator can use the Content Browser to view the project structure. From the Windows Start menu go to **Agilent Technologies > Content Browser**.

Instrument configuration

In the Control Panel  , display the **Instruments** page. Explain the following. Refer to the applicable *Configuration and Administration Guide* for VWorks Plus or VWorks Standard.

1 The *instrument* is configured automatically during installation.

The *instrument* is the VWorks computer that is connected to the automation device or running the software. By default, the *instrument* name is the same as the computer name.

2 The predefined VWorks groups include *instrument* privileges, which are required for the VWorks login. If using Windows Domain, privileges must be granted to any imported groups.

3 No additional *instrument* settings are required.

Configure e-mail server

If applicable, configure the e-mail server in the Control Panel  . Refer to the applicable *Configuration and Administration Guide* for VWorks Plus or VWorks Standard for details.

System Maintenance

Refer to the applicable *Configuration and Administration Guide* for VWorks Plus or VWorks Standard and review the following with the customer:

- Backup and restore procedures
- Other maintenance tasks

Setting up and connecting to the VWorks databases

This topic outlines the setup and connection tasks for the VWorks databases. After setting up PostgreSQL for the VWorks databases, you enable the connections in the VWorks Options dialog box.

Note: For non-Agilent-supplied computers, you will need to obtain the 32-bit ODBC driver for PostgreSQL (psqlodbc_x86.msi). Contact Agilent Technical Support for details.

VWorks Experiments database

VWorks Standard and VWorks Plus. In the *VWorks Automation Control Setup Guide*, see *Setting up and connecting VWorks Experiments database*.

1. Set up PostgreSQL for the Experiments database.
2. In the VWorks Options dialog box, enable the connection to the Experiments database.

   The first time changes are saved in the Options dialog box, the error messages appear stating that the **error library file doesn't exist** and **macro library file doesn't exist**. Click **Yes** to create the error library and macro library files.

VWorks E-Signatures database

VWorks Plus only. In the *VWorks Automation Control Setup Guide*, see *Setting up and connecting VWorks E-Signatures database*.

1. Set up PostgreSQL for the Experiments database.
2. Connect VWorks to the Experiments database.

Installing Protein Sample Prep Workbench 4.0.2

IMPORTANT Ensure that Agilent OpenLab for VWorks and VWorks have already been installed before you install the Protein Sample Prep Workbench.

The Protein Sample Prep Workbench installation wizard installs:

- Protein Sample Prep Workbench software
- Default methods for each Workbench app and utility
- AssayMAP Knowledge Base and PDFs of user guides

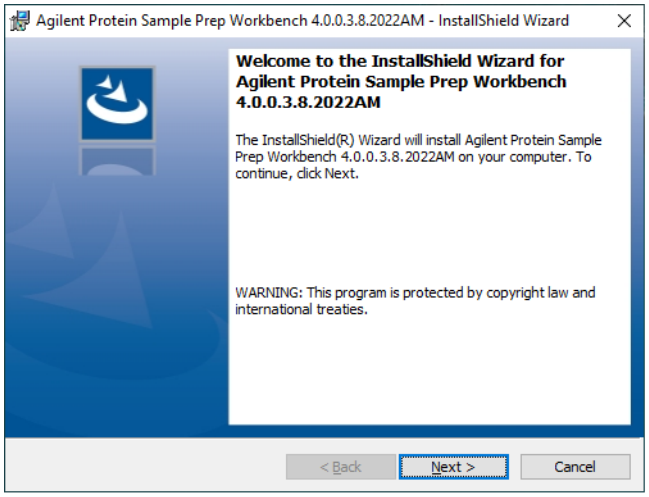
After installation, shortcuts to start the Protein Sample Prep Workbench are available in the Windows Start (⊞) menu under Agilent Technologies and on the Windows desktop.

Installing the Workbench

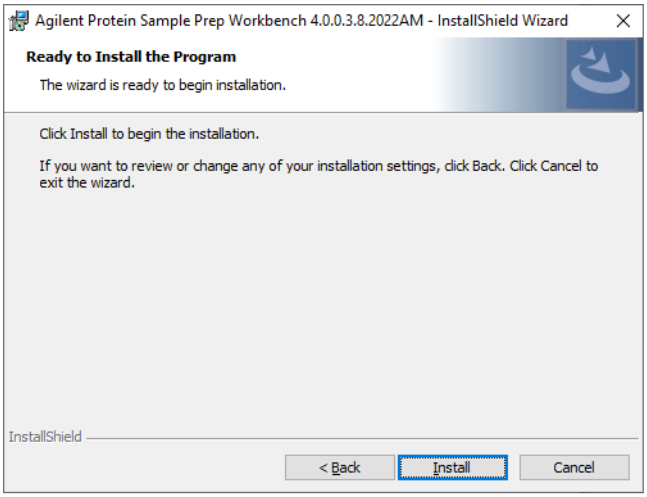
To install Protein Sample Prep Workbench 4.0.2:

1. Ensure that you have copied the Agilent Protein Sample Prep Workbench_4.0.2.x.exe installer (where x is the build number) to the computer where you are installing the software.
2. Double-click the icon to launch the installer.
3. Click **Yes** to allow the installer to make changes to your device.
4. When the **Welcome** page displays, click **Next**.

   Note: The following figures show examples of the installation wizard and may not reflect the final build number of the released software.

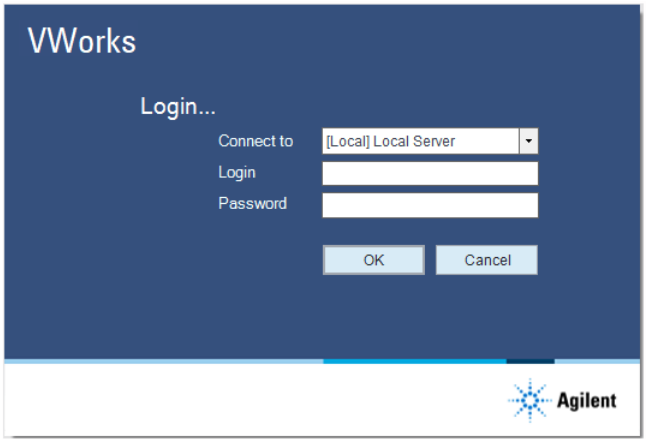


5 When the **Ready to Install the Program** page displays, click **Install**.

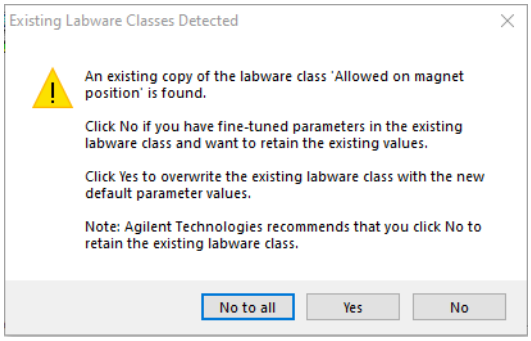


6 When the **VWorks Login** page opens, log in using OpenLab administrator credentials. By default, the credentials are:

- Login *admin*
- Password *openlab*

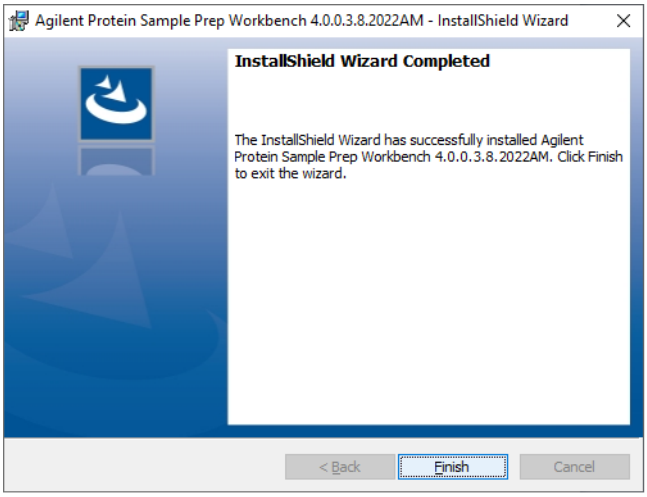


7 If an existing labware classes or labware detected message appears, click **Yes**.



Note: VWorks 14.4 and Protein Sample Prep Workbench use Shared Services storage instead of the registry to store this type of record. This message appears at this step because the VWorks 14.4 installer has already installed a set of labware and labware classes.

8 When the **Wizard Completed** page displays, click **Finish**.



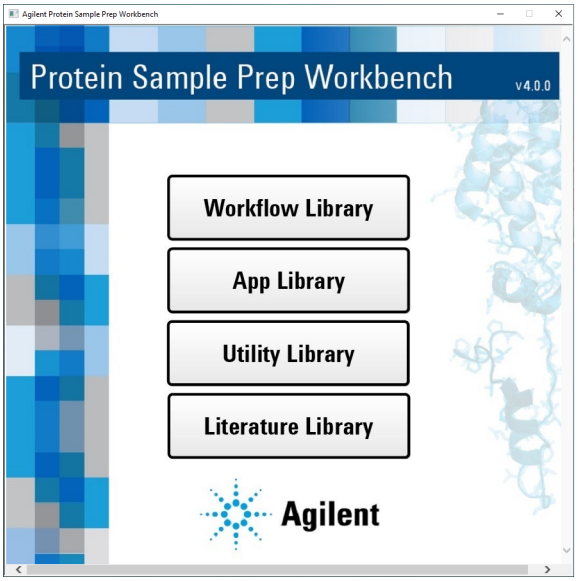
Checking the Workbench installation

To check the Protein Sample Prep Workbench installation:

1 On the Windows desktop, double-click the shortcut icon 

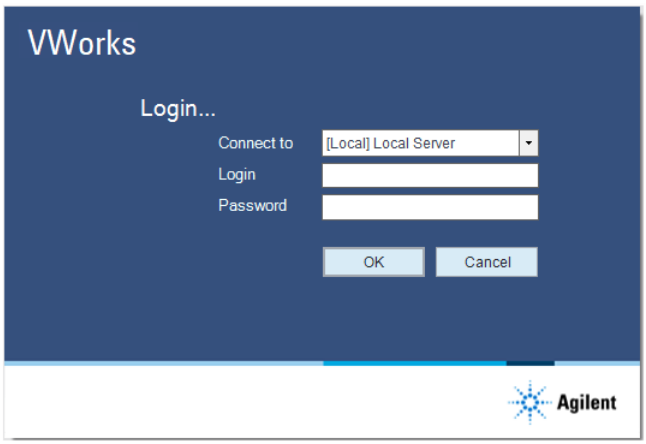
.

2 In the **Protein Sample Prep Workbench** landing page, click any Library button. For example, click **App Library**.

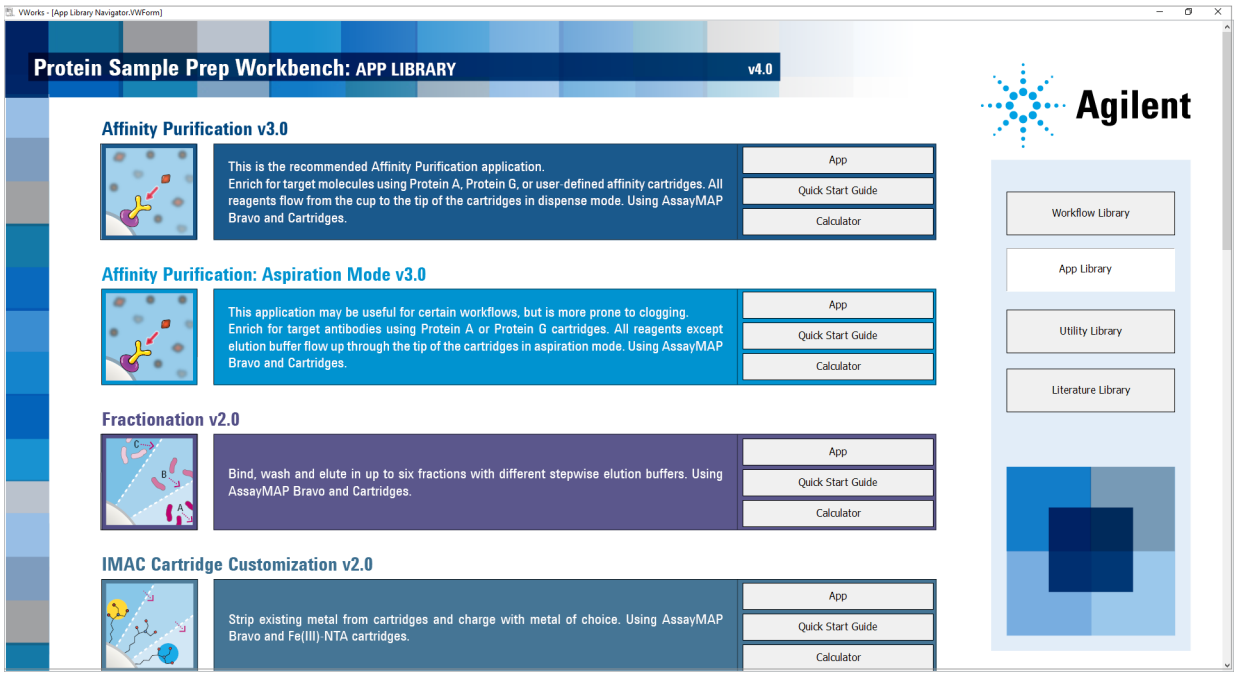


The VWorks software launches and the VWorks Login window appears.

3 In the Login window, enter the same Login (user name) and Password that you used to install the VWorks software. Click **OK.**



The selected Library page opens in the Protein Sample Prep Workbench. The following figure shows the App Library.



4 Ensure that the selected Library page opens without any errors, and then exit the Protein Sample Prep Workbench.

Verifying Excel VWorksMethodSetupTool add-in

The Workbench requires the VWorksMethodSetupTool add-in in Microsoft Excel for the method setup tools in the following utilities:

- Normalization
- Reformatting
- Serial Dilution

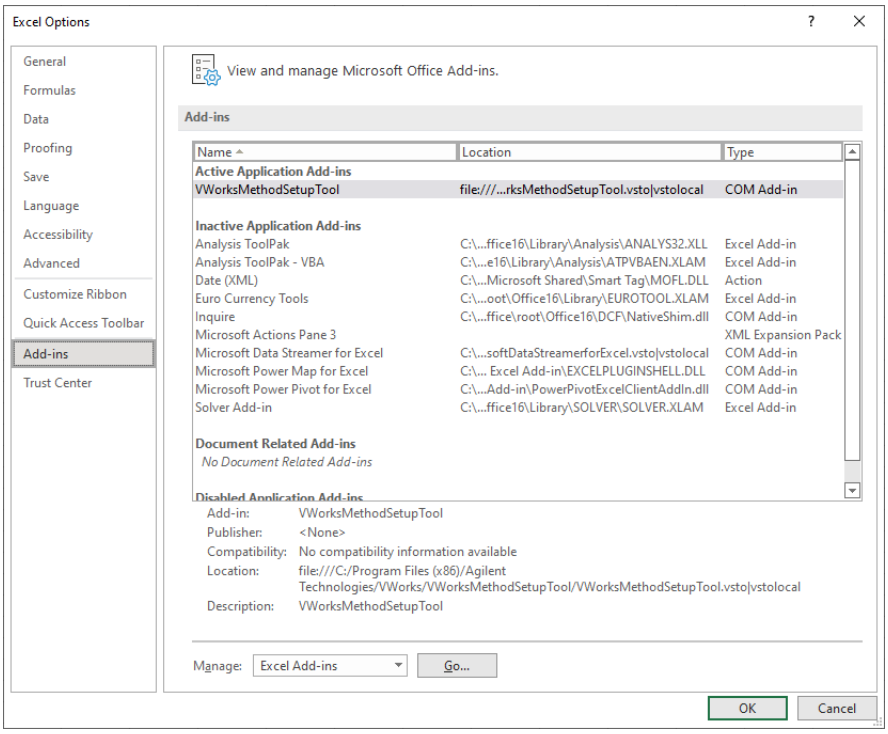
Use the following procedure to verify that Microsoft Excel includes this add-in.

IMPORTANT The following procedure requires Microsoft Excel 32-bit.

To verify Excel includes the VWorksMethodSetupTool add-in:

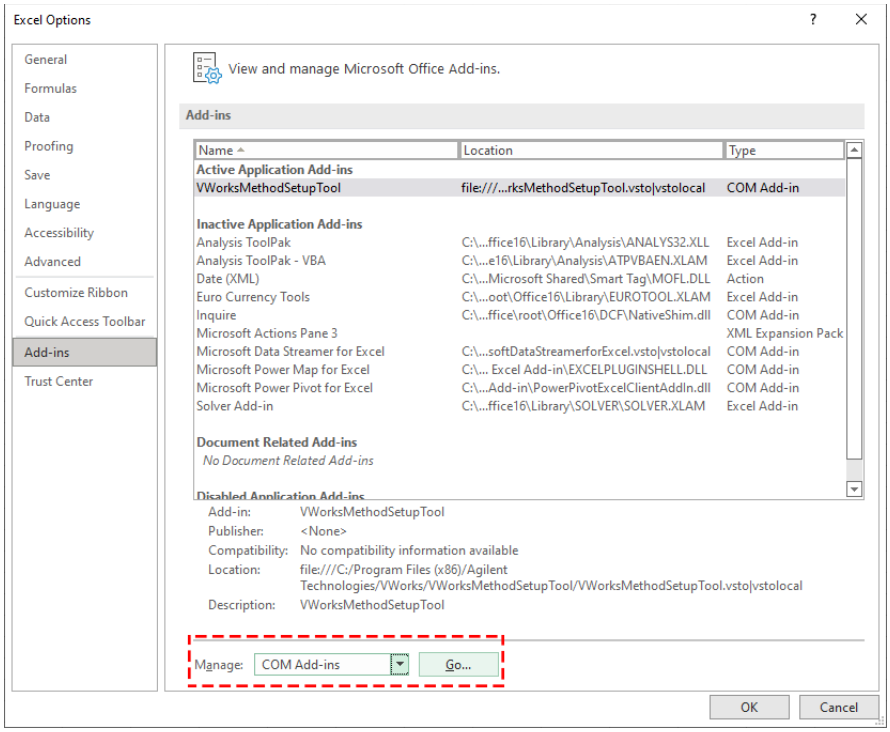
1 In Microsoft Excel click **File > Options**. The Excel Options dialog box opens.

2 Click **Add-ins** and verify that the **VWorksMethodSetupTool** is listed in the Add-ins table.

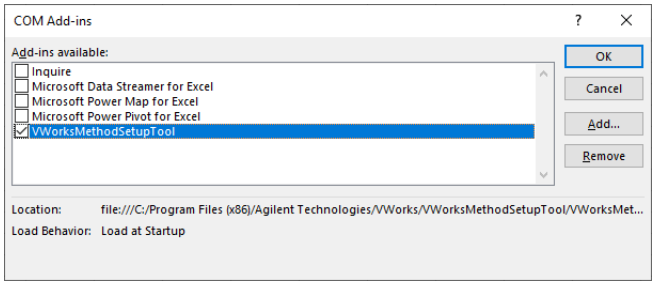


- If the add-in is present, click **OK** to close the dialog box and then exit Excel.
- If the add-in is missing, continue to step 3.

3 In the **Manage** list, select **COMM Add-ins**, and then click **Go**.



4 In the **COMM Add-ins** window, select **VWorksMethodSetupTool**, and then click **OK**.



The VWorksMethodSetupTool is added to the Add-Ins table in the Excel Options dialog box.

5 Click **OK** to close the dialog box, and then exit Excel.

Turning on the platform and understanding the profiles

Before you start

You must set up the AssayMAP Bravo Platform in the VWorks software before you can safely run the protocols in the Protein Sample Prep Workbench. Make sure that you perform the following steps in the order given to set up the AssayMAP Bravo Platform.

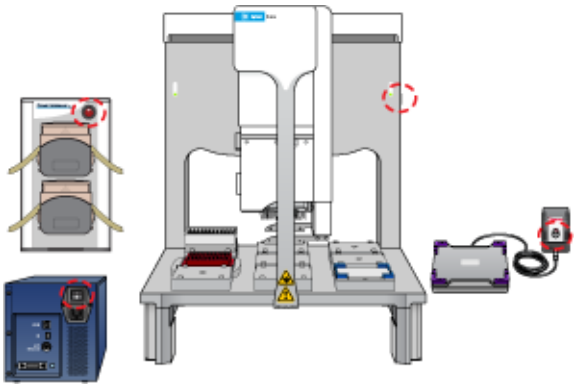
WARNING **To avoid potential injury and damage to the device, only personnel trained in how to teach the AssayMAP Bravo Platform should perform the setup procedures.**

Step	For this task...	See...
1	If you have not already done so, turn on the AssayMAP Bravo Platform.	"Turning on the AssayMAP Bravo Platform" on page 64
2	Understand the device profile requirements.	"Device profile requirements" on page 66
3	Start the VWorks software, establish communication with the device, and then verify the device profile settings for this installation.	"Verifying the profile settings and configuration" on page 68

Turning on the AssayMAP Bravo Platform

To turn on the platform:

1. Ensure that the Ethernet cable, pendant cable, power cord, and Pump Module cable are properly connected to the Bravo rear connection panels.
2. If you have not already done so, turn on the accessories: Pump Module, STC Controller, and Orbital Shaking Station control module.
3. If you have not already done so, turn on the computer.
4. On the side of the Bravo, press the power switch to the **on (|)** position.



Starting the VWorks software

IMPORTANT

Ensure that the Protein Sample Prep Workbench is closed.

Start the VWorks software and log in using the same credentials that you used to install the VWorks software.

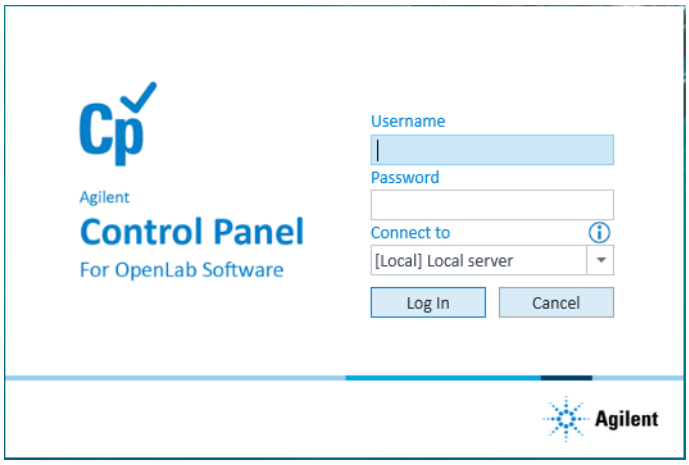
Note: If this is the first time to start VWorks after installation, right-click the VWorks shortcut and click Run as administrator to start the software.

To start VWorks from a desktop shortcut:

1 On the Windows desktop, double-click the VWorks shortcut 

.

The Control Panel Login window opens.

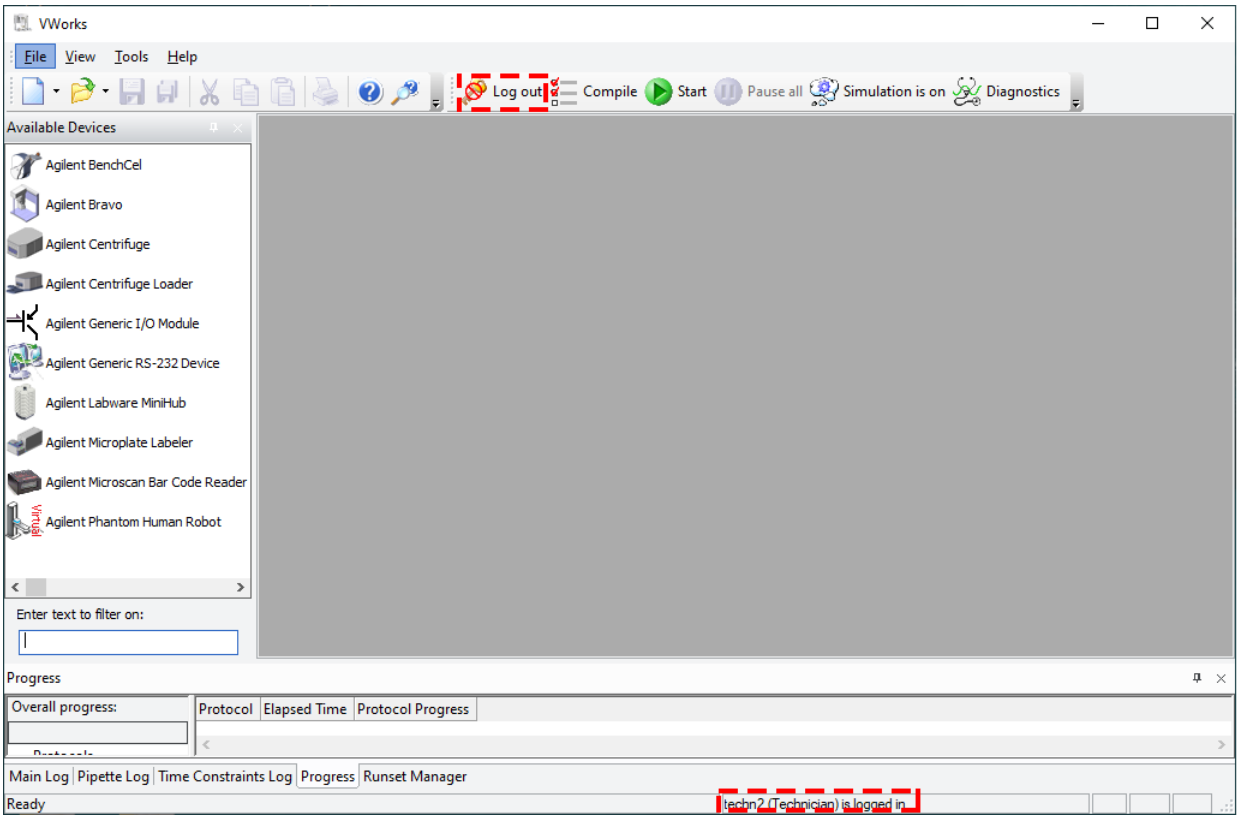


2 In the **Control Panel** login window:

- Type your **Username** and **Password**.
- If applicable, select the server from the **Connect to** list.

Click **Log In.** The VWorks window opens. The following figure shows an example. The window display can vary depending on any previous settings for view options.

In the VWorks window, the Log in button changes to Log out, and the status bar indicates that the login is successful.



Device profile requirements

Each AssayMAP application requires a specific Bravo device file and profile. The device profile specifies the head type (Bravo 96AM Head), Ethernet communication settings for the device, the configuration of the platepads and accessories on the deck, and the associated teachpoints for the specific combination of instrument and Bravo 96AM Head.

The following tables lists the AssayMAP device files and their associated profiles, and the applications and utilities associated with each of them.

Table AssayMAP device files and associated profiles for Workbench 4.0

Device file name	Profile name	AssayMAP applications and utilities
AssayMAP Bravo.dev	AssayMAP 1	Affinity Purification Affinity Purification: Aspiration Mode Immobilization
AM Peptide Sample Prep.dev	AssayMAP Peptide Sample Prep	Fractionation IMAC Cartridge Customization In-Solution Digestion: Multi-Plate On-Cartridge Reaction Peptide Cleanup Peptide Cleanup: Aspiration Mode Phosphopeptide Enrichment Protein Cleanup
Evosep_96AM Bravo.dev	Evosep_96AM Bravo	Evosep 96AM Workflow
InSolution Digestion-AM Bravo-v2.dev	Single Plate InSolution Digestion v2	In-Solution Digestion: Single Plate
Normalization-AM Bravo.dev	AssayMAP Normalization	Normalization, Serial Dilution, Reformatting

The device profiles must specify the correct deck configuration and the associated teachpoints for the Bravo deck layout. The following sections of this guide describe how to verify the configurations and set the teachpoints.

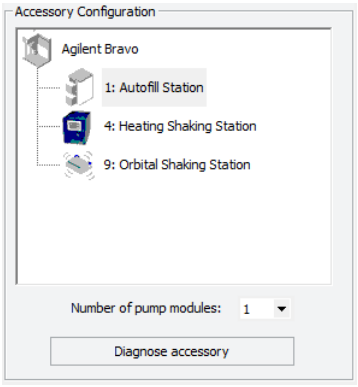
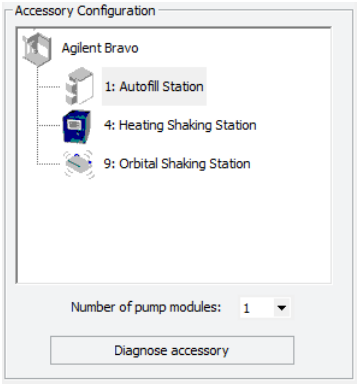
IMPORTANT

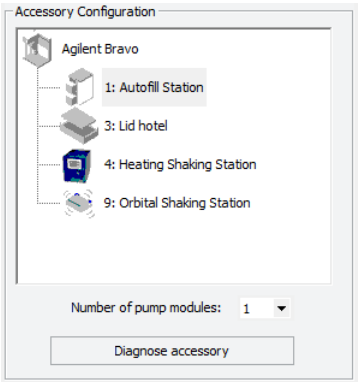
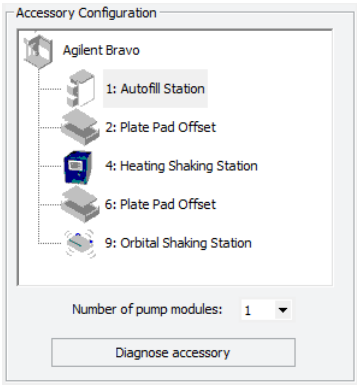
If other liquid-handling heads will be used on the AssayMAP Bravo Platform, such as a 96LT Head, ensure that you verify the corresponding device files and profiles for the those liquid-handling heads. For details, see the *Bravo Platform User Guide*.

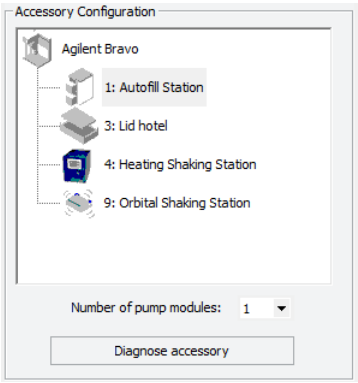
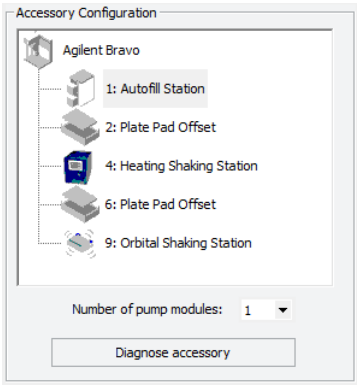
Verifying the profile settings and configuration

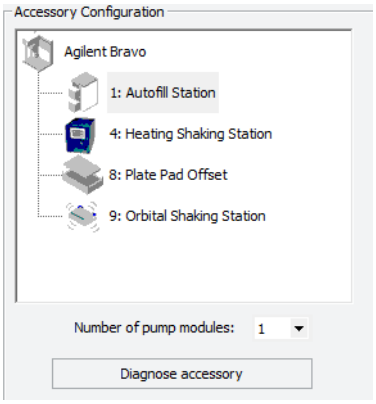
Profile verification workflow

Perform the steps in the following workflow in the order given to verify the device files and associated profiles.

Step	Task	Verification task...
1	**AssayMAP Bravo.dev** device file and **AssayMAP 1** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
2	**AssayMAP 1** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck: 	Accessory **a** Autofill Station for wash station (location 1) — "Verifying the Autofill Station configuration (wash station)" on page 75 **b** Heating Shaking Station for Peltier Thermal Station (location 4) — "Verifying the Peltier Thermal Station configuration" on page 77 **c** Orbital Shaking Station (location 9) — "Verifying the Orbital Shaking Station configuration" on page 79
3	**AM Peptide Sample Prep.dev** device file and **AssayMAP Peptide Sample Prep** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
4	**AssayMAP Peptide Sample Prep** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck: 	Accessory **a** Autofill Station for wash station (location 1) — "Verifying the Autofill Station configuration (wash station)" on page 75 **b** Heating Shaking Station for Peltier Thermal Station (location 4) — "Verifying the Peltier Thermal Station configuration" on page 77 **c** Orbital Shaking Station (location 9) — "Verifying the Orbital Shaking Station configuration" on page 79

Step	Task	Verification task...
5	**InSolution Digestion-AM Bravo-v2.dev** device file and **Single Plate InSolution Digestion v2** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
6	**Single Plate InSolution Digestion v2** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck:	
		
	Accessory configuration	
	a Autofill Station for wash station (location 1)	"Verifying the Autofill Station configuration (wash station)" on page 75
	b Heating Shaking Station for Peltier Thermal Station (location 4)	"Verifying the Peltier Thermal Station configuration" on page 77
	c Orbital Shaking Station (location 9)	"Verifying the Orbital Shaking Station configuration" on page 79
	d Lid Hotel (location 3) *Note:* Even though a standard platepad is installed at this location, the Lid Hotel configuration is required to enable the location to accept a lid in a Delidding task.	"Verifying the Lid Hotel configuration" on page 81
7	**Normalization-AM Bravo.dev** device file and **AssayMAP Normalization** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
8	**AssayMAP Normalization** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck:	
		
	Accessory configuration	
	a Autofill Station for wash station (location 1)	"Verifying the Autofill Station configuration (wash station)" on page 75
	b Heating Shaking Station for Peltier Thermal Station (location 4)	"Verifying the Peltier Thermal Station configuration" on page 77
	c Orbital Shaking Station (location 9)	"Verifying the Orbital Shaking Station configuration" on page 79
	d Plate Pad Offset (locations 2 and 6) *Note:* Even though standard platepads are installed at these locations, this configuration is required to enable the use of Plate Risers at these deck locations.	"Verifying Plate Pad Offset for AssayMAP Normalization" on page 82

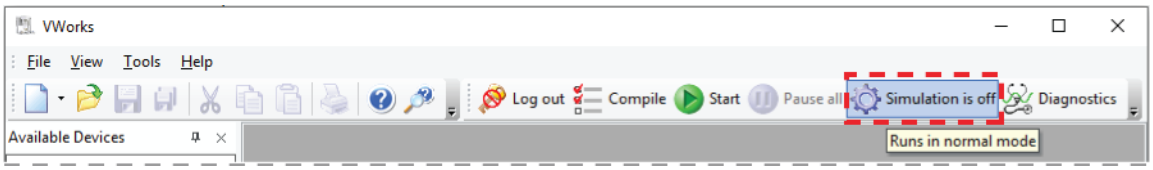
Step	Task	Verification task...
5	**InSolution Digestion-AM Bravo-v2.dev** device file and **Single Plate InSolution Digestion v2** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
6	**Single Plate InSolution Digestion v2** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck: 	Accessory configuration
	a Autofill Station for wash station (location 1)	"Verifying the Autofill Station configuration (wash station)" on page 75
	b Heating Shaking Station for Peltier Thermal Station (location 4)	"Verifying the Peltier Thermal Station configuration" on page 77
	c Orbital Shaking Station (location 9)	"Verifying the Orbital Shaking Station configuration" on page 79
	d Lid Hotel (location 3) *Note:* Even though a standard platepad is installed at this location, the Lid Hotel configuration is required to enable the location to accept a lid in a Delidding task.	"Verifying the Lid Hotel configuration" on page 81
7	**Normalization-AM Bravo.dev** device file and **AssayMAP Normalization** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
8	**AssayMAP Normalization** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck: 	Accessory configuration
	a Autofill Station for wash station (location 1)	"Verifying the Autofill Station configuration (wash station)" on page 75
	b Heating Shaking Station for Peltier Thermal Station (location 4)	"Verifying the Peltier Thermal Station configuration" on page 77
	c Orbital Shaking Station (location 9)	"Verifying the Orbital Shaking Station configuration" on page 79
	d Plate Pad Offset (locations 2 and 6) *Note:* Even though standard platepads are installed at these locations, this configuration is required to enable the use of Plate Risers at these deck locations.	"Verifying Plate Pad Offset for AssayMAP Normalization" on page 82

Step	Task	Verification task...
9	**Evosep_96AM Bravo.dev** device file and **Evosep_96AM Bravo** profile: Ensure that the device and profile settings are correct.	"Opening the device file and verifying the profile settings" on page 71
10	**Evosep_96AM Bravo** profile: Ensure the deck configuration matches the physical AssayMAP Bravo deck:	
		Accessory configuration
	a Autofill Station for wash station (location 1)	"Verifying the Autofill Station configuration (wash station)" on page 75
	b Heating Shaking Station for Peltier Thermal Station (location 4)	"Verifying the Peltier Thermal Station configuration" on page 77
	c Orbital Shaking Station (location 9)	"Verifying the Orbital Shaking Station configuration" on page 79
	d Plate Pad Offset (location 8) *Note:* Even though a standard platepad is installed at this location, this configuration is required to enable the use of the Evotips Adapter with Evotips.	"Verifying Plate Pad Offset for Evosep_96AM Bravo" on page 84

Opening the device file and verifying the profile settings

To open the device file and verify the profile settings:

1 In the VWorks software, ensure that Simulation is off.

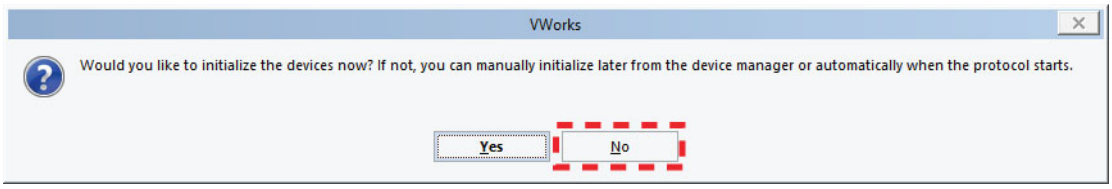


2 In the VWorks window, choose **File > Open Device** and open the AssayMAP device file for the profile that you are verifying. For example, open AssayMAP Bravo.dev to verify the AssayMAP 1 profile.

The device files are stored at the following location:

Software edition	Profile name
VWorks Plus	/VWorks Projects/VWorks/Protein Sample Prep Workbench/Device Files/
VWorks Standard	C:\OLSS Projects\VWorks Projects\VWorks\Protein Sample Prep Workbench\Device Files\

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



4 In the VWorks window <*name*>.dev tab, ensure that the **Profile** selection is correct.

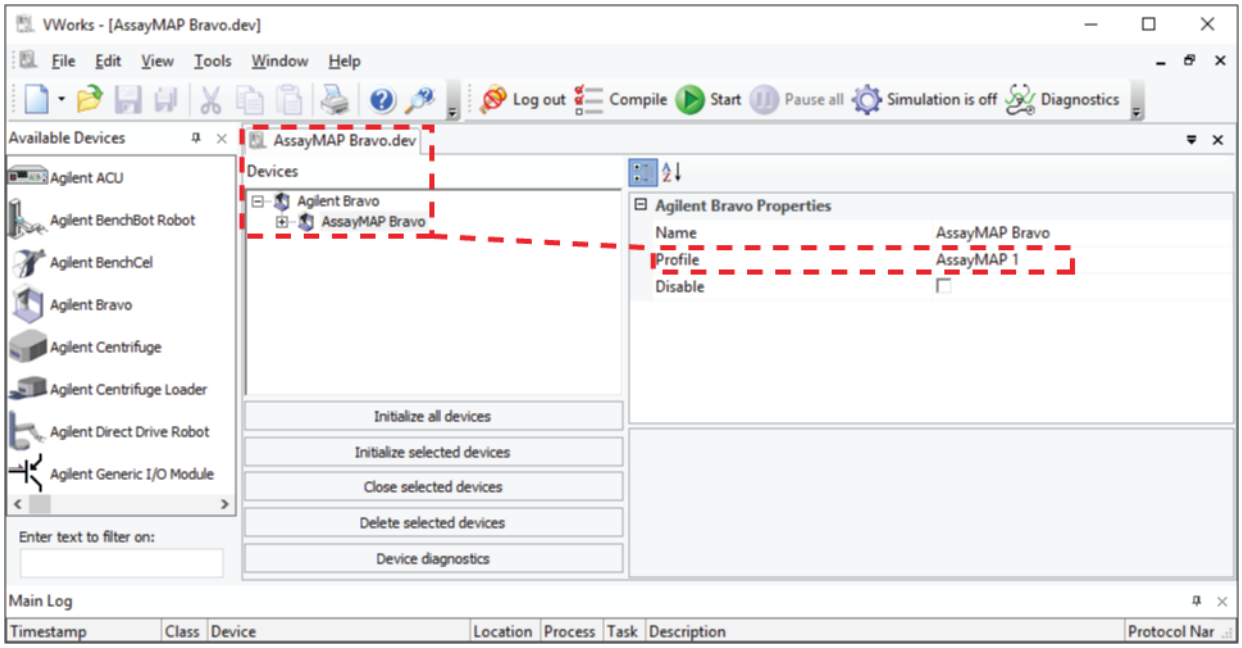
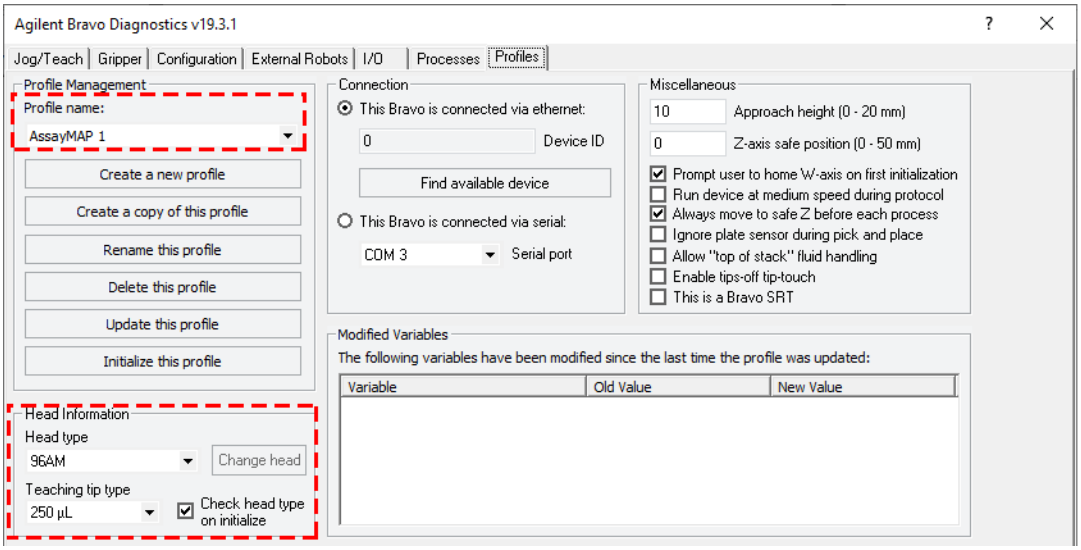


Table Device files and associated profiles

Device file name	Profile name
AssayMAP Bravo.dev	AssayMAP 1
AM Peptide Sample Prep.dev	AssayMAP Peptide Sample Prep
InSolution Digestion-AM Bravo-v2.dev	Single Plate InSolution Digestion v2
Normalization-AM Bravo.dev	AssayMAP Normalization
Evosep_96AM Bravo.dev	Evosep_96AM Bravo

5 In the VWorks window <*name*>.dev tab, click **Device diagnostics**.

The **Agilent Bravo Diagnostics** dialog box opens.

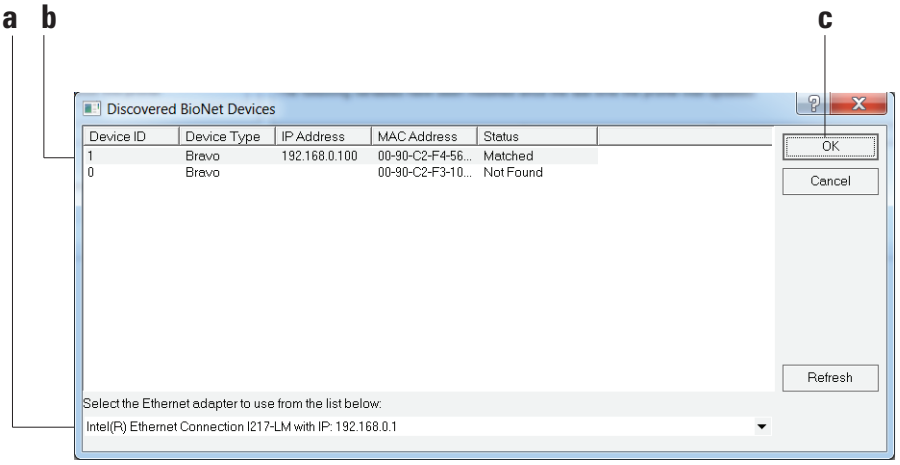


6 In the **Profiles** tab, verify the **Profile name** and the following **Head Information** properties

Property	Setting
Head type	96AM
Teaching tip type	250 µL
Check head type on initialize	☑ selected

7 In the **Connection** area, select **This Bravo is connected via ethernet**, and then click **Find available device** to select the device to associate with the profile.

In the **Discovered BioNet Devices** dialog box that appears, perform the following tasks:



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 Bravo device. If multiple Bravo devices are on the network, use the **MAC Address** to identify the Bravo device for this profile. To successfully communicate with the Bravo device, the **Status** column must display **New** or **Matched**.

c Click **OK**.

Note: If necessary, shutdown the computer, ensure that the only Ethernet port connection is to the Bravo instrument, and then restart the computer.

Note: The Bravo device has a default IP address of 192.168.0.8. If necessary, Agilent field service can use the Gemini Test Utility to change the default IP address if a conflict occurs. For instructions, see the *G5562A, G5563A Bravo Platform Service Guide*.

8 In the **Miscellaneous** area, verify the property settings for the profile that you are verifying.

The following figures show the settings for all the AssayMAP profiles. But you will verify only one profile at a time.

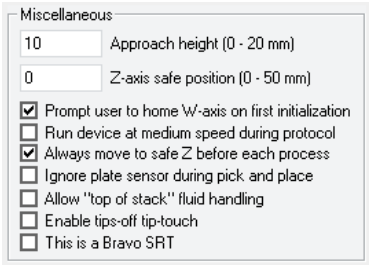
Figure Profile settings in Miscellaneous area

AssayMAP 1

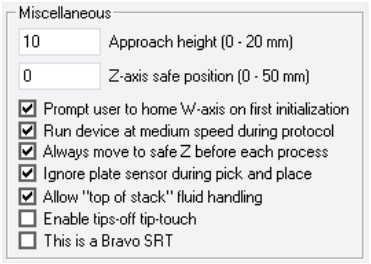
AssayMAP Normalization

Single Plate InSolution Digestion v2

Evosep_96AM Bravo



AssayMAP Peptide Sample Prep



9 Click **Update this profile**.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

Verifying the Autofill Station configuration (wash station)

The Autofill Station configuration controls pumping the liquid to and from the wash station installed at deck location 1.

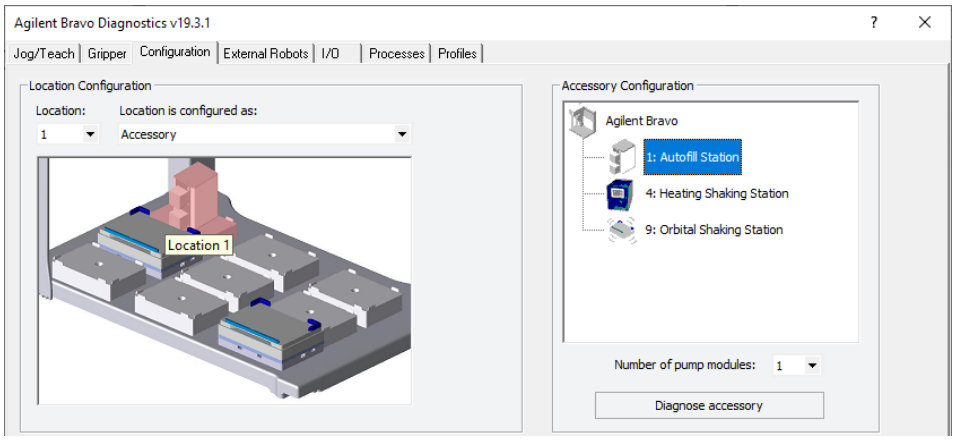
IMPORTANT

Use the following procedure to verify the Autofill Station configuration settings in every AssayMAP profile.

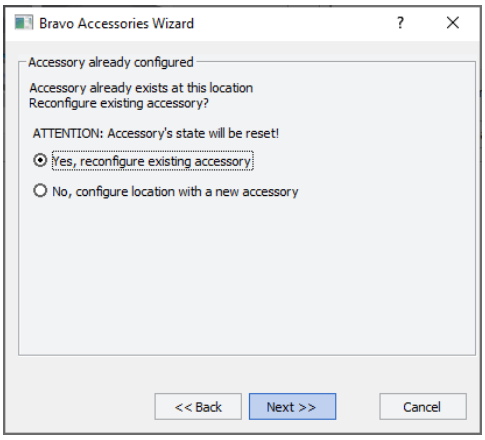
All the supplied profiles already include the Autofill Station configuration. You perform the following steps to ensure that the setup is correct.

To verify the Autofill Station configuration

1. In Bravo Diagnostics, ensure the correct profile is selected in the **Profiles** tab.
2. In the **Configuration** tab, verify that the deck image shows a Pump Module at deck location 1.



3. To verify the settings, right-click deck location 1 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.
4. In the **Location for accessory** list, verify the location and then click **Next**.
5. In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.



6 Verify the following property settings in the **Autofill Station properties** table, and then click **Next**.

Autofill station properties	Setting
Fill module	1
Pump for filling	Pump 1
Direction for filling	Forward
Empty module	1
Pump for emptying	Pump 2
Direction for emptying	Reverse
Use Weigh Station?	No
Weigh Station module number	1

7 Click **Finish**. The Bravo Accessories Wizard closes.

8 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

IMPORTANT You repeat this procedure in every AssayMAP profile to ensure that the apps or utilities associated with that profile function properly.

Verifying the Peltier Thermal Station configuration

The Heating Shaking Station configuration controls the Peltier Thermal Station (also known as the CPAC Ultraflat) installed at deck location 4.

IMPORTANT

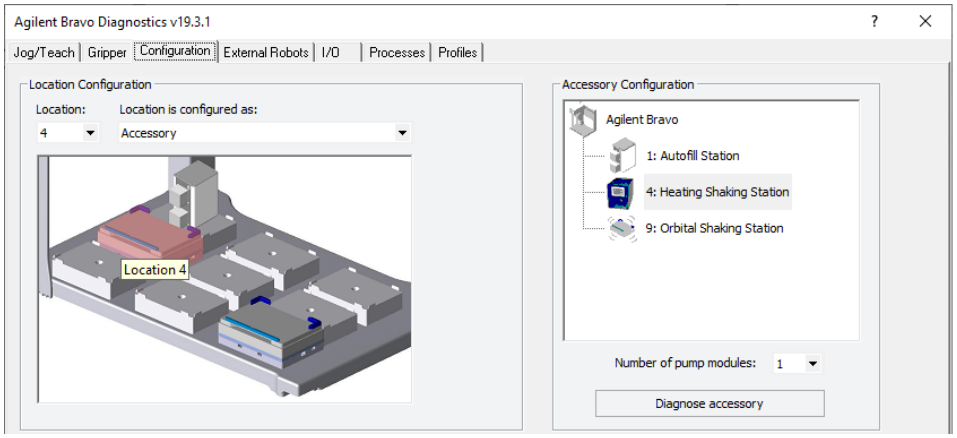
Use the following procedure to verify the Peltier Thermal Station configuration settings in every AssayMAP profile.

All the supplied profiles already include the Heating Shaking Station configuration. You perform the following steps to ensure that the setup is correct.

Note: If a standard platepad is installed at location 4 instead of a Peltier Thermal Station, configure that deck location for a standard platepad in the profile.

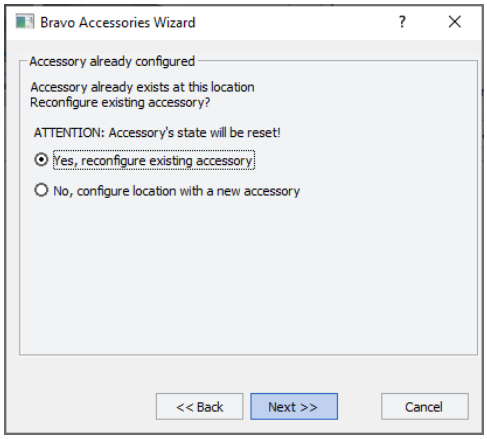
To verify the Peltier Thermal Station configuration:

1. In Bravo Diagnostics, ensure the correct profile is selected in the **Profiles** tab.
2. In the **Configuration** tab, verify that the deck image shows a Heating Shaking Station icon at deck location 4.



3. To verify the settings, right-click deck location 4 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.
4. In the **Location for accessory** list, verify that location 4 is selected, and then click **Next**.

5 In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.



6 Verify the following settings in the **Properties** table, and then click **Next**.

Properties	Setting
MTCSTC Id	0
MTCSTC Type	STC
Slot Id	1

Note: The Inheco STC Controller ships with an MTCSTC Id setting of 0. However, this setting may have been changed on demo units for use with multiple devices. Use the DIP switches on the back of the STC Controller to determine what the actual Id setting is and make changes if necessary. See the manufacturer's user documentation for more information.

7 Click **Finish**. The Bravo Accessories Wizard closes.

8 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

IMPORTANT

Repeat this procedure in every AssayMAP profile to ensure that the associated apps or utilities function properly.

Verifying the Orbital Shaking Station configuration

The Orbital Shaking Station configuration controls the Orbital Shaking Station installed at deck location 9.

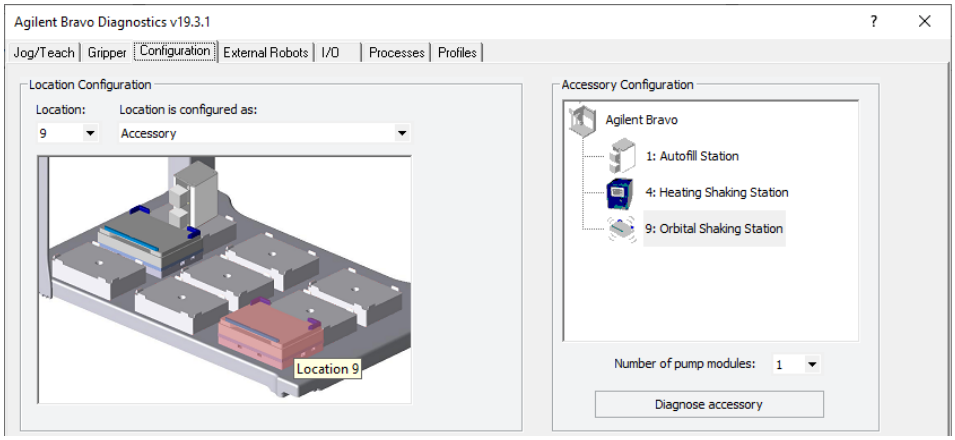
IMPORTANT

Use the following procedure to verify the Orbital Shaking Station configuration settings in every AssayMAP profile.

All the supplied profiles already include the Orbital Shaking Station configuration. You perform the following steps to ensure that the setup is correct.

To verify the Orbital Shaking Station configuration:

1. In Bravo Diagnostics, ensure the correct profile is selected in the **Profiles** tab.
2. In the **Configuration** tab, verify that the deck image shows a Orbital Shaking Station icon at deck location 9.



3. To verify the settings, right-click deck location 9 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.
4. In the **Location for accessory** list, verify that the location is 9, and then click **Next.**
5. In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.

6 In the **Properties** table, verify the Serial Port number and Module Number, and then click **Next**.

Property	Setting
Serial Port	1*
Module Number	1

*The Serial Port parameter will be automatically defined when a USB-to-serial adapter is connected to the computer. You might need to look up the port assigned to this device in the Windows Device Manager.

Note: Occasionally, a port number is reassigned for a USB-to-serial connection if you disconnect and reconnect the accessory. If this happens, you must verify that the correct Serial Port is set in each profile.

7 Click **Finish**. The Bravo Accessories Wizard closes.

8 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

Next tasks

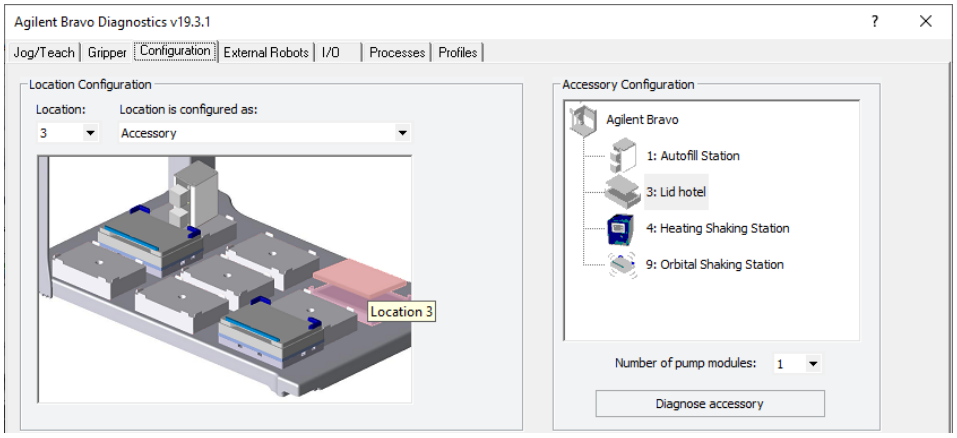
Next tasks	See …
Depends on the profile	"Profile verification workflow" on page 68

Verifying the Lid Hotel configuration

Use the following procedure only for the Single Plate InSolution Digestion v2 profile.

To verify the Lid Hotel configuration:

1. In Bravo Diagnostics **Profiles** tab, select the **Single Plate InSolution Digestion v2** profile.
2. In the **Configuration** tab, verify that the deck image shows a Lid Hotel icon at deck location 3.



3. To verify the settings, right-click deck location 3 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.
4. In the **Location for accessory** list, verify that the location is 3, and then click **Next.**
5. In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.

6. In the **Properties** table, verify the following, and then click **Next**.

Property	Setting
Slots	1
Waste bin (lids discarded)	No

7 Click **Finish**. The Bravo Accessories Wizard closes.

8 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

Next tasks

Next tasks	See ...
Depends on the profile	"Profile verification workflow" on page 68

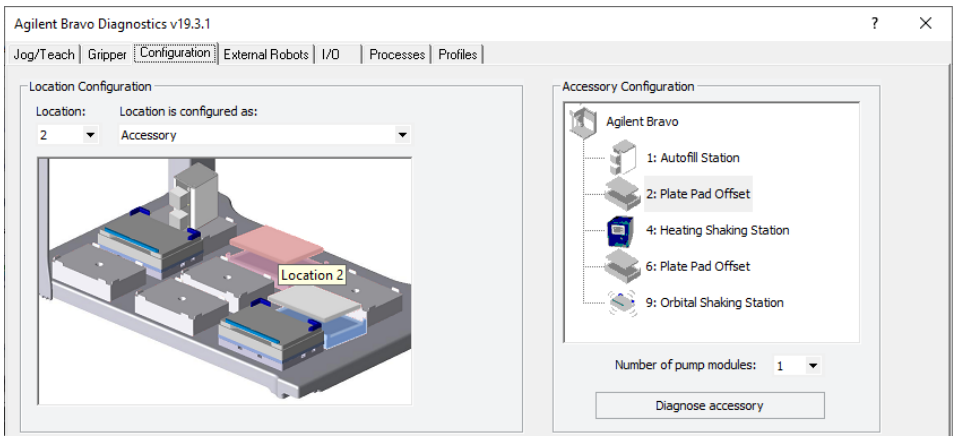
Verifying Plate Pad Offset for AssayMAP Normalization

Use the following procedure only for the AssayMAP Normalization profile.

To verify the Plate Pad Offset configuration for the AssayMAP Normalization profile:

1 In Bravo Diagnostics **Profiles** tab, select the **AssayMAP Normalization** profile.

2 In the **Configuration** tab, verify that the deck image shows a Plate Pad Offset icon at deck locations 2 and 6.



3 To verify the settings, right-click deck location 2 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.

4 In the **Location for accessory** list, verify that the location is 2, and then click **Next.**

5 In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.

6 In the **Properties** table, verify the following, and then click **Next**.

Property	Setting
Insert height in millimeters	28.4
Clearance height offset in millimeters	0

7 Click **Finish**. The Bravo Accessories Wizard closes.

8 Repeat steps 3–7 for deck location 6.

9 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

Next tasks

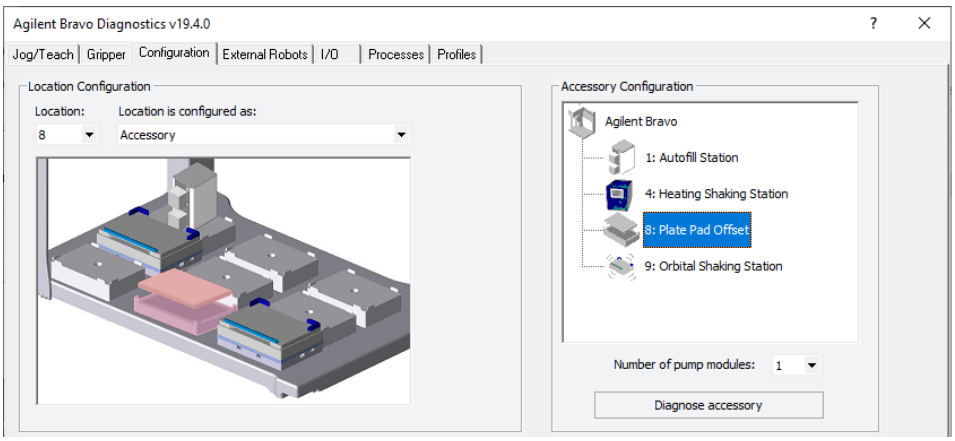
Next tasks	See ...
Depends on the profile	"Profile verification workflow" on page 68

Verifying Plate Pad Offset for Evosep_96AM Bravo

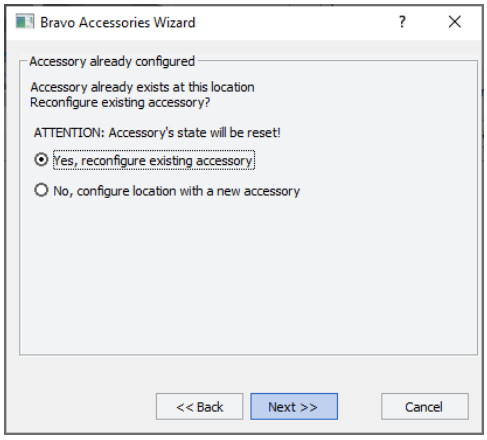
Use the following procedure only for the Evosep_96AM Bravo profile.

To verify the Plate Pad Offset configuration for Evosep_96AM Bravo profile:

1. In Bravo Diagnostics **Profiles** tab, select the **Evosep_96AM Bravo** profile.
2. In the **Configuration** tab, verify that the deck image shows a Plate Pad Offset icon at deck location 8.



3. To verify the settings, right-click deck location 8 in the image. In the shortcut menu that appears, click **Configure location > Accessory**. The Bravo Accessories Wizard opens.
4. In the **Location for accessory** list, verify that the location is 8, and then click **Next.**
5. In the **Accessory already configured** page, click **Yes, reconfigure existing accessory**, and then click **Next**.



6. In the **Properties** table, verify the following, and then click **Next**.

Property	Setting
Insert height in millimeters	4.6
Clearance height offset in millimeters	0

7. Click **Finish**. The Bravo Accessories Wizard closes.

8 If you made any changes to the configuration settings, click the **Profiles** tab, and then click **Update this profile** to save the changes.

VWorks Plus only. If an audit trail is being logged, select or type a reason for the change in the **Audit Comment** dialog box, and then click **OK**.

Next tasks

Next task...	Go to...
Ensure that you have verified the deck configuration for all AssayMAP profiles.	"Profile verification workflow" on page 68
If you have finished verifying accessory configurations in all AssayMAP profiles, you are ready to test the accessories.	"Testing the accessories" on page 86

Testing the accessories

Before you start

Ensure that you have verified the accessory configuration in the profile before you perform the following workflow.

Use the following workflow to guide you through testing the accessories for each of the four profiles.

IMPORTANT Ensure that you test the accessories in each AssayMAP profile before you set the teachpoints.

Step	For this task...	See...
1	Initialize the **AssayMAP 1** profile (AssayMAP Bravo.dev). *Note:* You must initialize the profile you are testing immediately before testing the communication with the accessories.	"Initializing the profile you are verifying" on page 87
2	Test the communication with the accessories.	"Testing the Pump Module" on page 88 "Testing the Peltier Thermal Station" on page 90 "Testing the Orbital Shaking Station" on page 91
3	Initialize the **AssayMAP Peptide Sample Prep** profile (AM Peptide Sample Prep.dev).	"Initializing the profile you are verifying" on page 87
4	Test the communication with the accessories.	"Testing the Pump Module" on page 88 "Testing the Peltier Thermal Station" on page 90 "Testing the Orbital Shaking Station" on page 91
5	Initialize the **Single Plate InSolution Digestion v2** profile (InSolution Digestion-AM Bravo-v2.dev).	"Initializing the profile you are verifying" on page 87
6	Test the communication with the accessories.	"Testing the Pump Module" on page 88 "Testing the Peltier Thermal Station" on page 90 "Testing the Orbital Shaking Station" on page 91
7	Initialize the **AssayMAP Normalization** profile (Normalization-AM Bravo.dev).	"Initializing the profile you are verifying" on page 87
8	Test the communication with the accessories.	"Testing the Pump Module" on page 88 "Testing the Peltier Thermal Station" on page 90 "Testing the Orbital Shaking Station" on page 91
9	Initialize the **Evosep_96AM Bravo** profile (Evosep-96AM Bravo.dev).	"Initializing the profile you are verifying" on page 87

Step	For this task...	See...
10	Test the communication with the accessories.	"Testing the Pump Module" on page 88 "Testing the Peltier Thermal Station" on page 90 "Testing the Orbital Shaking Station" on page 91

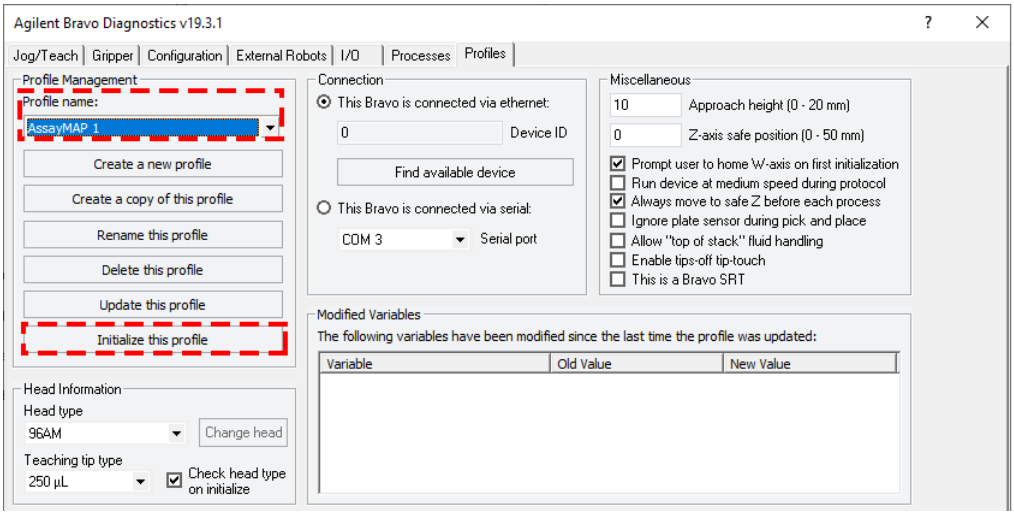
Initializing the profile you are verifying

Initializing the profile establishes communication with the AssayMAP Bravo Platform and accessories. You will initialize a profile to test the accessory settings and verify the gripper adjustment for that profile.

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.**

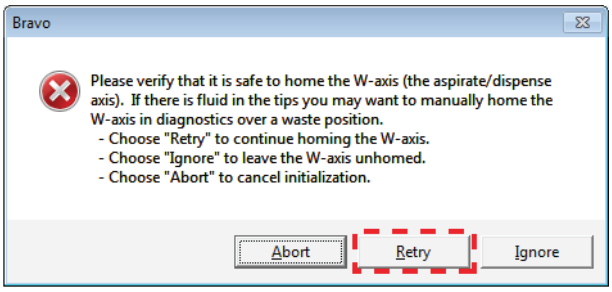
To initialize the profile:

1 In the **Profiles** tab, select the profile from the **Profile name** list, and then click **Initialize this profile** to start initializing the selected profile.



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

3 When the **verify that it is safe to home the W-axis** message appears, click **Retry** to continue homing the *w*-axis.



When the **initialization complete** message appears, go to "Testing the Pump Module" on page 88.

Testing the Pump Module

IMPORTANT

Make sure that you initialize the profile you are testing immediately before testing the communication with the accessories.

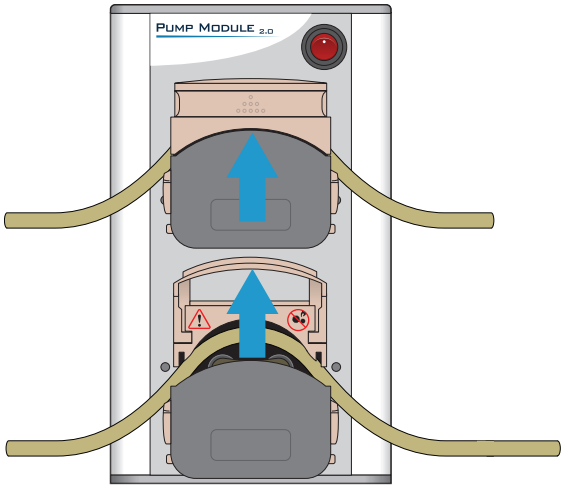
Use the following procedure to test the communication with the Pump Module. In a subsequent verification procedure, you will run the Startup utility, which will test the functioning of the Pump Module and wash station using liquid.

To test the communication with the Pump Module:

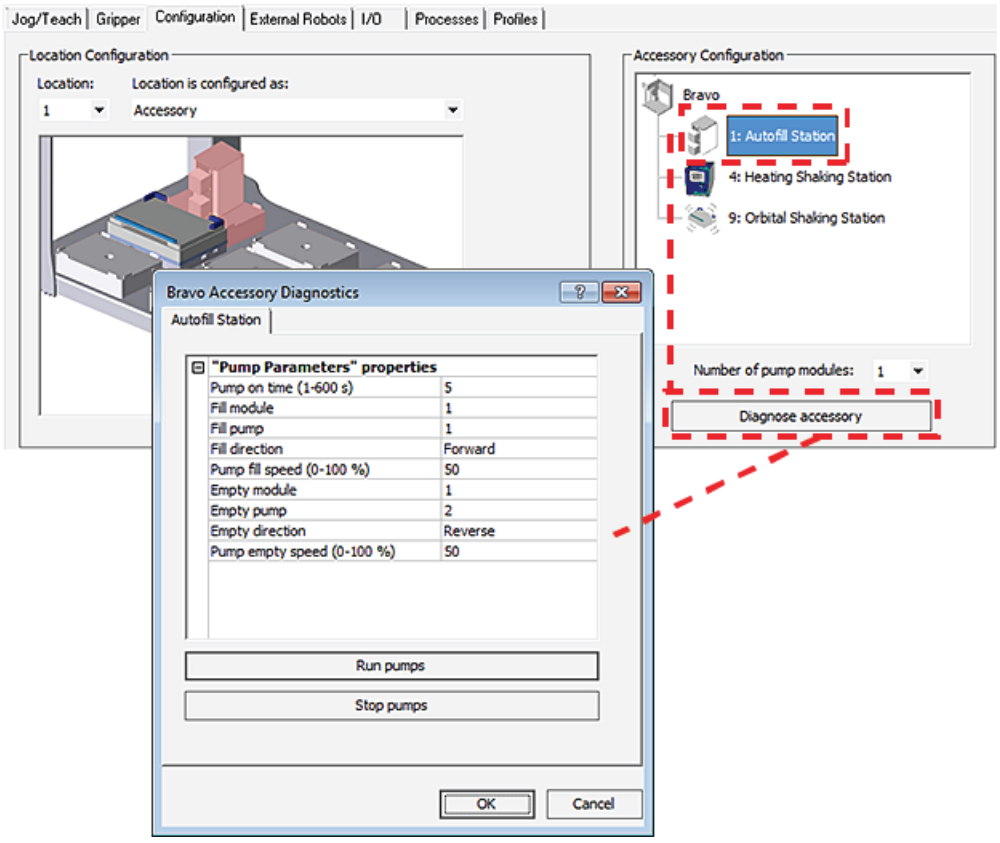
1 Ensure that the Pump Module is on.

2 Lift the flip-top cover on each pump head so that it is fully open.

Note: While the pump heads are open, no liquid will pump in the subsequent steps.



3 In the **Configuration** tab, click the **Autofill Station** icon, and then click **Diagnose accessory**. The Bravo Accessory Diagnostics dialog box opens.



4 Click **Run pumps**.

5 Verify that the pumps run. While they are running, verify that the pumps are spinning in the correct directions:

- Top pump should be spinning clockwise.
- Bottom pump should be spinning counter-clockwise.

6 Click **Stop pumps**, and then click **OK**.

Testing the Peltier Thermal Station

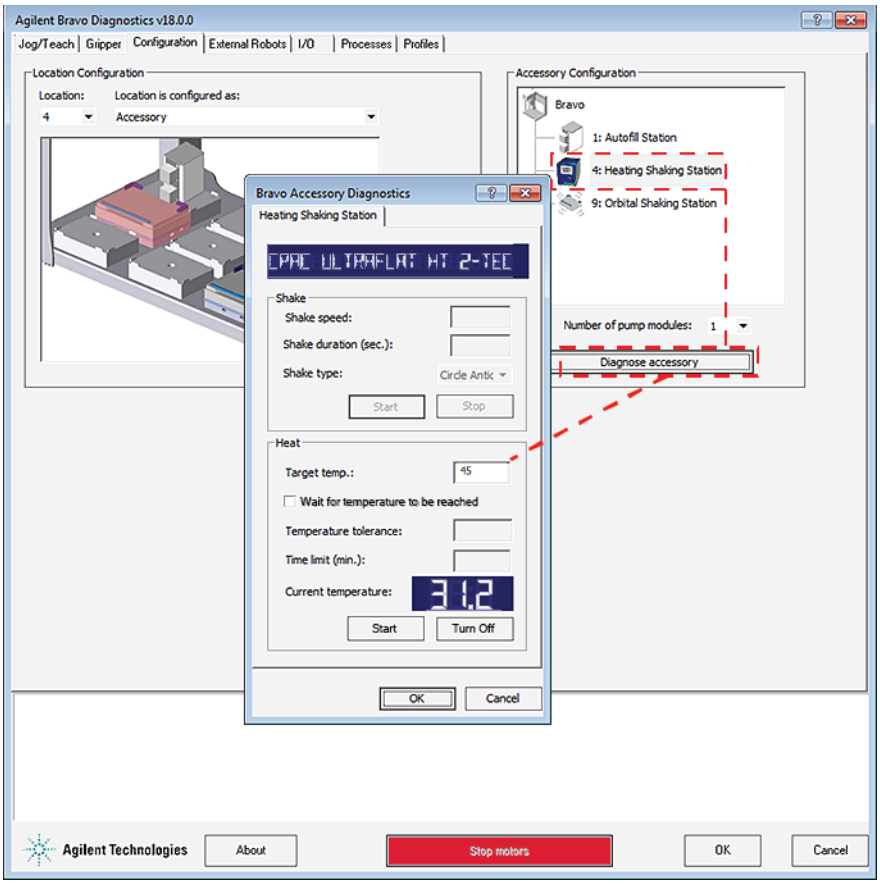
IMPORTANT

Make sure that you initialize the profile you are testing immediately before testing the communication with the accessories.

To test the Peltier Thermal Station:

1 Ensure that the MTC Controller is on.

2 In the **Accessory Configuration** area, click the **Heating Shaking Station** icon for deck location 4, and then click **Diagnose accessory**. The Bravo Accessory Diagnostics dialog box opens.



3 In the Bravo **Accessory Diagnostics** dialog box, verify that the correct device (CPAC Ultraflat) appears in the display at the top.

4 In the **Heat** area, set the parameters to test the temperature function:

- **a** In the **Target temp** box, type 45.
- **b** Click **Start**.
- **c** Wait for the **Current temperature** display to read 45 +/- 1 ºC. Confirm the temperature reading on the controller display is also 45 +/- 1 ºC.
- **d** Click **Turn Off** to stop the heating and confirm that the Peltier Thermal Station at deck location 4 is warm to the touch.

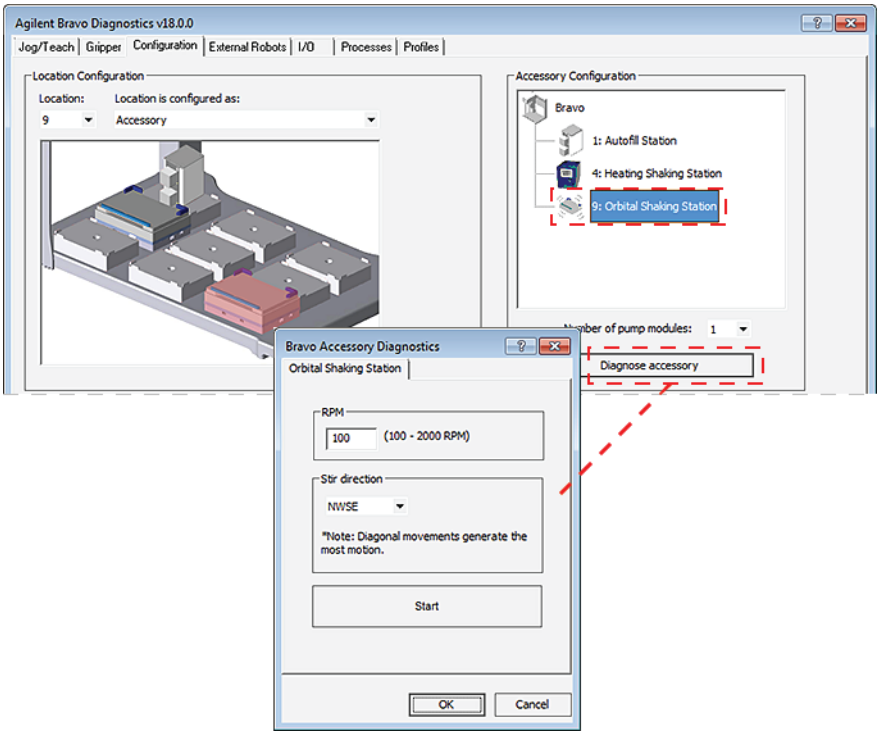
Testing the Orbital Shaking Station

IMPORTANT

Make sure that you initialize the profile you are testing immediately before testing the communication with the accessories.

To test the Orbital Shaking Station:

1 In the **Accessory Configuration** area, click the Orbital Shaking Station icon, and then click **Diagnose accessory**. The Bravo Accessory Diagnostics dialog box opens.



2 In the **RPM** box, type 1000.

3 Test each **Stir direction** option:

- **a** Select **NWSE**, and then click **Start**.
- **b** At the Orbital Shaking Station on the deck, verify that the accessory operates correctly.
- **c** In the **Bravo Accessory Diagnostics** dialog box, click **Stop**.
- **d** Repeat steps a to c for the remaining options:

  NESW

  EW

  NS

  NE, SW

  NW, SE

4 Click **OK**.

Next tasks

IMPORTANT

Ensure that you test the accessories in each AssayMAP profile before you set the teachpoints.

Next task...	Go to...
• If you have not tested the accessories in each AssayMAP profile, continue testing the next profile.	"Testing the accessories" on page 86
• If you have finished testing the accessories in each AssayMAP profile, proceed to setting the teachpoints.	"Step 1: Set teachpoints in AssayMAP 1 profile" on page 94

4 Setting the teachpoints

- "Step 1: Set teachpoints in AssayMAP 1 profile" on page 94
- "Step 2: Adjust teachpoints for accessories" on page 100
- "Step 3. Check and adjust gripper y-axis offset" on page 107
- "Step 4. Copy teachpoints to other profiles" on page 114

Step 1: Set teachpoints in AssayMAP 1 profile

This topic describes how to set the teachpoints in the AssayMAP 1 profile. After setting the teachpoints and verifying the gripper *y*-axis offset in the AssayMAP 1 profile, you will copy the teachpoints and gripper *y*-axis offset to the other profiles in the Protein Sample Prep Workbench.

Teachpoint requirements

A teachpoint is a set of axial coordinates that define a location to which the Bravo head moves. Each of the nine deck locations has a teachpoint.

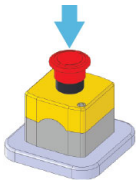
The teachpoints are valid only for the specific Bravo instrument, deck configuration, and liquid-handling head.

Before you start

WARNING **Without the Light Curtain and shields installed, make sure you keep clear of the device while it is in motion to avoid potential injury.**

WARNING **To avoid potential injury and damage to the device, only personnel trained in how to teach the Bravo Platform should perform the procedures in this topic.**

WARNING **The red Stop motors button in Bravo Diagnostics does not perform an immediate stop. The Bravo head can continue to move in the same direction at the same speed after you click the button. To perform an emergency stop, press the red button on the emergency-stop pendant.**



IMPORTANT Make sure that you remove all labware from the deck except for the wash station at deck location 1. The wash station remains installed at deck location 1 in the following procedure while you set the teachpoint for deck location 2. In a subsequent procedure, you will adjust the wash station teachpoint at deck location 1.

Ensure that you have the required resources:

- 250-µL pipette tip

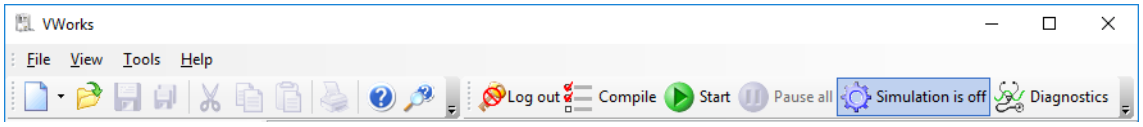
  Ensure that the pipette tip is new and in good condition.
- 0.010-inch (0.254 mm) feeler gauge

This gauge is used to set the vertical distance between the pipette tip and top of the crosshairs mark on the platepad or accessory.

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

Ensure the following:

- All Workbench profiles have been configured correctly. See "Verifying the profile settings and configuration" on page 68.
- The Protein Sample Prep Workbench software is not open.
- In the VWorks software, Simulation is off.



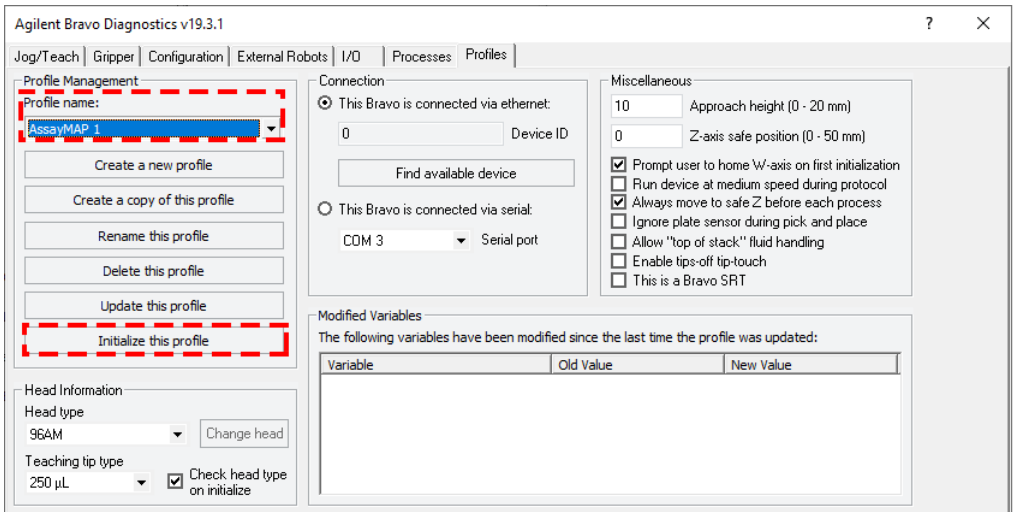
Workflow for setting the teachpoints

Step	For this task...	See...
1	In the Bravo Diagnostics dialog box, initialize the AssayMAP 1 profile.	"Initializing AssayMAP 1 profile for teaching" on page 96
2	Set the teachpoint for deck location 2 and derive the remaining teachpoints for the AssayMAP 1 profile.	"Setting the teachpoint for deck location 2 and deriving the remaining teachpoints" on page 97
3	Adjust the accessory location teachpoints for the AssayMAP 1 profile.	"Step 2: Adjust teachpoints for accessories" on page 100
4	Adjust the gripper offset.	"Step 3. Check and adjust gripper y-axis offset" on page 107
5	Copy the teachpoints and the gripper offset to the remaining profiles.	"Step 4. Copy teachpoints to other profiles" on page 114

Initializing AssayMAP 1 profile for teaching

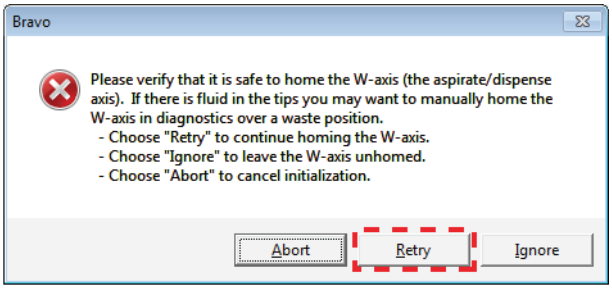
To initialize the profile:

1 In the **Profiles** tab, ensure that the AssayMAP 1 profile is selected, and then click **Initialize this profile**.



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

3 When the **verify that it is safe to home the W-axis** message appears, click **Retry** to continue homing the *w*-axis.



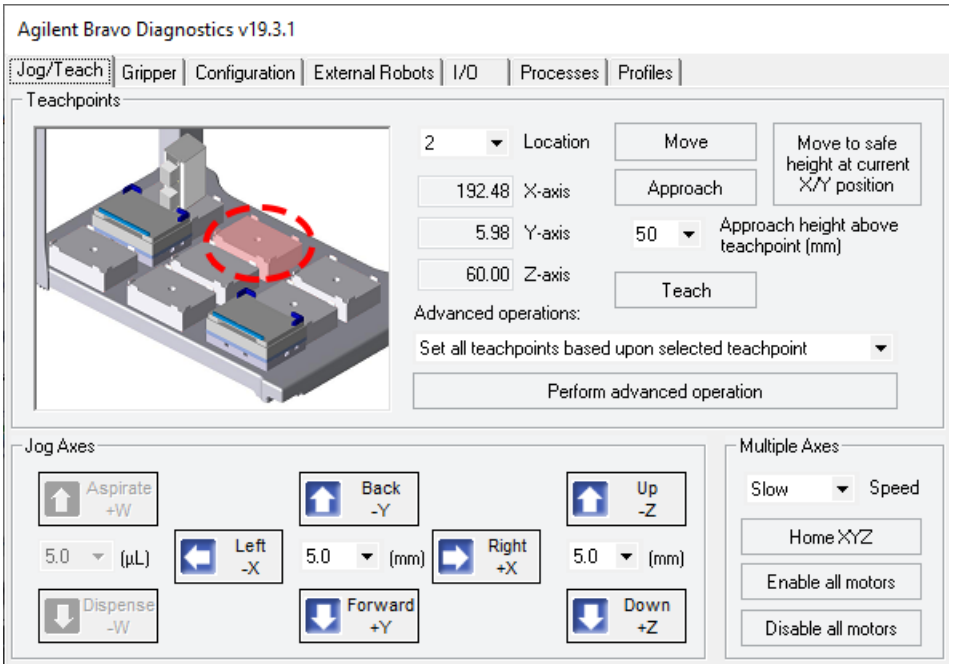
Setting the teachpoint for deck location 2 and deriving the remaining teachpoints

To set the teachpoints:

1 Manually seat a 250-µL pipette tip on probe A1 (back left corner of the Bravo 96AM Head). Ensure that the pipette tip locks into place with the probe.

Ensure a standard platepad is installed at deck location 2.

2 In the **Bravo Diagnostics** dialog box, click the **Jog/Teach** tab.



3 In the image of the Bravo deck in the upper left corner, click **Location 2**.

4 In the **Approach height above teachpoint** list, select **50**, and then click **Approach**.

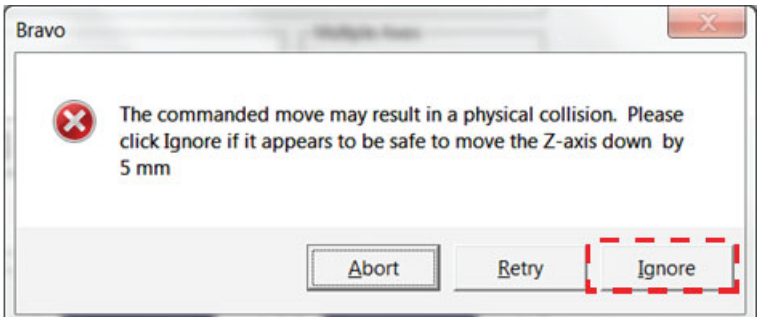
The Bravo head moves to deck location 2 and moves down so that the pipette tip is approximately 50 mm above the platepad crosshairs.

5 Carefully, use the **Jog Axes Down +Z** control to adjust the height of the A1 pipette tip above the crosshairs on platepad 2.

Use incrementally smaller jog increments as you jog the tip down closer to the crosshairs.

As the pipette tip moves down along the *z*-axis towards the crosshairs, the following error message appears. Visually inspect the clearance remaining between the tip and the crosshairs. If the tip is not yet at the crosshairs, adjust the jog increment as required, and click **Ignore** to continue jogging the head down.

CAUTION **Before you click Ignore in the error message, verify that enough space remains to continue jogging the head down. Jogging the head down too far will result in a collision and cause equipment damage.**



Note: This error message appears every time you jog in the z-axis to a point that is lower than the default *z*-axis teachpoint (60.00 mm).

6 When the pipette tip is 1–2 mm above the crosshairs, do the following:

a Ensure that the A1 pipette tip is perfectly centered above the platepad crosshairs in the *x*- and *y*-axes using the **Left -X**, **Right +X**, **Back -Y**, and **Forward +Y** controls.

b Set the **Jog Axes Up/Down** increment to 0.1-mm. Carefully, jog the head down in 0.1-mm increments just until the feeler gauge cannot fit under the pipette tip.

c Raise the head by 0.05-mm increments until you reach the lowest possible height that allows the 0.010-inch feeler gauge to slide under the pipette tip without deflecting it.

7 Click **Teach**.

8 To derive the teachpoints for the remaining locations from deck location 2:

a In the **Advanced operations** list, select **Set all teachpoints based upon the selected teachpoint**.

b Ensure that deck location 2 is still selected, and then click the **Perform advanced operations**.

c Click **OK** in the confirmation message.

Fine tuning the teachpoints

To fine tune the automatically derived teachpoints:

1. In the **Jog/Teach** tab image of the Bravo deck, click **Location 3**.
2. In the **Approach height above teachpoint** list, select **10**, and then click **Approach**.

   The Bravo head moves to deck location 3 and moves down so that the pipette tip is approximately 10 mm above the platepad crosshairs.
3. Carefully, use the **Jog Axes Down** controls to adjust the *z*-axis height of the A1 pipette tip above the crosshairs.

   Use incrementally smaller jog increments as you jog the tip down closer to the crosshairs.
4. When the pipette tip is 1–2 mm above the crosshairs, do the following:
   a. Verify that the A1 pipette tip is perfectly centered above the crosshairs in the *x*- and *y*-axes.
   b. Set the **Jog Axes Up/Down** increment to 0.1-mm. Carefully, jog the head down in 0.1-mm increments just until the feeler gauge cannot fit under the pipette tip.
   c. Raise the head by 0.05-mm increments until you reach the lowest possible height that allows the 0.010-inch feeler gauge to slide under the pipette tip without deflecting it.
5. Click **Teach**.
6. Repeat steps 1 to 5 for deck locations 4, 5, 6, 7, and 8.
7. To save the new teachpoints, click the **Profiles** tab, and then click **Update this profile.**

   VWorks Plus only. If an audit trail is being logged, select or type a comment in Audit Comment dialog box, and then click **OK**.

Next tasks

Next task...	Go to...
Adjust the teachpoints for the accessory locations: • Orbital Shaking Station • Wash station • Seating station	"Step 2: Adjust teachpoints for accessories" on page 100

Step 2: Adjust teachpoints for accessories

This topic includes the following procedures:

- "Teaching the Orbital Shaking Station at deck location 9" on page 100
- "Teaching the wash station at deck location 1" on page 102
- "Adjusting the teachpoint at deck location 2 for the seating station" on page 105

Teaching the Orbital Shaking Station at deck location 9

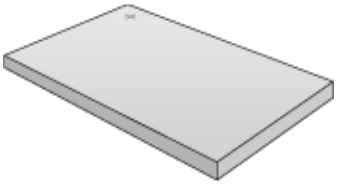
Use the following procedure to set the teachpoint for the Orbital Shaking Station at deck location 9.

Before you start

Ensure that you have the following:

- Pipettor teaching plate (G5550-17692). The teaching plate is a 10-mm thick metal plate that fits in the plate nest of an accessory. The teaching plate has a crosshairs in one corner, as the following figure shows.

Figure Pipettor teaching plate



- 250-µL pipette tip seated on probe A1 (back left corner) of the Bravo 96AM Head.

IMPORTANT

Ensure that the pipette tip is new and in good condition.

- 0.010-inch (0.254 mm) feeler gauge

  This gauge is used to set the vertical distance between the pipette tip and top flat surface of the Orbital Shaking Station.

To teach the Orbital Shaking Station at deck location 9:

1. Place the teaching plate in the plate nest of the Orbital Shaking Station. Ensure that the crosshairs is at the back left corner and facing upward.

   Press down on the teaching plate so that the bottom touches the top surface of the plate nest.
2. In the **Jog/Teach** tab, and click **Location 9**.
3. In the **Approach height above teachpoint** box, select **15**, and then click **Approach**.

   The Bravo head moves to deck location 9 and moves down so that the pipette tip is approximately 5 mm above the crosshairs on the 10-mm teaching plate.
4. Carefully, use the **Jog Axes Down +Z** control to move the pipette tips down until the pipette tip is 1–2 mm from the crosshairs, and then use the **Jog Axes X/Y** controls to center the A1 tip above the crosshairs.
5. When the A1 tip is perfectly centered above the crosshairs, click **Teach** to save this value temporarily.
6. Click the **Move to safe height at current X/Y position**. Remove the teaching plate from the Orbital Shaking Station.
7. Ensure that deck location 9 is still selected, and then click **Move**. The head moves down so that the tip is approximately 10 mm above the top surface of the plate nest in the Orbital Shaking Station.
8. Use the **Down +Z** control to lower the pipette head incrementally.
9. When the pipette tip is 1–2 mm above the flat surface of the Orbital Shaking Station, do the following:
   a. Set the **Down +Z** increment to 0.1 mm. Carefully, jog the head down in 0.1-mm increments just until a 0.254-mm (0.010-inch) feeler gauge cannot fit under the pipette tip.
   b. Raise the head by 0.05-mm increments until you reach the lowest possible height that allows the feeler gauge to slide under the pipette tip without deflecting it.
10. Click **Teach** to set the new teachpoint values for deck location 9.
11. To save the new teachpoint for this location, click the **Profiles** tab, and then click **Update this profile.**

    VWorks Plus only. If an audit trail is being logged, select or type a comment in Audit Comment dialog box, and then click **OK**.

Teaching the wash station at deck location 1

CAUTION **Failure to remove the pipette tip from the A1 probe will cause the pipette tip to collide with the wash station chimney, damaging the Bravo 96AM Head and Wash Station. Ensure that you remove the pipette tip before starting the procedure.**

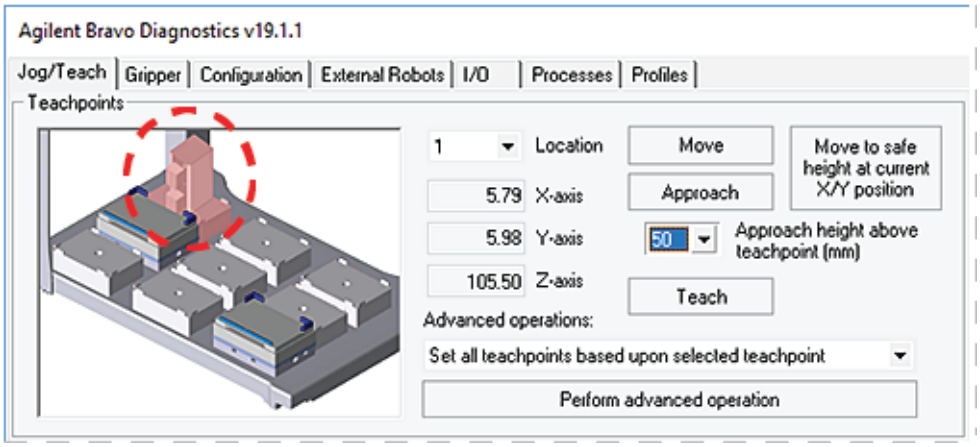
For this procedure, you will center the syringe probes above the wash station chimneys to adjust the *x*- and *y*-axes for the teachpoint, but you will use the existing *z*-axis teachpoint.

To teach the wash station:

1 If you have not already done so, remove the pipette tip from probe A1.

IMPORTANT Ensure that the 250-µL tip remains selected as the Teaching tip type in the Profiles tab. Ensure that no pipette tips or cartridges are seated on the Bravo 96AM Head.

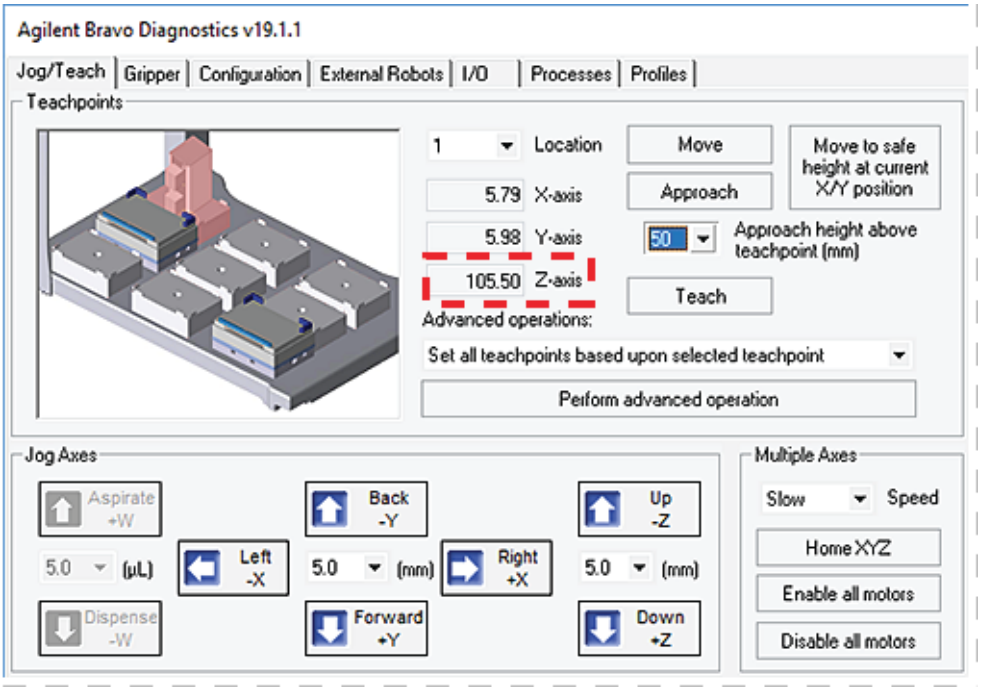
2 In the Bravo **Diagnostics Jog/Teach** tab, click **Location 1**.



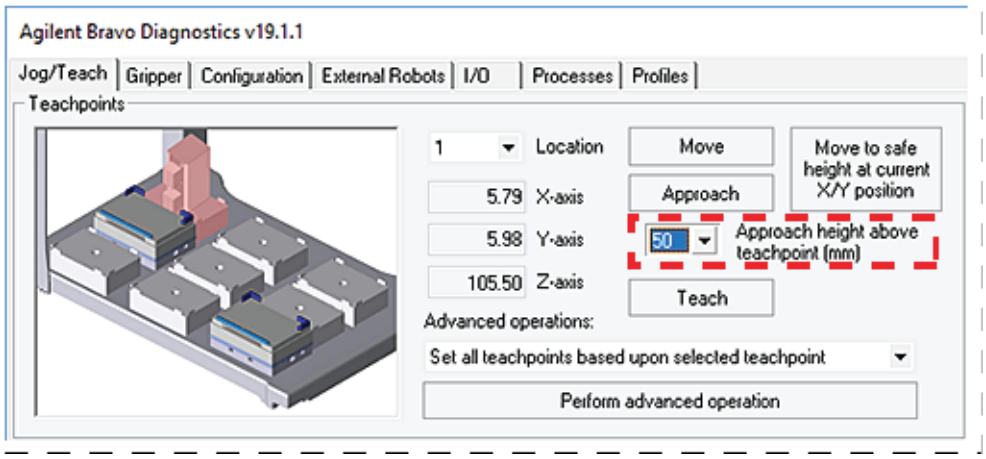
Note: Additional accessories will appear in the image if you have configured them in this profile.

3 In the **Location** list, locate the **Z-axis** box. Write down the Z-axis value on a piece of paper. You will use this value in a subsequent step.

Note: The Z-axis teachpoint value for deck location 1 is approximately 105 mm for a standard height AssayMAP Bravo Platform and standard platepad.



4 In the **Approach height above teachpoint** box, select **50**, and then click **Approach**.

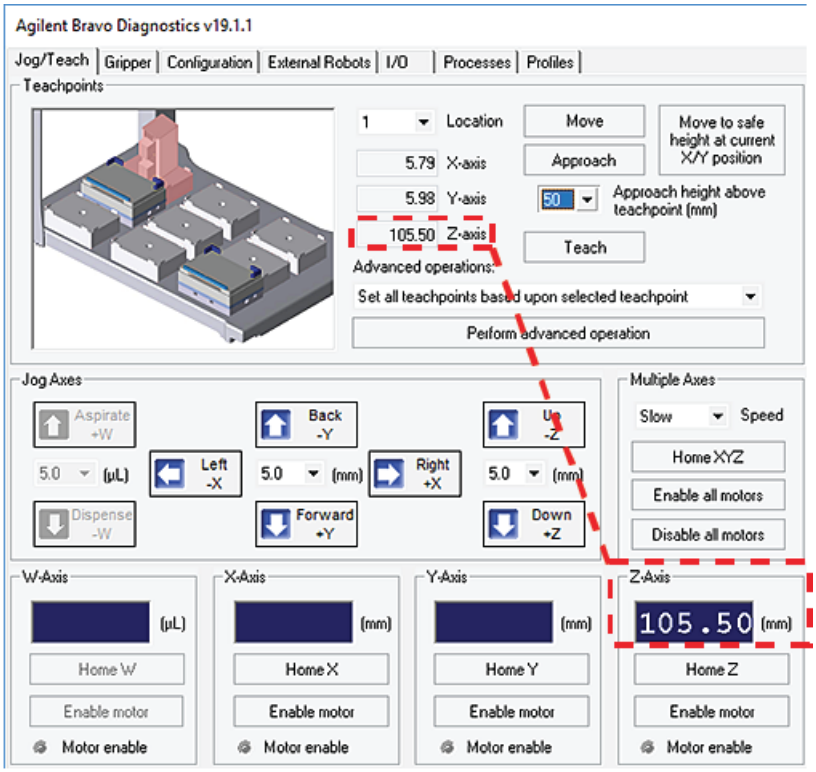


5 Carefully, use the **Jog Axes** controls to position the syringe probes so that they are
   a Approximately 1 mm above the tops of the wash station chimneys, and
   b Perfectly centered over the corresponding chimneys in the wash station.

6 When the probes and chimneys are perfectly aligned, use the **Jog Axes** controls to move the head down slowly along the *z*-axis to the original **Z-axis** teachpoint value that you recorded in step 3.

Note: This step will insert the probes into the wash station chimneys, which is a normal part of the teaching process.

7 When the position of the *z*-axis (as indicated by the Z-axis readout in the bottom right of the screen) matches the value that was written down from above, click **Teach** to set the new teachpoint for deck location 1.



8 Click the **Move to safe height at current X/Y** position to remove the probes from the wash station chimneys, and return the head to the safe Z-height.

9 In the **Profiles** tab, click the **Update this profile** to save the new teachpoints.

VWorks Plus only. If an audit trail is being logged, select or type a comment in Audit Comment dialog box, and then click **OK**.

Adjusting the teachpoint at deck location 2 for the seating station

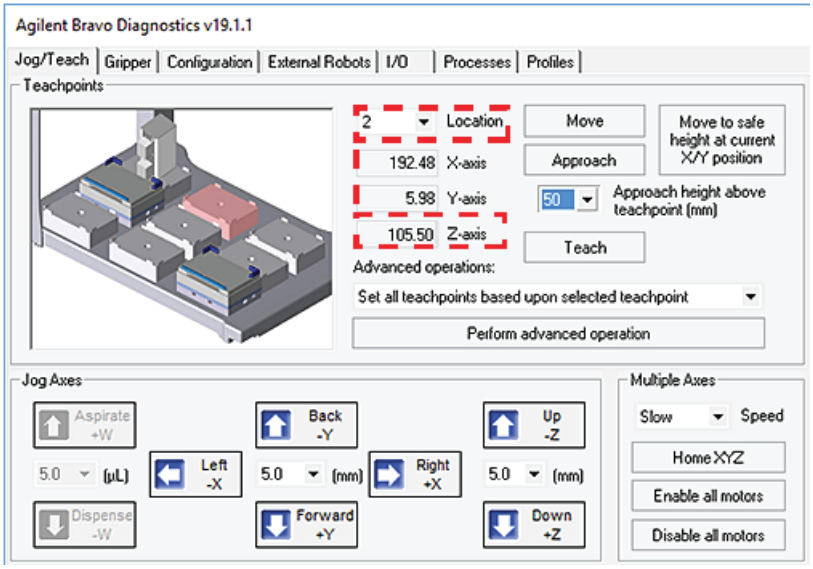
You adjust the teachpoint for deck location 2 to enhance the precision of the probes as they move into the cartridges or pipette tips in the 96AM Cartridge & Tip Seating Station.

IMPORTANT

Ensure that no pipette tips or cartridges are seated on the Bravo 96AM Head. Ensure that the 250-µL tip remains selected as the Teaching tip type in the Profiles tab.

To adjust the teachpoint for the seating station:

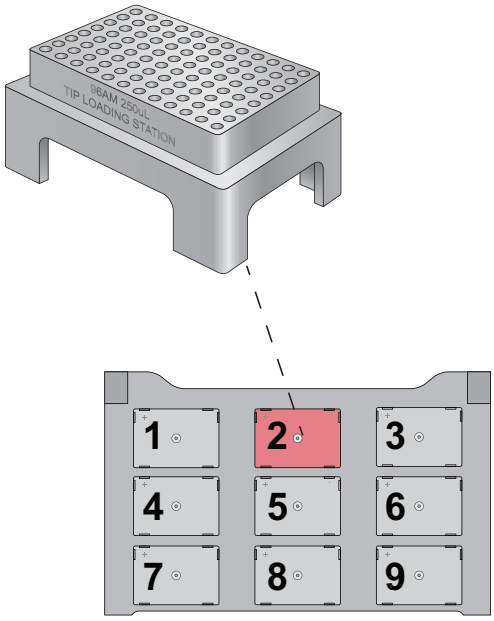
1. Ensure that no labware is on the deck other than the wash station at deck location 1.
2. In the **Bravo Diagnostics Jog/Teach** tab, click **Location 2**.
3. Write down the value that appears in the **Z-axis** box for location 2. You will use this value in a later step.



Note: Additional accessories will appear in the image if you have configured them in this profile.

4. In the **Approach height above teachpoint (mm)** list, select **50**, and then click **Approach**.

5 Using care to avoid touching the head probes, place the seating station on the platepad at deck location 2. Ensure that the station is fully seated on the platepad.



6 Carefully, use the **Jog Axes** controls to jog the head down incrementally to the 96AM Cartridge & Tip Seating Station.

7 When the syringe probes are just above the wells, use the **Jog Axes** controls for the *x*- and *y*-axes to position the probes so that they are perfectly centered within the openings of the corresponding wells in the seating station.

8 When the probes are perfectly centered within the well openings:

   a Click **Teach** to save these values temporarily.

   b Click **Move to safe height at current X/Y position** to return the head to a safe *z*-axis height.

9 Remove the seating station from the deck.

10 Carefully, use the **Down +Z** control to jog the head down incrementally until the value in the **Z-axis** box matches the value that you noted in step 3.

11 Click **Teach** to set the new teachpoint.

12 In the **Profiles** tab, click **Update this profile**.

   VWorks Plus only. If an audit trail is being logged, select or type a comment in Audit Comment dialog box, and then click **OK**.

Next tasks

Next task...	Go to...
Adjust the gripper *y*-axis offset	"Step 3. Check and adjust gripper y-axis offset" on page 107

Step 3. Check and adjust gripper y-axis offset

To pick up and place labware correctly, the gripper fingers must be positioned at equal distances from the long sides of the labware on a platepad.

Before you start

IMPORTANT

Before you adjust the gripper *y*-axis offset, ensure that the pipettor teachpoints (*x*-, *y*-, and *z*-axes) have been verified and no pipette tips or cartridges are installed on the head.

Make sure that:

- The Bravo gripper fingers are in good condition and aligned with the head. Perform a visual inspection to ensure the gripper fingers are not bent.
- The gripper pads (black rubber) are in place on the gripper fingers and in good condition. Ensure the gripper pads are not partially ripped off or pulled askew.

Use the following workflow:

Step	Task	See ...
1	Ensure that the AssayMAP 1 profile is initialized.	"Initializing AssayMAP 1 profile for teaching" on page 96
2	Adjust the gripper y-axis offset, and then write down the **Y offset** value.	"Adjusting the gripper y-axis offset" on page 108
3	Test the gripper pick-and-place operations.	"Testing the gripper pick-and-place operations" on page 112

After verifying the gripper *y*-axis offset in the AssayMAP 1 profile, you will copy the updated teachpoints and gripper axis offset to the other Workbench profiles.

Adjusting the gripper y-axis offset

Use deck location 8 (front center) for the following procedure.

IMPORTANT

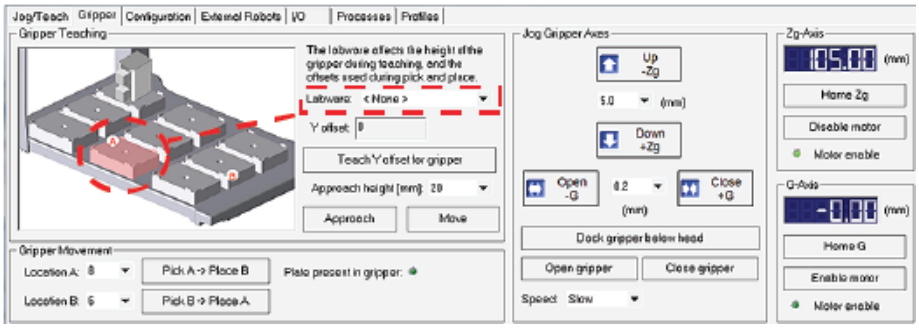
Ensure that you use a standard platepad for the following procedure.

To adjust the gripper y-axis offset:

1 In Bravo Diagnostics, click the **Gripper** tab.

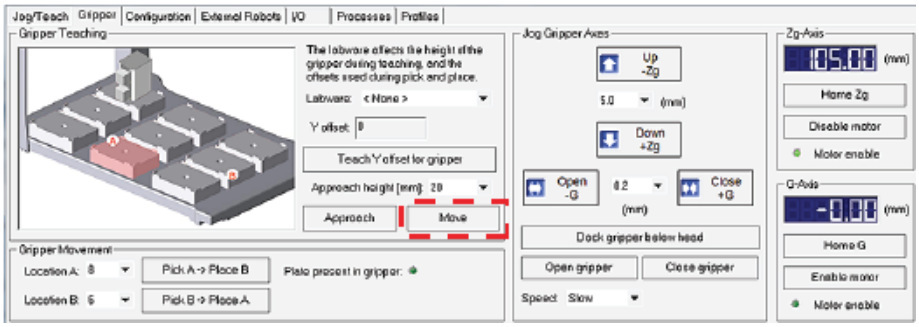
2 In the **Labware** list, select **None**.

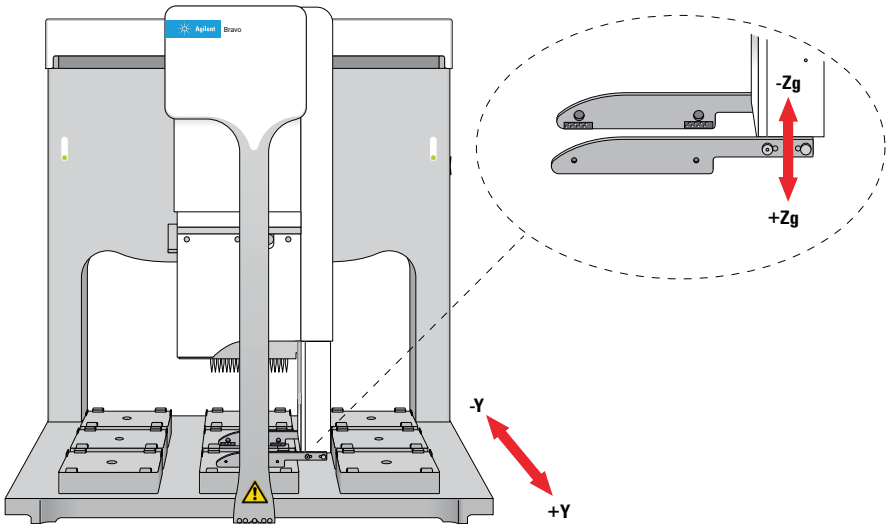
3 In the deck image, click a deck location where a standard platepad is installed. The location should be easily accessible, for example in the front row or a corner.



4 Click **Move** to move the gripper to the previously saved teachpoint for the selected location.

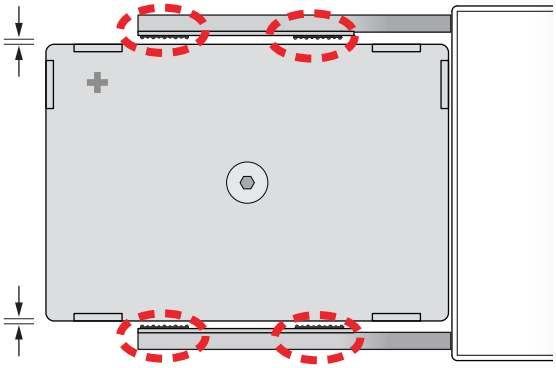
The Bravo head moves above the deck location, and the gripper assembly extends down (*Zg*-axis) so that the gripper fingers are just above the top surface of the platepad.





5 Visually inspect the spacing between the black rubber gripper pads and the sides of the platepad (*y*-axis). Make sure that all the gripper pads have clearance so that the gripper can move down without colliding with the platepad.

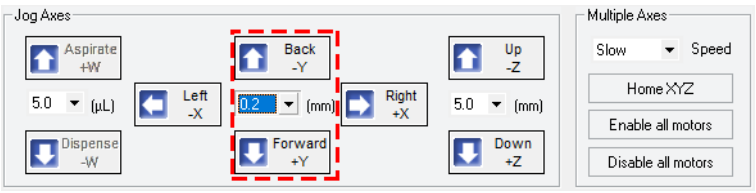
Figure Gripper pad clearance from sides of platepad (top view)



6 If the gripper pads are touching or overlapping on one side of the platepad, do the following to adjust the clearance:

a Click the **Jog/Teach** tab, and ensure that the deck location you selected in step 3 is still selected.

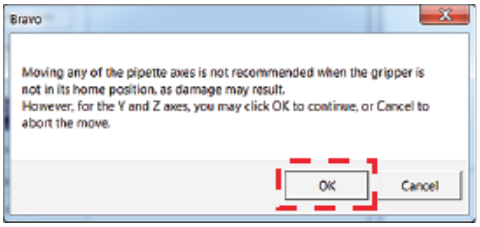
b Under **Jog/Axes**, set the **Back -Y/Forward +Y** increment to a small enough size, such as 0.2 mm.



CAUTION **Make sure you use small enough jog increments to prevent any gripper collisions, which could damage the gripper.**

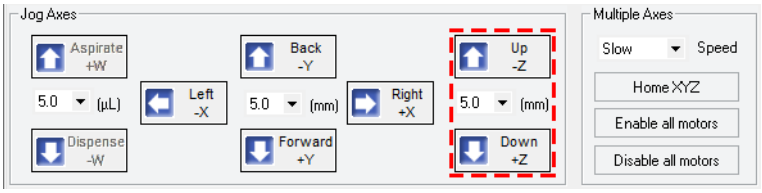
c Click **Back -Y** or **Forward +Y** as required to adjust the gripper *y*-axis position so that the gripper pads will clear the sides of the platepad when you jog down in the next step.

When the following message appears, click **OK**.

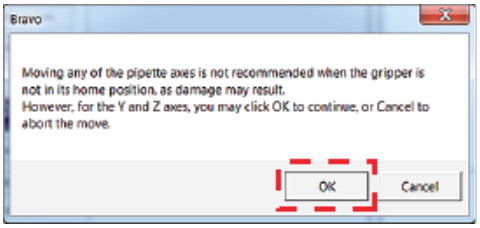


7 After ensuring that the gripper pads will not collide with the platepad, set the **Down +Z** increment to **5.0 mm** in the **Jog/Teach** tab, and then click **Down +Z**.

CAUTION **Make sure you do not jog the gripper down more than 5.0 mm at this stage. Jogging down farther will result in a gripper collision with the setscrew on the platepad, which could damage the gripper.**



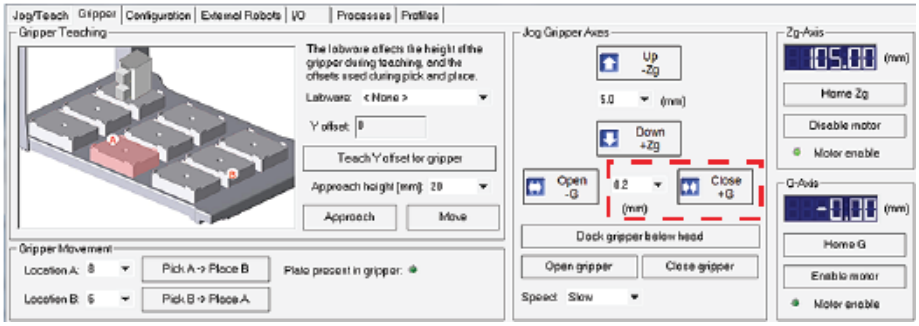
When the following message appears, click **OK**.



At this stage, the gripper fingers should be next to the sides of the platepad.

8 Fine tune the gripper alignment as follows:

a In the **Gripper** tab, set the **Close +G** increment to a small value, such as 0.2 mm, and then click **Close +G** so that you can clearly see the alignment of the gripper pads with the platepad.



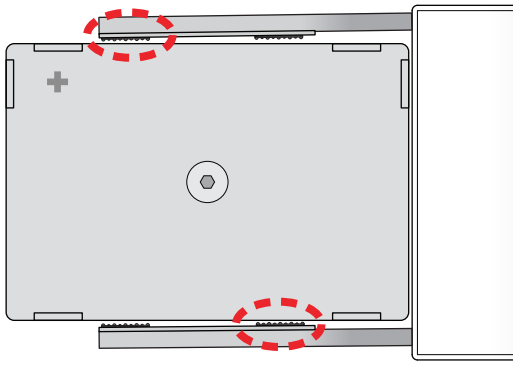
IMPORTANT **Do not** click **Close gripper**. Otherwise, you must redo the procedure.

b In the **Jog/Teach** tab, set the *y*-axis increment to 0.2 mm, and then use the **Back -Y** and **Forward +Y** buttons to position the gripper so that the fingers are at equal distances around the platepad.

Ensure the pair of gripper pads on each side are as close as possible to the sides of the platepad without actually touching the platepad.

Note: If a gripper finger is not perfectly straight, one of its gripper pads may be closer than the other to the side of the platepad, as the following figure shows. In this case, adjust the *y*-axis using the gripper pad closest to the platepad and the diagonally opposite gripper pad for reference.

Figure Example of diagonally opposite gripper pads (top view)



9 In the **Gripper** tab, click **Teach Y offset for gripper**.

10 In the **Profiles** tab, click **Update this profile**.

VWorks Plus only. If an audit trail is being logged, select or type a comment in Audit Comment dialog box, and then click **OK**.

11 In the **Profiles** tab, reinitialize the profile.

Testing the gripper pick-and-place operations

For this procedure, you will use the gripper to move a labware between deck locations 7 and 8.

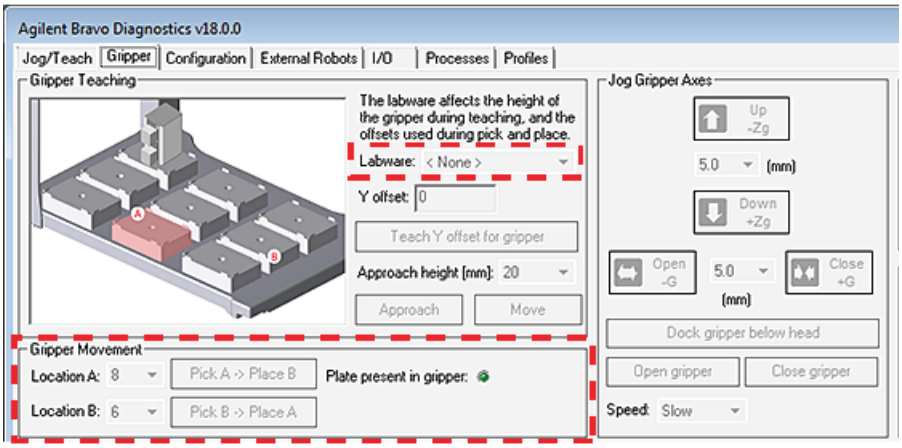
Before you start:

- Ensure that you have a microplate for this test, for example:

  96 Greiner 650201, U-Bottom Standard, PolyPro
- Reinitialize the profile.

To test the gripper pick-and-place operations:

1. Place the microplate on the platepad at the deck location where you are starting the test.
2. In Bravo **Diagnostics**, click the **Gripper** tab.
3. In the **Labware** list, select the name of the labware type you are using.
4. In the **Location A** list, select the deck location where you placed the labware. In the **Location B** list, select the deck location to which the labware will move.
5. Click **Pick A -> B** to pick up the microplate from deck location A and place it on deck location B. Click **Pick B -> A** to pick up the microplate from deck location B and place it on deck location A.



6. Repeat steps 4 and 5 for the remaining deck locations.
7. Make sure that the gripper holds the microplate securely and keeps it level while moving the microplate from location to location.

   If the gripper performs the operation without problem, no further adjustment is required.

   If the gripper does not hold the microplate level, use the following procedure to adjust the *y*-axis offset.

- If the gripper performs the operation without problem, no further adjustment is required.
- If the gripper has problems performing the operations, the solution to the problems depends on the cause.
  - Carefully inspect the gripper finger alignment and the condition of the gripper pads.
  - Ensure that the labware definition is correct for the selected labware.

  See the *Bravo Platform User Guide* or the *Bravo Platform Service Guide* for details.

Step 4. Copy teachpoints to other profiles

Before you start

Use the procedure in this topic to update the other Workbench profiles based on the AssayMAP 1 profile. This procedure updates the following:

- Pipette head teachpoints (*x*- , *y*-, and *z*-axes) for all nine deck locations
- Gripper *y*-axis offset

VWorks Plus. The software logs audit trails for device profiles (.xml file type), which are records of interest.

Ensure that you have completed the following procedures:

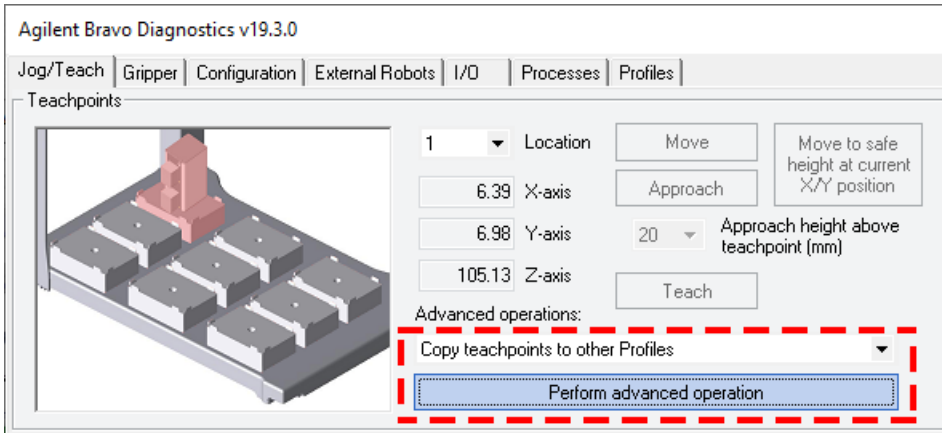
- "Step 1: Set teachpoints in AssayMAP 1 profile" on page 94
- "Step 2: Adjust teachpoints for accessories" on page 100
- "Step 3. Check and adjust gripper y-axis offset" on page 107

Copying the AssayMAP 1 teachpoints to the other profiles

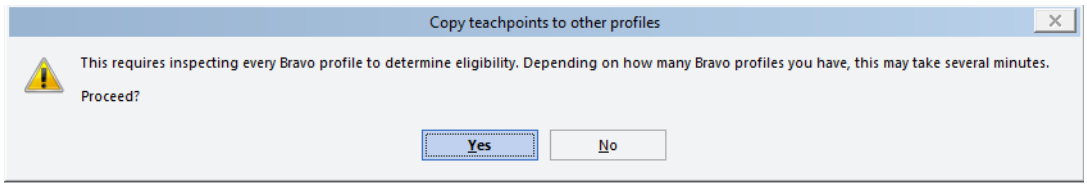
To copy the AssayMAP 1 teachpoints to the other profiles:

1 In the **Bravo Diagnostics** dialog box, ensure that the **AssayMAP 1** profile is initialized in the **Profiles** tab.

2 In the **Jog/Teach** tab, under **Advanced operations**, select **Copy teachpoints to other Profiles**, and then click **Perform advanced operation**.

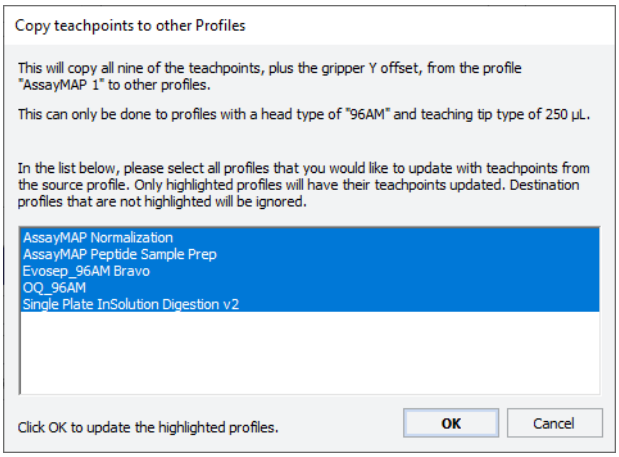


A message appears and warns you that the software must inspect every Bravo profile before providing a list of eligible profiles. Click **Yes** to proceed.



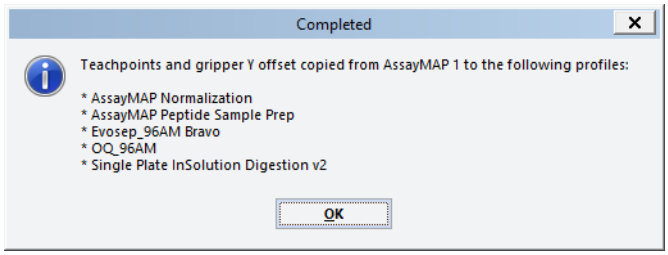
3 In the **Copy teachpoints to other Profiles** dialog box, select the following profiles, and then click **OK**:

- AssayMAP Normalization
- AssayMAP Peptide Sample Prep
- Evosep_96AM Bravo
- OQ_96AM
- Single Plate InSolution Digestion v2

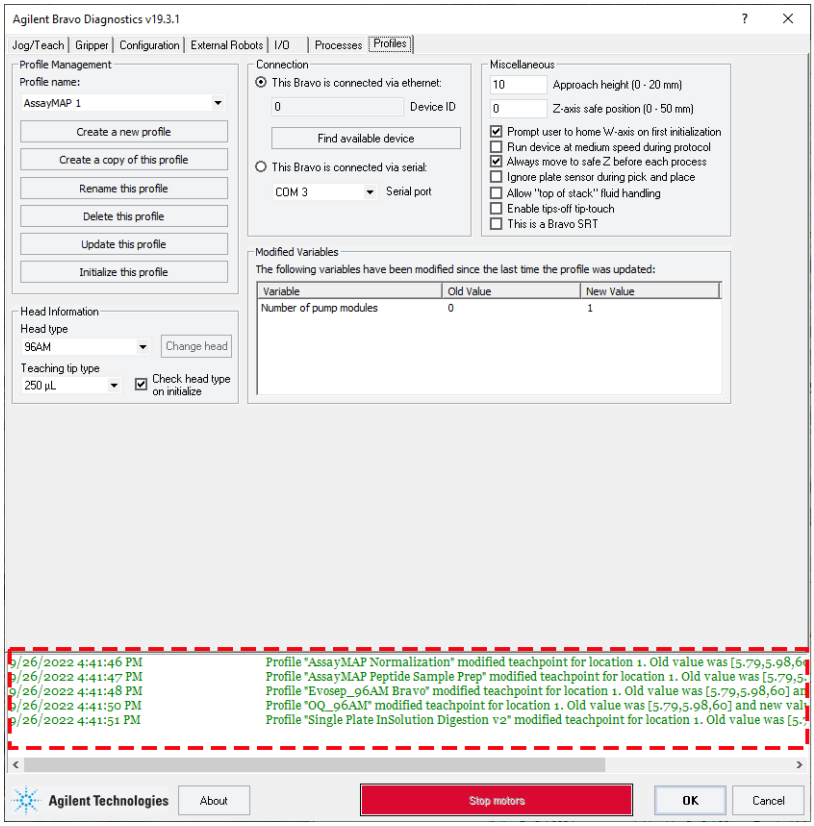


4 *VWorks Plus only*. If an audit trail is being logged, the Audit Comment dialog box opens. Select or type the audit comment for all the profiles to be updated, and then click **OK**.

5 Click **OK** when the Completed message appears.



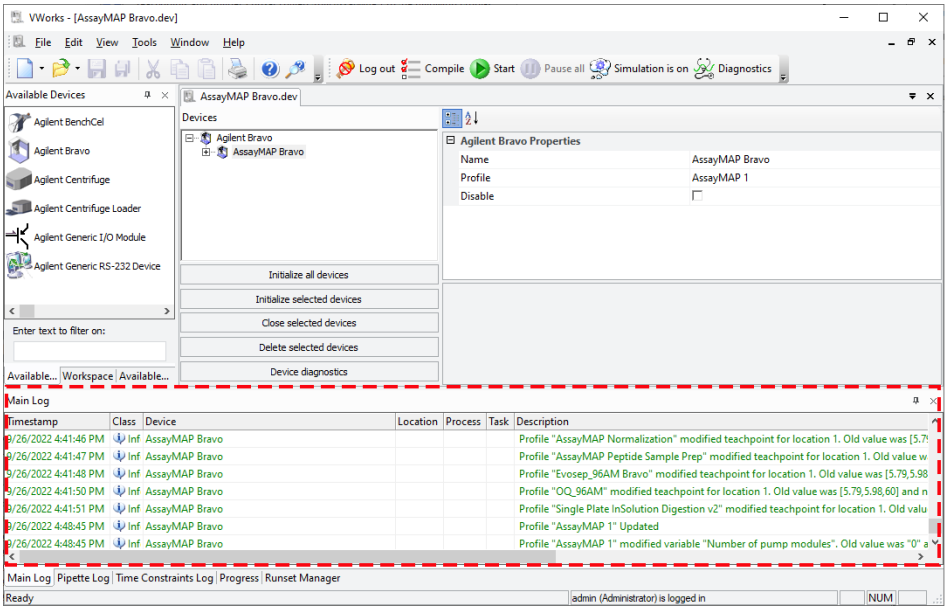
The mini log in Bravo Diagnostics displays the list of profiles and their changes.



6 Close Bravo Diagnostics.

7 *VWorks Plus only*. If an audit trail is being logged, the Audit Comment dialog box opens. Select or type the audit comment for all the profiles to be updated, and then click **OK**.

8 In the Main Log area of the VWorks window, ensure that the profile changes are listed.



IMPORTANT After updating the profiles, make sure that you verify the setup. See "Verification workflow" on page 120.

5 Verifying the installation and setup

- "Verification workflow" on page 120
- "About installing the Bravo pendant, Light Curtain, and shields" on page 120
- "Opening the Workbench and accessing the utilities" on page 122
- "About the experiment ID and methods" on page 123
- "Creating an experiment ID for setup" on page 124
- "Setting up and running the Startup utility" on page 126
- "Testing the safety equipment" on page 131
- "Washing the syringes to prepare for first time use" on page 134
- "Performing a test run" on page 138
- "Running the Syringe Test utility" on page 148
- "Running the Shutdown utility" on page 151

Verification workflow

Perform the following steps in the order given to verify the installation and setup.

Step	For this task...	See...
1	Ensure that the Light Curtain, pendant, and shields are installed.	"About installing the Bravo pendant, Light Curtain, and shields" on page 120
2	Open the Protein Sample Prep Workbench and access the Utility Library.	"Opening the Workbench and accessing the utilities" on page 122
3	*VWorks Plus*. Create an experiment ID.	"Creating an experiment ID for setup" on page 124
4	Run the Startup utility.	"Setting up and running the Startup utility" on page 126
5	Test the safety equipment.	"Testing the safety equipment" on page 131
6	Run the Syringe Wash utility for 60 cycles.	"Washing the syringes to prepare for first time use" on page 134
7	Perform a test run of the Affinity Purification protocol.	"Performing a test run" on page 138
8	Run the Syringe Test utility.	"Running the Syringe Test utility" on page 148
9	Run the Shutdown utility.	"Running the Shutdown utility" on page 151

About installing the Bravo pendant, Light Curtain, and shields

WARNING **Moving-parts hazards are accessible through the front, rear, and side openings of the Bravo Platform. To prevent potential injury, ensure that the safety equipment is installed and in good working condition.**

Ensure that the following are installed properly. For instructions, see the *Bravo Platform Safety and Installation Guide*.

- *Emergency-stop pendant*. Ensure that the pendant and its cable are in good condition and connected to the Pendant port on the junction box.
- *Light Curtain*. Ensure the lightpost transmitter (TX) and receiver (RX) cables are connected and that the light beams are aligned correctly.
- *Bravo front, side and rear shields*. Ensure that the accessory tubing and cabling is routed off the Bravo deck through the access windows in the side and rear shields.

Figure AssayMAP Bravo Platform with Light Curtain and emergency-stop pendant

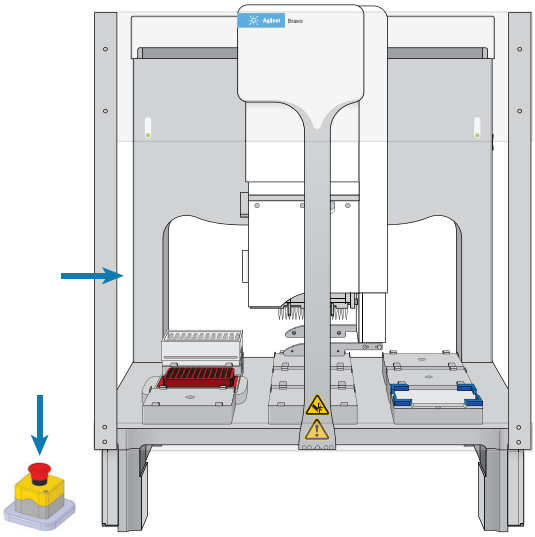
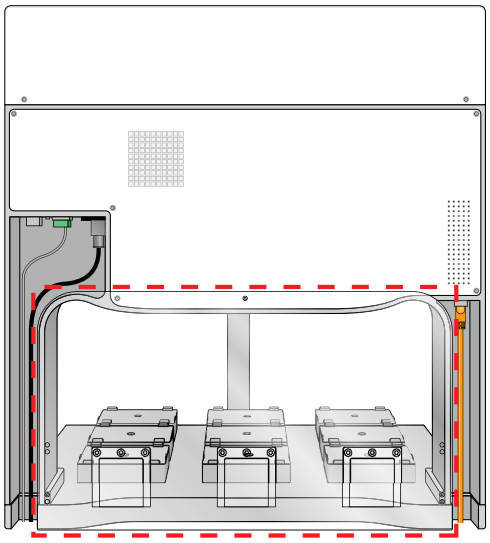


Figure Bravo rear shield with access window covers installed



WARNING

Potential injury and equipment damage can result if you attempt to lift the Bravo device while the light curtain and shields are attached. The light curtain posts attach to the Bravo base handles, rendering the handles inaccessible as lift points. Do not lift the Bravo device while the light curtain and shields are installed.

Opening the Workbench and accessing the utilities

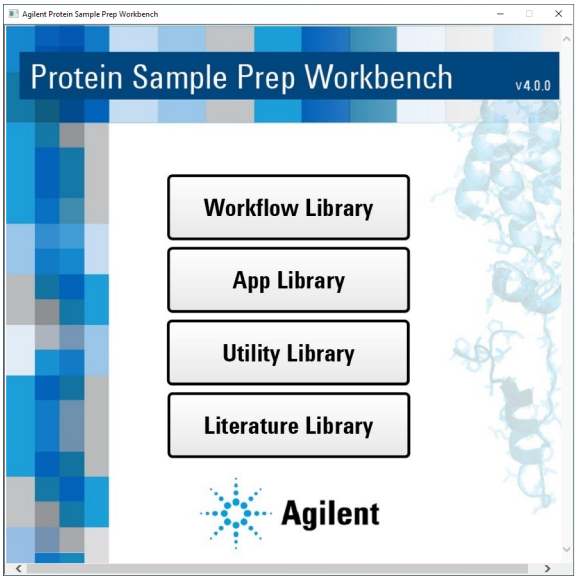
Opening the Protein Sample Prep Workbench

To open the Protein Sample Prep Workbench and access the utilities:

1 On the Windows desktop, double-click the shortcut icon 

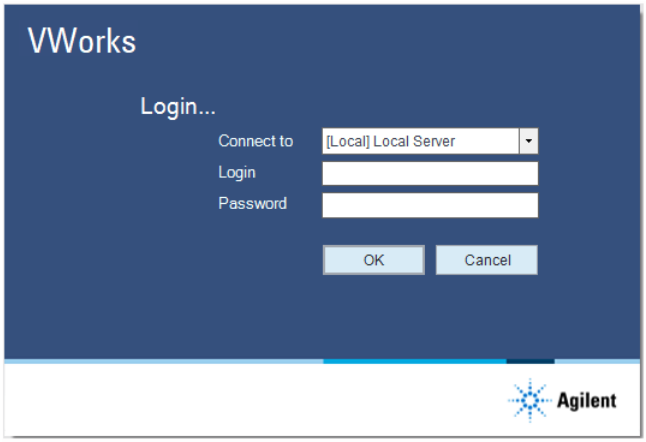
.

2 In the **Protein Sample Prep Workbench** window, click **Utility Library**.

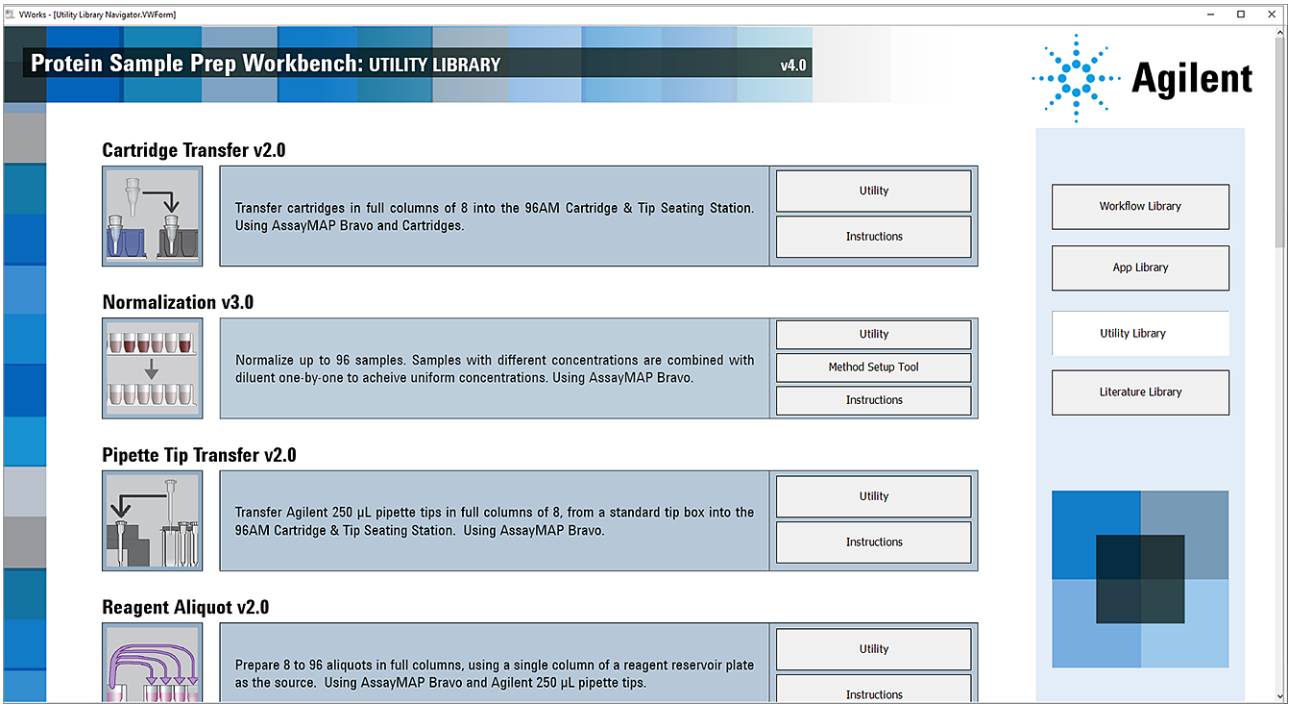


The VWorks software launches and the Login window appears.

3 In the Login window, enter the Login (user name) and Password.



The Utility Library page opens.



About the experiment ID and methods

For each app and utility that you run to verify the installation, you will select the following experiment settings:

- **Experiment ID**. The following procedure explains how to create the experiment ID, which you will use for all the installation verification runs:

  `Installation and Introduction Runs`

- **Method**. The methods you use for the installation verification runs are app- and utility-specific and are installed with software.

App or utility	Method to use for verification
Startup utility	Startup Prime Tubing Default.mth
Cartridge Transfer utility	Twelve Column Transfer.mth Reverse 12 Column Transfer.mth
Syringe Wash utility	First Syringe Wash.mth
Affinity Purification app	Installation Verification Run.mth
Syringe Test utility	Default Settings.mth
Shutdown utility	Default Settings.mth

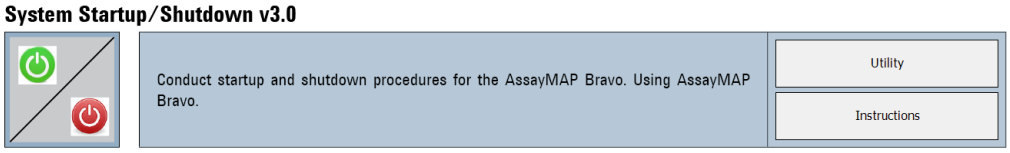
Creating an experiment ID for setup

An experiment ID is required to run any Workbench application or utility in the VWorks Plus, and it is good practice for VWorks standard as it allows you to generate a run report. Use the following procedure to create an experiment ID to use for all the runs performed during the AssayMAP Bravo Platform setup verification.

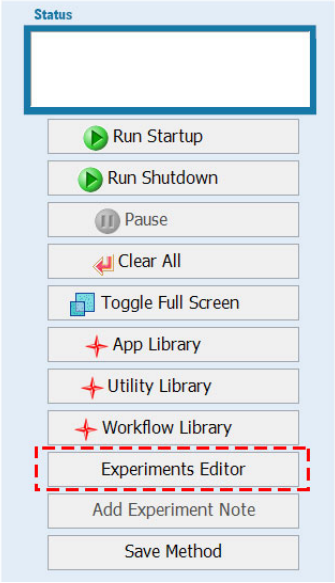
Note: An *experiment ID* is a database record that captures the steps executed and the settings used during each run of an application or utility. Any errors that may have occurred during a run are also recorded.

To create an experiment ID for setup verification:

1 In the **Utility Library**, locate the **System Startup/Shutdown** utility, and then click **Utility**.



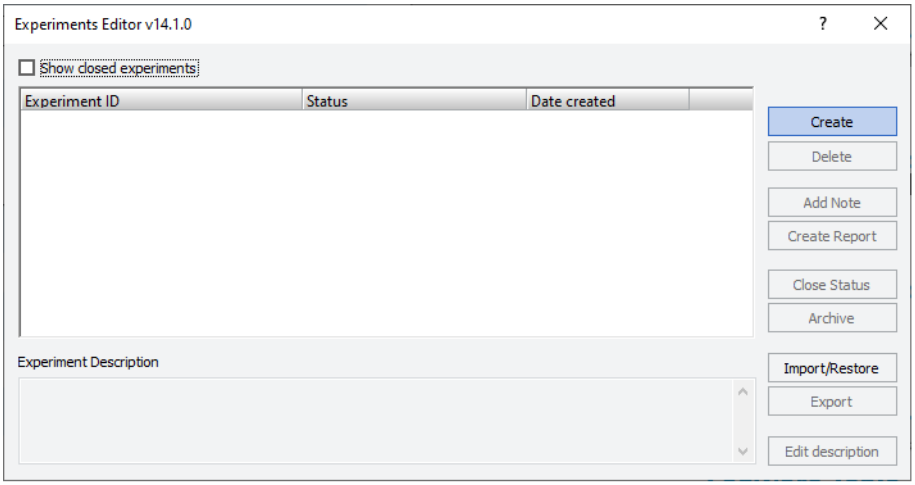
2 In the System Startup/Shutdown utility form, click the **Experiments Editor** button in the navigation pane.



The Experiments Editor opens.

Note: VWorks administrator or technician privileges are required to click the Experiments Editor button in the navigation pane of a Workbench app or utility.

3 In the **Experiments Editor** click **Create**.

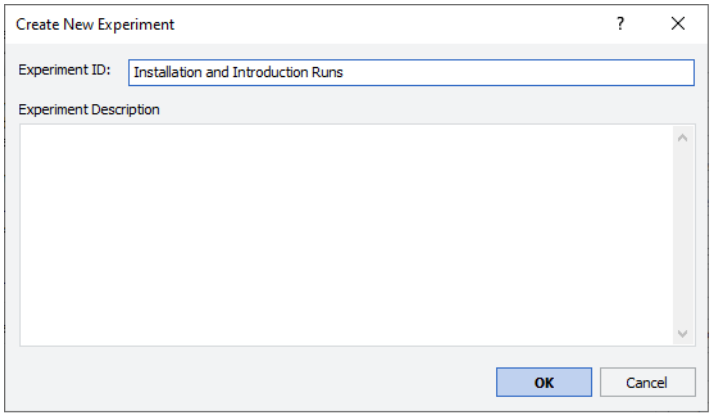


4 In the **Create New Experiment** dialog box that opens:

a Type the following name in the **Experiment ID** box:

```
Installation and Introduction Runs
```

b Click **OK**.



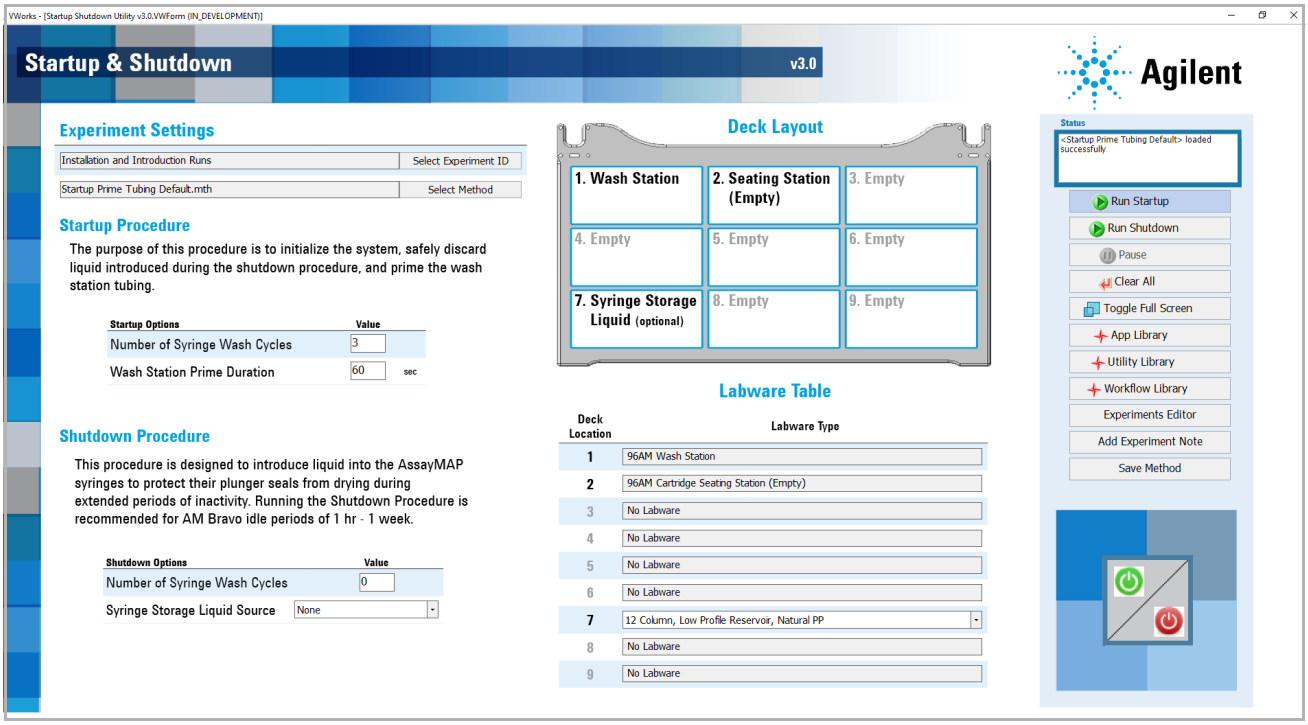
5 Close the **Experiments Editor**.

Setting up and running the Startup utility

The Startup utility initializes the AssayMAP Bravo Platform and primes the wash lines from the Pump Module.

Setting up the Startup protocol

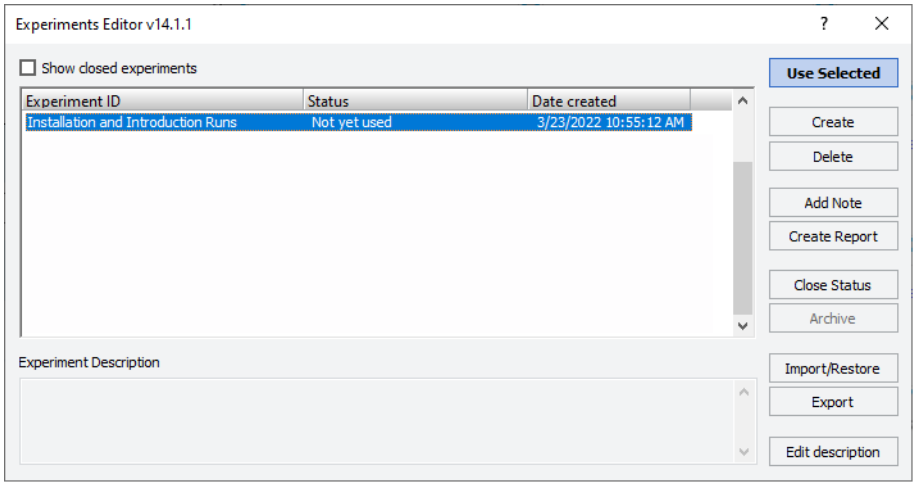
The following figure shows the settings for the first-time setup run.



To set up the Startup protocol:

1 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

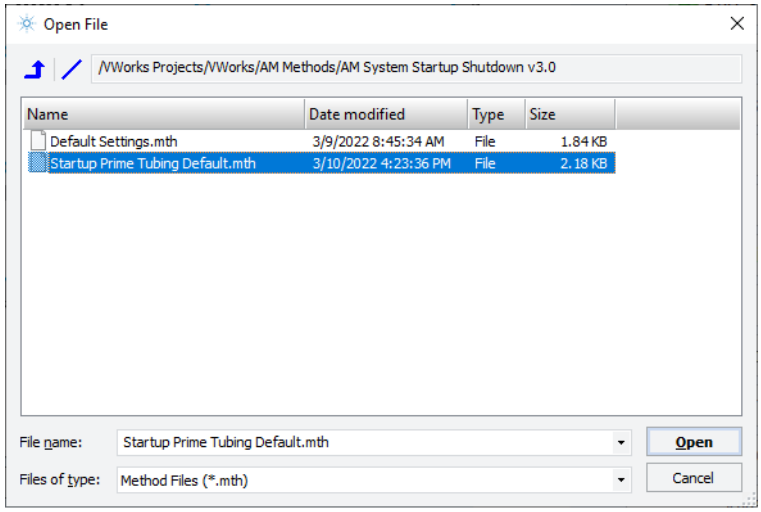
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

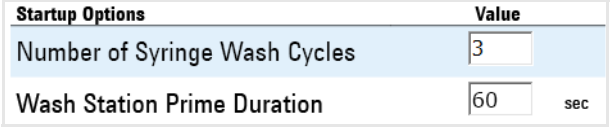
2 In the form, click **Select Method**. The Open File dialog box opens.

In the **Open File** dialog box, select the **Startup Prime Tubing Default.mth**, and then click **Open**.



VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run the updated method.

Note: This method specifies 3 wash cycles and a 60 sec prime duration, which provides plenty of time to prime the lines and observe the flow through the wash station chimneys.



Before you run the Startup protocol

WARNING **If you touch any of the moving parts or attempt to move labware while the Bravo Platform is in operation, the device could pinch, pierce, or bruise you. Keep your fingers, hair, clothing, and jewelry away from the device while it is in motion.**

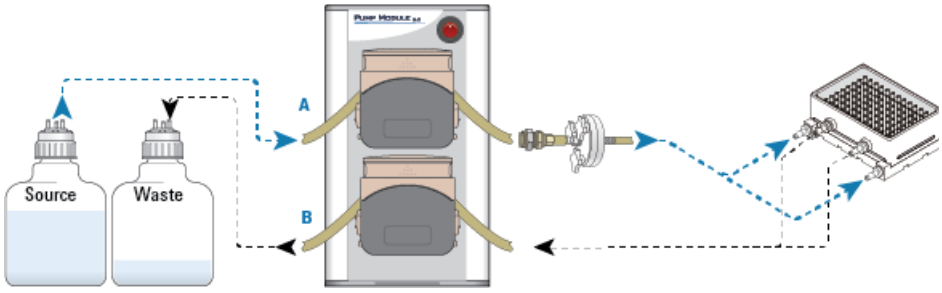
WARNING **The probes of the Bravo 96AM Head are sharp and can scratch you if they brush across your hand. A probe scratch can expose you to any contaminants remaining on the probes. Be careful to avoid touching the probes.**

Before running the Startup protocol:

1 Check the liquid levels of the source and waste bottles for the wash station. Fill the source bottle and empty the waste bottle, as required.

Verify that the flip-top cover on each pump head is closed and that the tubing connections are secure.

Figure Wash station fill line (A) and empty line (B)



2 Turn on the Pump Module and Peltier Thermal Station Controller.

3 Ensure the following items are in position on the AssayMAP Bravo deck:

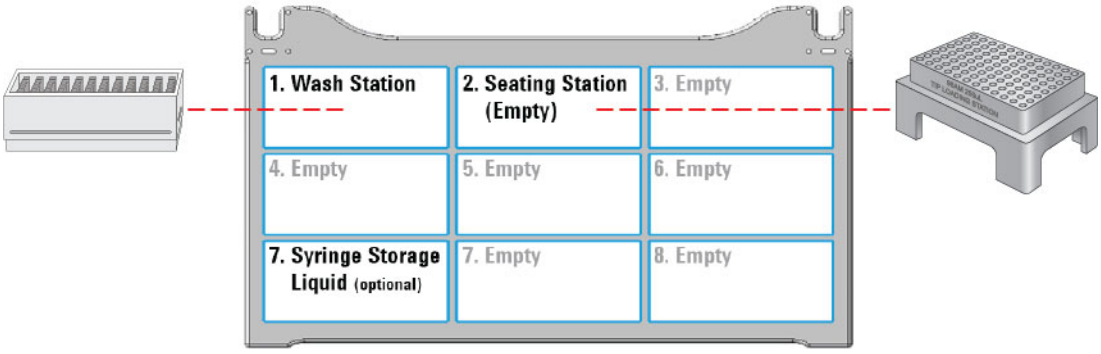
- 96AM Wash Station or the later model 96 Channel Wash Station at deck location 1
- Empty 96AM Cartridge & Tip Seating Station at deck location 2

4 Turn on the AssayMAP Bravo Platform.

Starting the protocol run

To start the protocol run:

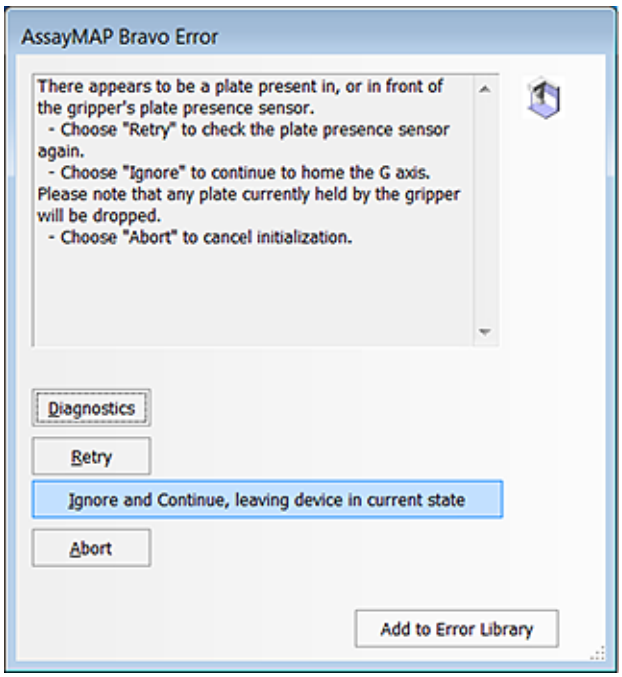
1 Confirm that the physical layout on the AssayMAP Bravo deck matches the display in the **Deck Layout** area of the form.



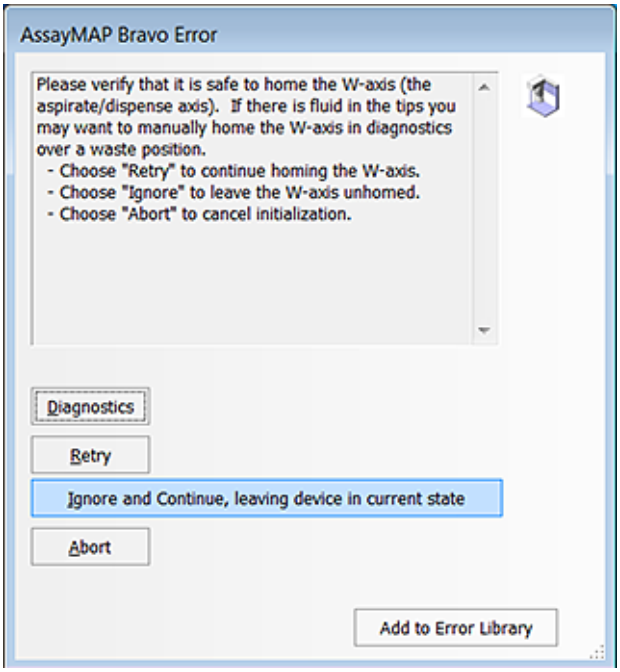
2 Click Run Startup.

- If this is the first time the Startup utility has been run after powering up the AssayMAP Bravo Platform, the device initialization process begins. Proceed to step 3.
- If the platform is already initialized, skip to step 5.

3 When the following message appears, confirm that the gripper is not holding a plate and if not, click **Ignore and Continue, leaving device in current state** to proceed to initialize the gripper.



4 When the following message appears, click **Ignore and Continue, leaving device in current state** to delay initializing the *w*-axis. The *w*-axis will automatically initialize in a later step when the Bravo 96AM Head is positioned over the wash station at deck location 1.



When the initialization process is finished, the orange lights on the Bravo Platform light panel flicker briefly and then begin to flash.

The Bravo 96AM Head does the following:

- Moves to deck location 2 and ejects the cartridges, if present.
- Moves to the wash station at deck location 1 and initializes the *w*-axis, causing the fluid in the syringes to dispense into the wash station.
- Washes the syringes the number of times that you specified in the method.

The priming step begins after the syringe wash.

5 During the priming step, ensure that fluid flows out of the top of each chimney. Check for any damaged chimneys in the wash station.

Click **Continue** to complete the Startup protocol.

When all the chimneys are flowing evenly, the device is ready for operation.

Troubleshooting problems	Probable cause and solution
Fluid does not flow out of a chimney.	A trapped air bubble can block the fluid flow out of a chimney. ***To clear the bubble:*** 1 Form a seal between the top of the problematic chimney and a 1000-µL pipette, and then draw the liquid out at a medium speed. 2 Run the Startup protocol again to determine if the bubble was successfully removed. 3 Repeat if necessary.

Troubleshooting problems	Probable cause and solution
Chimney deformity or irregularity	Chimney irregularities can result from a collision between the head and the wash station. To replace damaged chimneys, see the instructions in the *96 Channel Wash Station Maintenance Guide*.

Testing the safety equipment

Performing an emergency stop to test the safety equipment

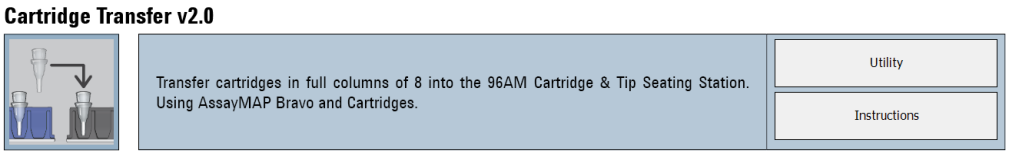
The AssayMAP Bravo Platform has a safety interlock circuit that is designed to protect operators from moving-parts hazards. The interlock circuit must be closed for the AssayMAP Bravo Platform to operate. The pendant and the Light Curtain are connected to the interlock circuit. Pressing the red button on the pendant or interrupting the Light Curtain trips the interlock circuit, causing the motion of the Bravo head to stop.

CAUTION **Using the safety interlock to stop the Bravo Platform might result in an interrupted protocol run that cannot be resumed or recovered. Do not interrupt the Light Curtain or press the red button on the pendant to perform a routine stop. To pause and continue a run, use the Pause button in the form. For detailed instructions on how to recover from errors, see the *AssayMAP Bravo Platform Error Recovery Guide*.**

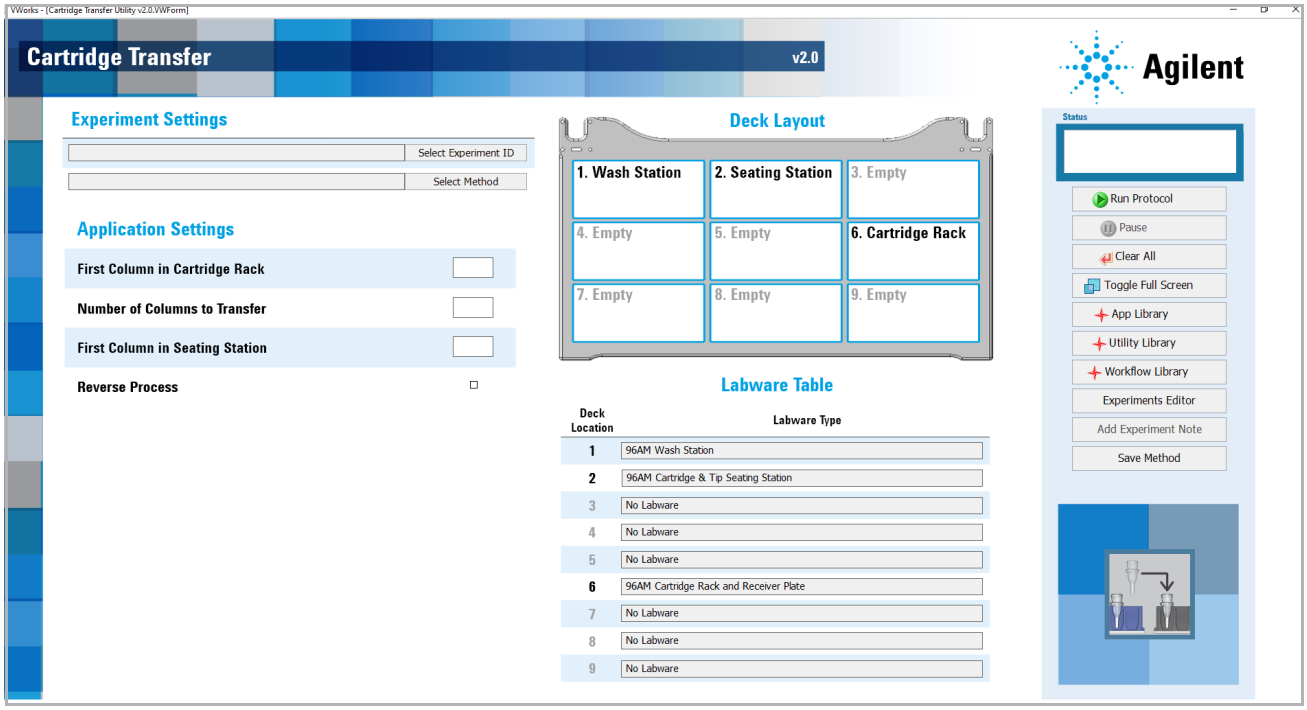
To test the emergency stop feature, perform the following procedure using the Cartridge Transfer utility, but without any cartridges on the deck.

To test the emergency stop feature:

1 In the **Utility Library**, locate the **Cartridge Transfer** utility, and then click **Utility**.

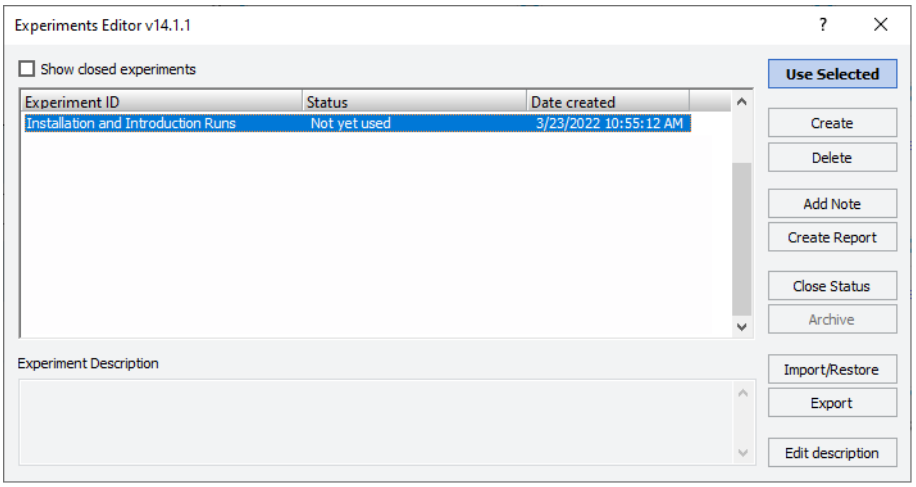


The Cartridge Transfer utility opens.



2 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

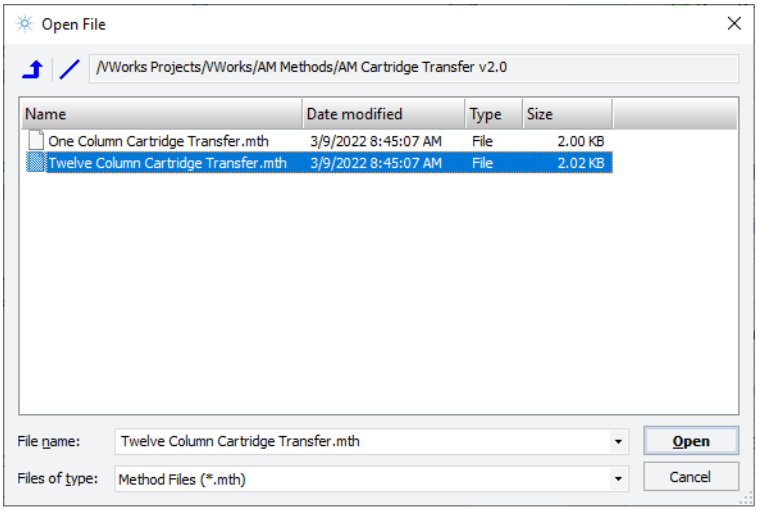
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

3 In the form, click **Select Method**. The Open File dialog box opens.

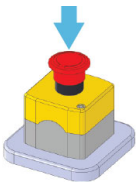
In the **Open File** dialog box, select the **Twelve Column Cartridge Transfer.mth**, and then click **Open**.



VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run the updated method.

4 Click Run Protocol to start the run.

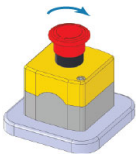
5 As soon as the Bravo head starts to move away from its position above the wash station and towards deck location 6, press the red button on the pendant.



The Bravo head stops moving and an error message appears.

6 To recover from the emergency stop:

a At the emergency-stop pendant, turn the red button clockwise. The spring-loaded button pops up.



b In the **AssayMAP Bravo Error** dialog box, click **Abort** to end the protocol.

c Run the Startup utility again to reset the system. For details, see "Setting up and running the Startup utility" on page 126.

7 Repeat steps 1 to 3 to start another run of the Cartridge Transfer utility.

8 As soon as the Bravo head starts to move away from its position above the wash station and towards deck location 6, use a pencil to interrupt the Light Curtain.

The Bravo head stops moving and an error message appears.

9 To recover from the emergency stop:

a Ensure that no objects are in the path of the Light Curtain.

b In the **AssayMAP** Bravo **Error** dialog box, click **Abort** to end the protocol.

c Run the Startup utility again to reset the system. For details, see "Setting up and running the Startup utility" on page 126.

Washing the syringes to prepare for first time use

Use the following procedure to prepare the new syringes for use. The procedure primes and washes the syringes for 60 cycles.

Before you start

Required materials	Name (manufacturer and part number)
One labware for wash buffer	Reservoir, Seahorse 201254-100, PP, no walls, pyramid bottom (Agilent 201254-100)
Deionized water	Not applicable

Procedure

To wash the syringes:

1 Set up the Wash Buffer Reservoir as follows:

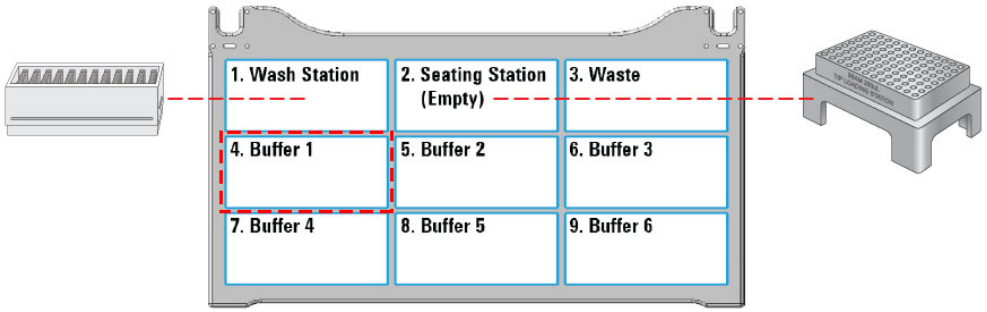
a Fill the labware with deionized water.

Labware	Minimum volume (mL)
Reservoir, Seahorse 201254-100, PP, no walls, pyramid bottom	50 mL

Note: The Seahorse reservoir is included in the Syringe Test kit.

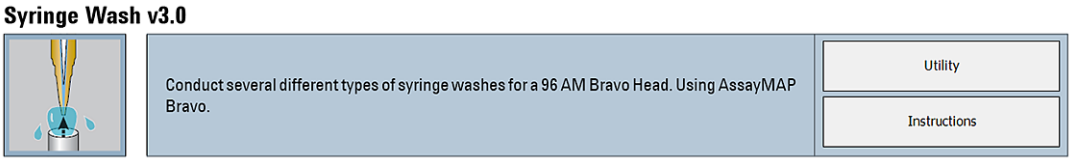
b Place the filled labware on Bravo deck location 4.

2 Ensure that the deck is clear of other labware, except the wash station at location 1, the seating station at location 2, and the filled reservoir at location 4.

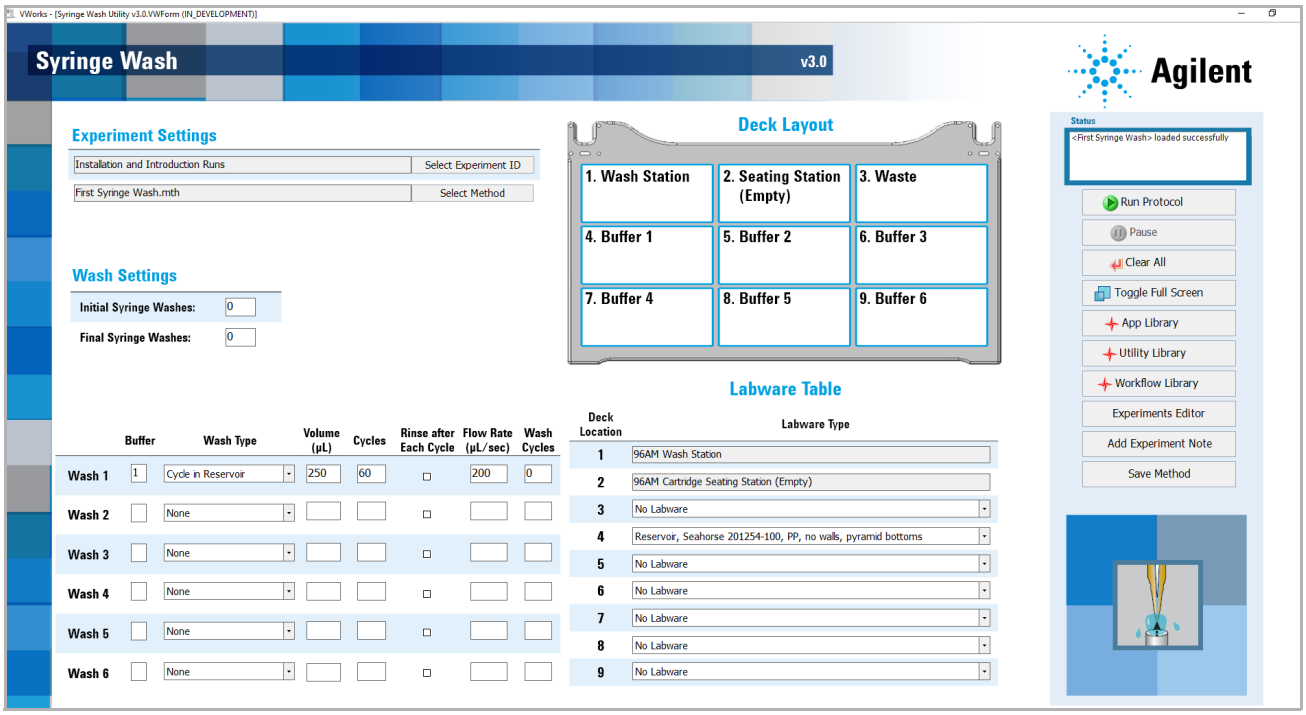


Make sure the seating station is empty. (The seating station should not contain cartridges or pipette tips.)

3 In the **Utility Library**, locate the **Syringe Wash** utility, and then click **Utility**.

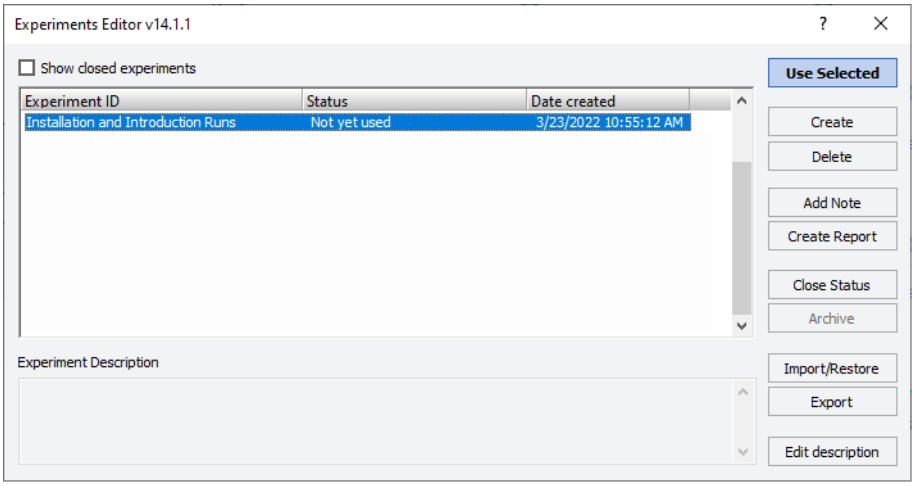


The Syringe Wash utility opens. The following figure shows the settings you use.



4 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

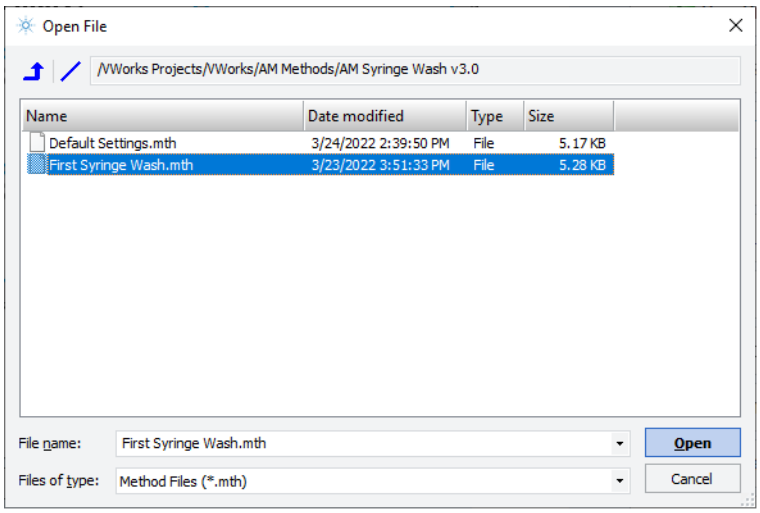
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

5 In the form, click **Select Method**. The Open File dialog box opens.

In the **Open File** dialog box, select the **First Syringe Wash.mth**, and then click **Open**.



This method uses the following settings. If a method with these settings does not already exist, you must create one.

Table Settings for first Syringe Wash

Setting	Value
Wash Settings	
Initial Syringe Washes	0
Final Syringe Washes	0
Wash 1	

	Buffer	Wash Type	Volume (µL)	Cycles	Rinse after Each Cycle	Flow Rate (µL/sec)	Wash Cycles
Wash 1	1	Cycle in Reservoir	250	60	☐	200	0

Buffer	1
Wash Type	Cycle in Reservoir
Volume (µL)	250
Cycles	60
Rinse after Each Cycle	Clear the check box
Wash Rate (µL/sec)	200
Wash Cycles	0
Wash 2–Wash 6 settings	
Wash Type	None
Cycles	0
Labware Table	
Deck Location 4	Reservoir, Seahorse 201254-100, PP, no walls, pyramid bottom *Note:* This setting must match the filled Wash Buffer Reservoir from step 1.
Deck locations 3, 5–9	Leave the labware selections at the default setting for these locations. **IMPORTANT** Do not place labware on the deck at these locations.

VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run it.

6 Click Run Protocol to start the run.

Performing a test run

To verify that the profile is configured and taught correctly for the installed hardware, use the procedures in this section to perform a test run of the Affinity Purification protocol.

Before you start

For the test run, you use the AssayMAP Resin-Free cartridges instead of packed cartridges, and you do not use any labware on the Bravo deck.

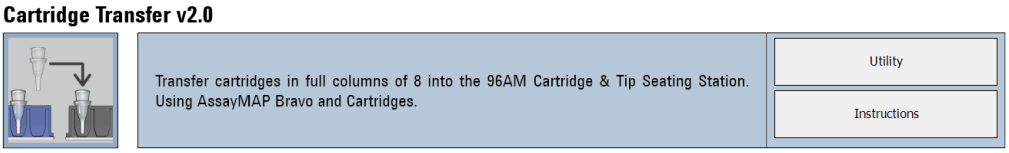
Required materials	Part number
AssayMAP Resin-Free cartridge rack *Note:* The protocol will not run if the cartridges are missing. **IMPORTANT** Ensure that these resin-free cartridges are **not** the ones from the AssayMAP Syringe Test Kit. Using damaged resin-free cartridges for the AssayMAP syringe test could impact the syringe test results.	Agilent G5496-60009
Deionized water in the source bottle for the Pump Module	Not applicable

Transferring the cartridges to the seating station

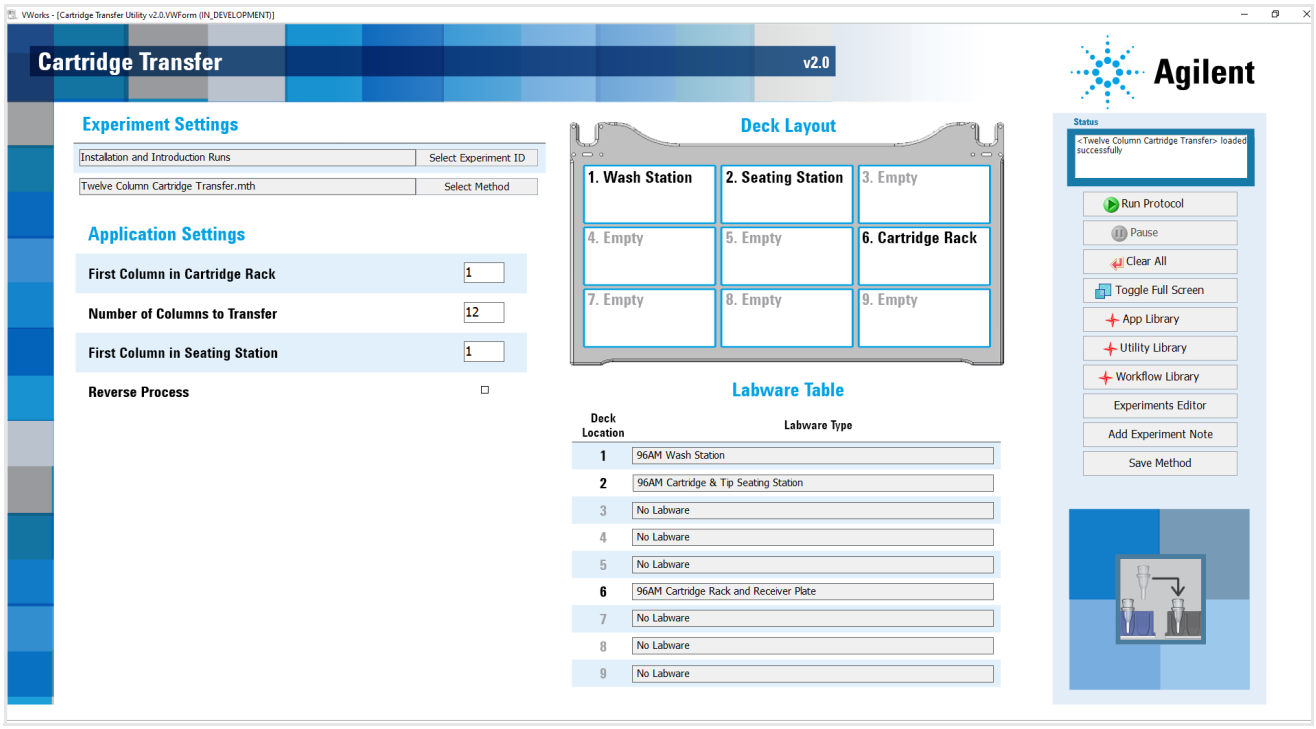
The cartridges must be in the seating station before you run the Affinity Purification protocol. Use the Cartridge Transfer utility to move full columns of AssayMAP cartridges from the cartridge rack to the seating station.

To transfer the cartridges to the seating station:

1 In the **Utility Library**, locate the **Cartridge Transfer** utility, and then click **Utility**.

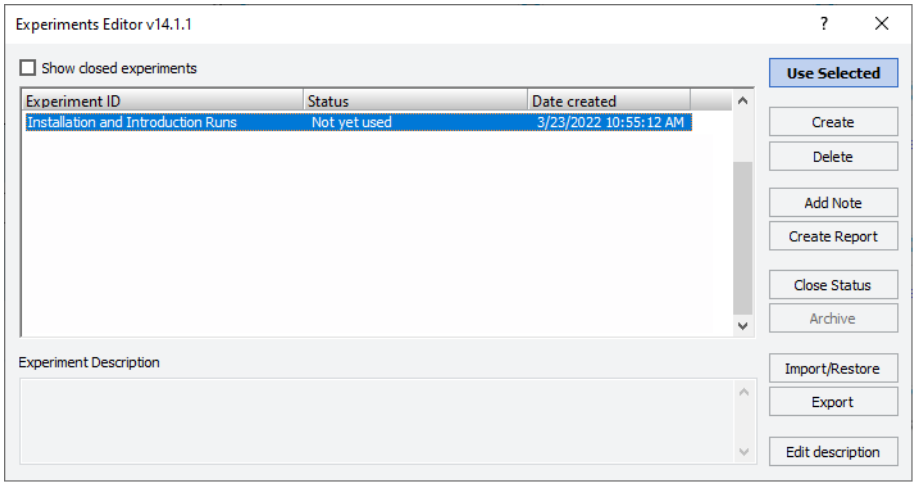


The Cartridge Transfer utility opens. The following figure shows the settings you use.



2 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.

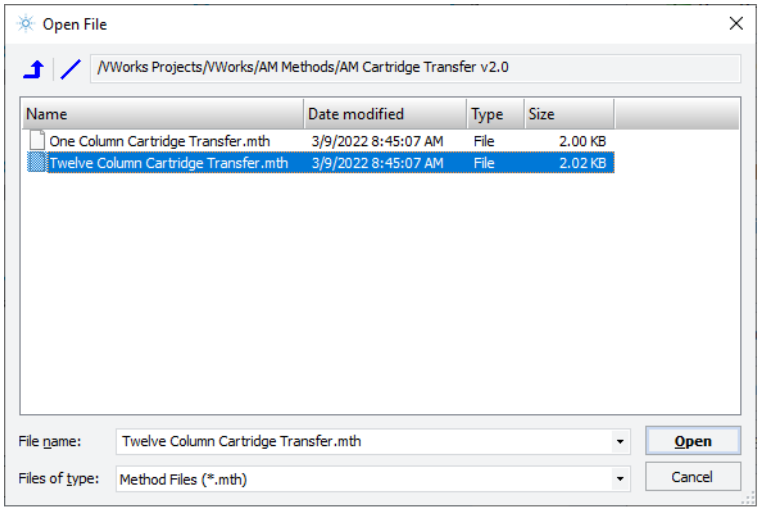


The Experiments Editor closes.

3 In the form, click **Select Method**. The Open File dialog box opens.

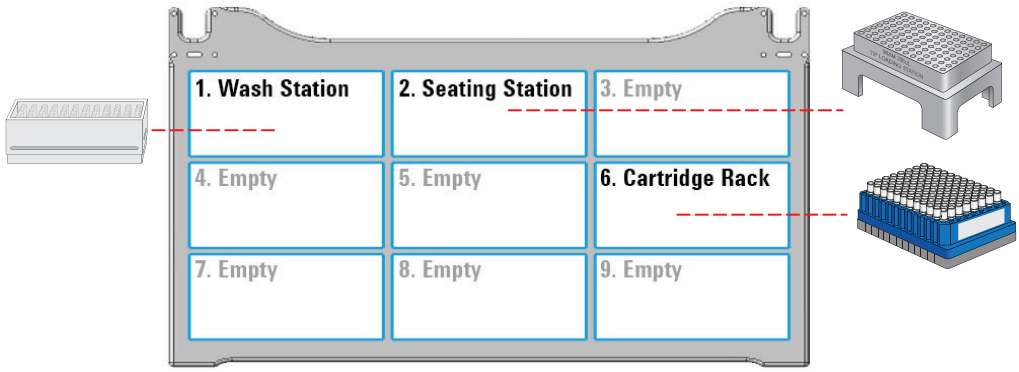
4 In the form, click **Select Method**. The Open File dialog box opens.

In the **Open File** dialog box, select the **Twelve Column Cartridge Transfer.mth**, and then click **Open**.



VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run the updated method.

5 Ensure that the accessories and cartridges are at the assigned deck locations, as shown in the **Deck Layout** image of the form.



Make sure the labware are properly seated on the Bravo deck.

- The empty seating station is at deck location 2.
- The 96AM Cartridge Rack and Receiver Plate is at deck location 6 and contains 12 full columns of 8 cartridges each. Make sure you remove the lid.
- The wash station is at deck location 1.
- All other deck locations are empty.

CAUTION **Incorrect labware selections and improperly seated labware can cause hardware collisions, resulting in equipment damage. Ensure that the selections in the Labware Table exactly match the physical labware present on the Bravo deck. Also ensure that all labware are properly seated within the alignment features of their respective platepads.**

6 Click Run Protocol to start the run.

7 When the run is finished, remove the 96AM Cartridge Rack and Receiver Plate from deck location 6.

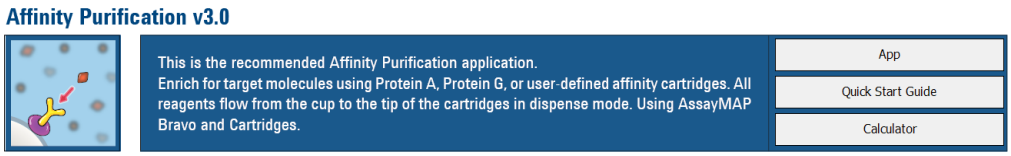
Performing an Affinity Purification test run

IMPORTANT

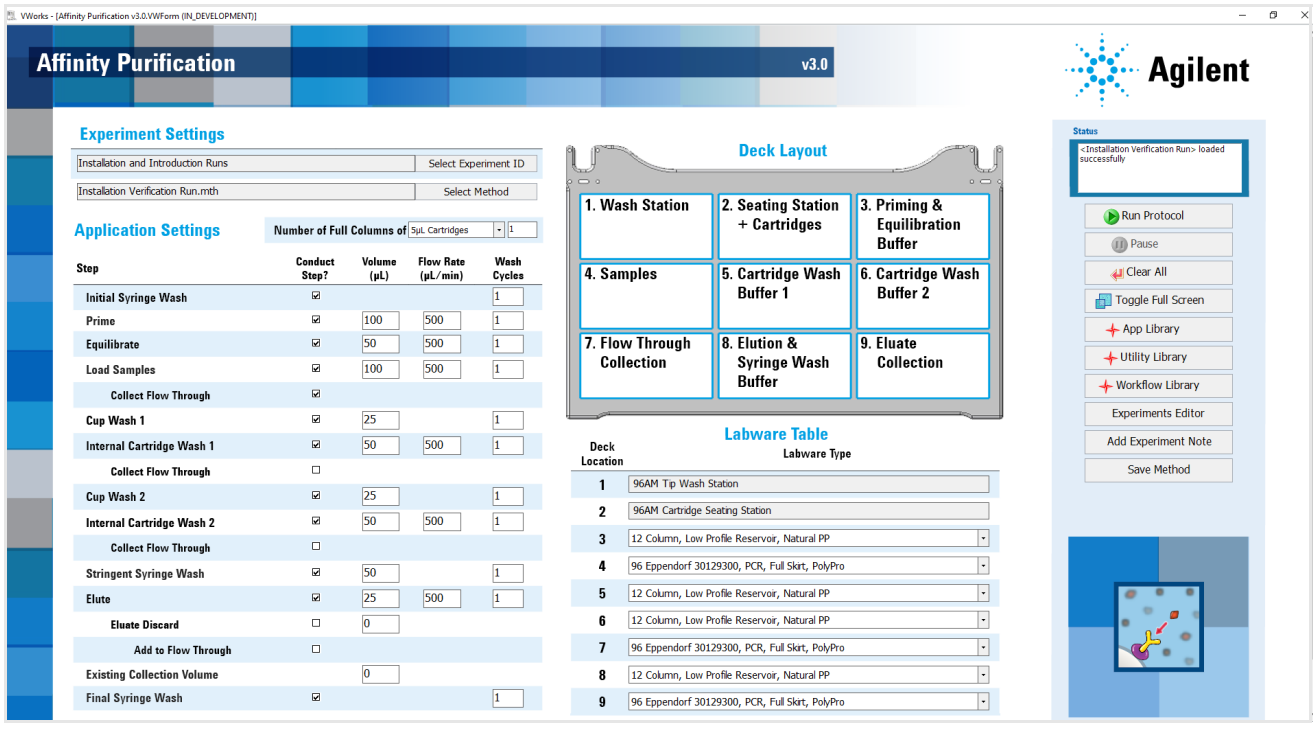
For this test run, you will not use any additional labware. Ensure that the only items on the deck are the wash station at deck location 1 and the seating station containing the Resin-Free cartridges at deck location 2.

To perform an Affinity Purification test run:

1 In the **Protein Sample Prep Workbench**, open the **App Library** and locate **Affinity Purification**. Click **App** to open the application.

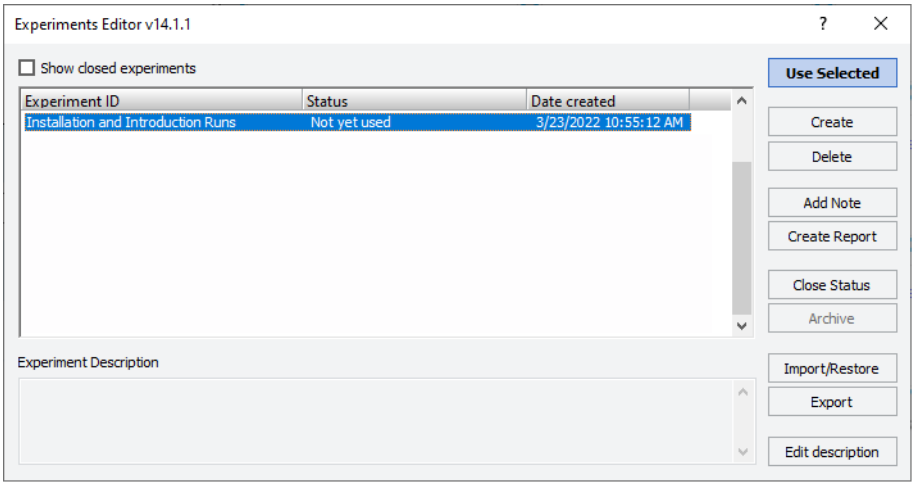


The Affinity Purification application opens. The following figure shows the settings you use for the test run.



2 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

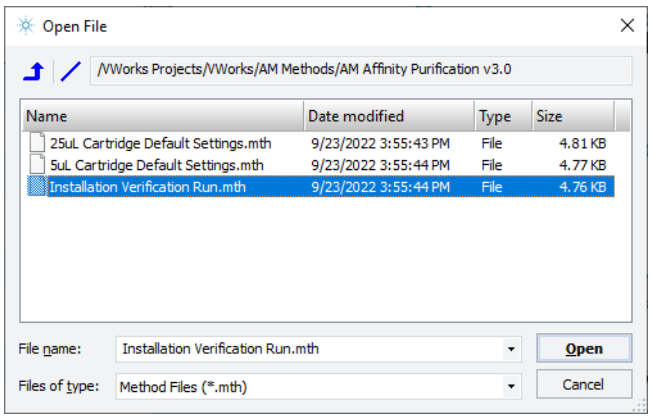
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

3 In the form, click **Select Method**. The Open File dialog box opens.

In the **Open File** dialog box, select the **Test Run Settings.mth**, and then click **Open**.



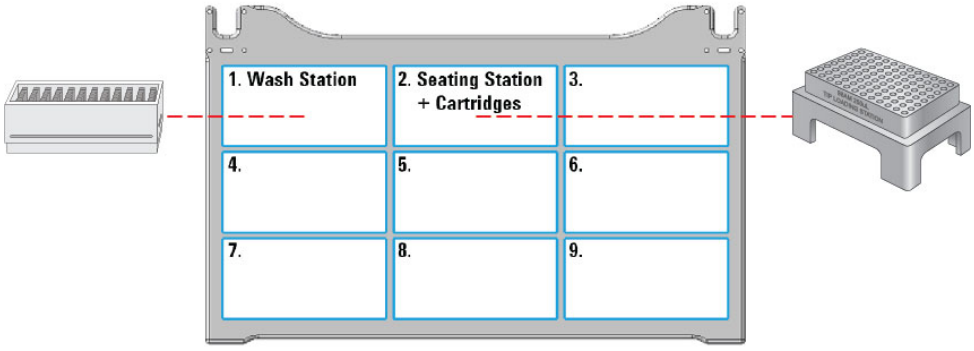
VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run the updated method.

Note: The Test Run Settings method is based on the 5µL Cartridge Default Settings method, but with the following changes:

- Number of Full Columns of Cartridges: 12
- Flow Rate (µL/min): 500 for each applicable step
- Wash Cycles: 1 for each applicable step

Note: No labware is required on the deck for the test run, but the method must specify the labware or an error will occur.

4 Ensure that the only items on the deck are the wash station at deck location 1 and the seating station containing the Resin-Free cartridges at deck location 2.

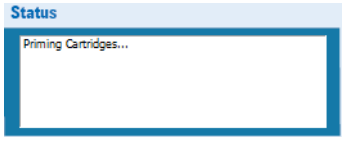


5 Click Run Protocol to start the run.

The protocol run starts and checks for conflicting step selections. The protocol with the 500-µL/min flow rate should take less than 15 minutes to complete.

6 During the test run, observe the automation movements of the Bravo 96AM Head to assess whether any problems occur. Make a note of any problems. See the following table for the sequence of movements.

To monitor the progress of the run, check the **Status** box.



To pause the run, click **Pause**. The task currently in progress finishes before the protocol pauses.

Note: After completing the run, you can use the Reverse 12 Column Transfer.mth in the Cartridge Transfer utility to transfer the cartridges from the seating station back to the cartridge rack.

Table Automation movements during the Affinity Purification protocol

Protocol step	Head moves to deck location...	Action
Start protocol	2	Parks any cartridges that may have been mounted on the head from a protocol that had been previously aborted.
	1	Dispenses any liquid remaining in the syringes into the wash station.
Initial Syringe Wash	1	Washes the syringes.

Protocol step	Head moves to deck location...	Action
Prime	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys, and then does an external probe wash.
	3	Aspirates 10 µL of Priming Buffer for the cartridge air-gap-prevention step.
	2	Dispenses the 10 µL of buffer into the cartridge cups and exercises the cartridges off task.
	3	Aspirates the Priming Buffer.
	2	Mounts the cartridges on the head.
	1	Dispenses the Priming Buffer through the cartridges into the wash station between the chimneys, and then does an external cartridge wash.
	2	Parks the cartridges in the seating station.
	1	Washes the syringes.
Equilibrate	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys, and then does an external probe wash.
	3	Aspirates 10 µL of Equilibration Buffer for the cartridge air-gap-prevention step.
	2	Dispenses the 10 µL of Equilibration Buffer into the cartridge cups and exercises the cartridges off task.
	3	Aspirates the Equilibration Buffer.
	2	Mounts the cartridges on the head.
	1	Dispenses the Equilibration Buffer through the cartridges to equilibrate, and then does an external cartridge wash.
	2	Parks the cartridges in the seating station.
	1	Washes the syringes at the wash station.

Protocol step	Head moves to deck location...	Action
Load Samples	4	Aspirates samples into the syringes.
	1	Washes the exterior of the syringe probes.
	2	Mounts the cartridges on the head.
	7	Dispenses the samples through the cartridges and into the Flow Through Collection plate.
	1	Washes the exterior of the cartridge tips.
	2	Parks the cartridges in the seating station.
	1	Washes the syringes.
Cup Wash 1	5	Aspirates Cartridge Wash Buffer 1 into the syringes.
	2	Washes the cartridge cups and exercises the cartridges off task.
	1	Dispenses the buffer into the wash station between the chimneys.
	1	Washes the syringes.
Internal Cartridge Wash 1	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys, and then does and external probe wash.
	5	Aspirates 10 µL of Cartridge Wash Buffer 1 for the cartridge air-gap-prevention step.
	2	Dispenses the 10 µL of buffer into the cartridge cups and exercises the cartridges off task.
	5	Aspirates Cartridge Wash Buffer 1 into the syringes for the sample chase and Internal Cartridge Wash 1 steps.
	2	Mounts the cartridges on the head.
	1	Dispenses 5 µL (5 µL cartridges) or 25 µL (25 µL cartridges) Cartridge Wash Buffer 1 through the cartridges at the Load Samples flow rate for the sample chase step.
	1	Dispenses the remaining Cartridge Wash Buffer 1 through the cartridges at the Internal Cartridge Wash 1 flow rate.
	1	Washes the exterior of the cartridge tips.
	2	Parks the cartridges in the seating station.
	1	Washes the syringes.

Protocol step	Head moves to deck location...	Action
Cup Wash 2	6	Aspirates Cartridge Wash Buffer 2 into the syringes.
	2	Washes the cartridge cups and exercises the cartridges off task.
	1	Dispenses buffer into the wash station between the chimneys.
	1	Washes the syringes.
Internal Cartridge Wash 2	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys, and then does an external probe wash.
	6	Aspirates 10 µL of Cartridge Wash Buffer 2 for the cartridge air-gap prevention step.
	2	Dispenses the 10 µL of buffer into the cartridge cups and exercises the cartridges off task.
	6	Aspirates Cartridge Wash Buffer 2 into the syringes.
	2	Mounts the cartridges on the head.
	1	Dispenses Cartridge Wash Buffer 2 through the cartridges.
	1	Washes the exterior of the cartridge tips.
	2	Parks the cartridges in the seating station.
	1	Washes the syringes.
Stringent Syringe Wash	8	Aspirates the Stringent Syringe Wash Buffer (Elution Buffer).
	1	Dispenses the buffer at the wash station.
	1	Washes the syringes.

Protocol step	Head moves to deck location...	Action
Elute	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys, and then does an external probe wash.
	8	Aspirates 10 µL of Elution Buffer for the cartridge air-gap-prevention step.
	2	Dispenses the 10 µL of Elution Buffer into the cartridge cups and exercises the cartridges off task.
	8	Aspirates the Elution Buffer.
	2	Mounts the cartridges on the head.
	9	Elutes the samples into the Eluate Collection plate.
	1	Washes the exterior of the cartridge tips.
	2	Parks the cartridges at the seating station.
	9	Mixes eluates.
	1	Washes the syringes.
Final Syringe Wash	2	Aspirates 20 µL of air above this location, moves down to just above the cartridge engagement point and aspirates 60 µL, and then exercises the cartridges off task.
	1	Dispenses into the wash station between the chimneys.
	1	Washes the syringes.

Running the Syringe Test utility

You use the AssayMAP Syringe Test Kit to evaluate all the syringes in the head concurrently while the Bravo 96AM Head is mounted on the AssayMAP Bravo Platform.

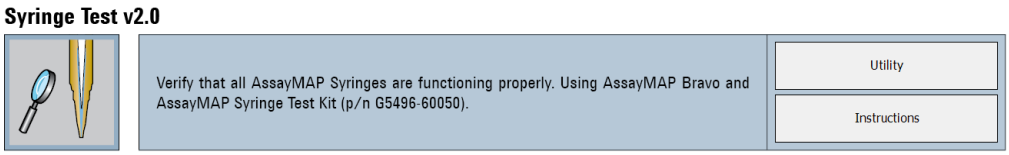
Required reagents, labware, and equipment

Item	Required items	Description	Part number
1	Syringe Test Kit	Contains labware, reagents, and materials to perform 20 tests of the 96 syringes in the Bravo 96AM Head.	Agilent G5496-60050
2	Microplate centrifuge	Centrifuge with a microplate rotor capable of achieving 500 x g	Not applicable
3	Microplate reader	Spectrophotometer capable of detecting absorbance at 405 or 425 nm in a 96-well microplate and generating a text (TXT) file of the data. *Note:* Although 425 nm is optimal, 405 nm is also acceptable.	NA

Workflow

To run the Syringe Test utility:

1 In the **Utility Library**, locate the **Syringe Test** utility, and then click **Utility**. The utility opens.

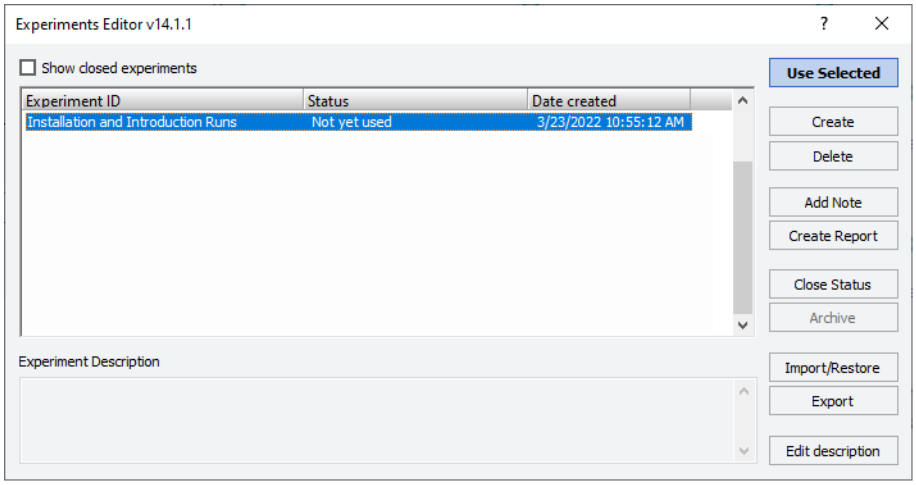


2 Click **Instructions**. The *Syringe Test User Guide* opens.

3 Follow the instructions to set up the Syringe Test, but use the following settings:

a *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

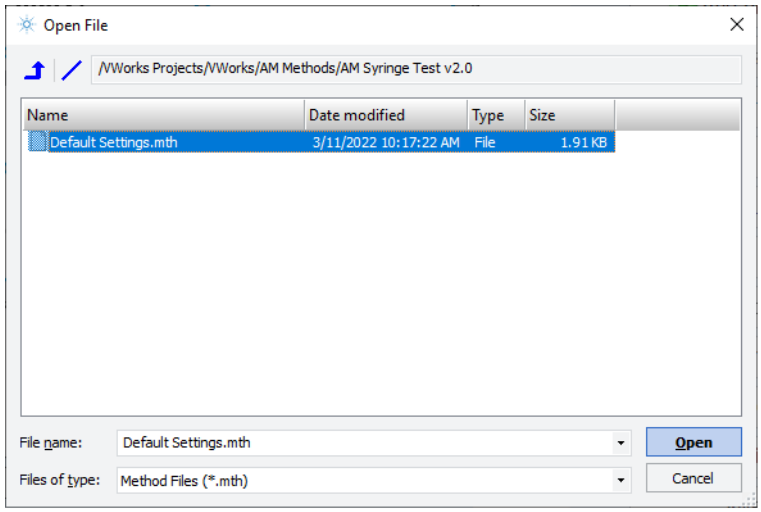
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

b In the form, click **Select Method**. The Open File dialog box opens.

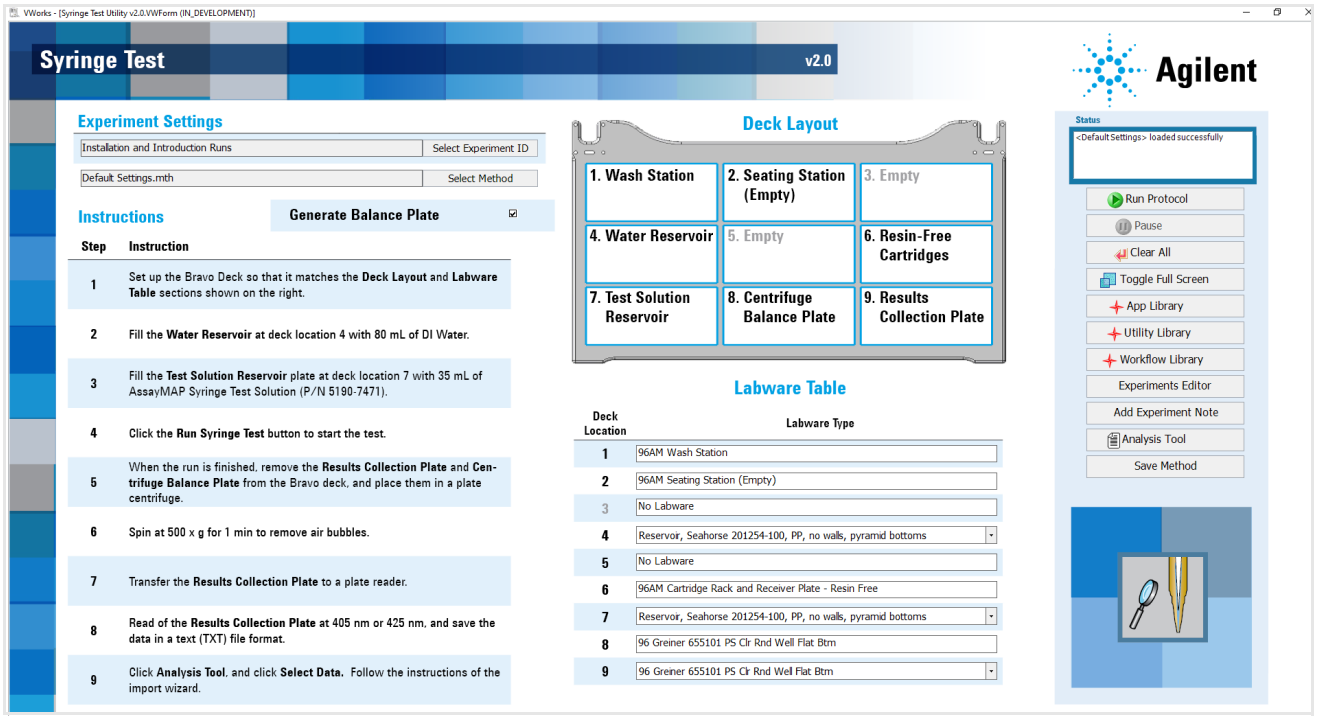
In the **Open File** dialog box, select the **Default Settings.mth**, and then click **Open**.



The following figure shows the Syringe Test utility with the default settings.

4 Follow the instructions in the *Syringe Test User Guide* to run the test protocol and analyze the results.

5 If required, replace defective syringes, and then rerun the Syringe Test to confirm all the syringes are functioning properly.


VWorks - [Syringe Test Utility v2.0.VWForm (IN_DEVELOPMENT)]
Syringe Test
v2.0
Agilent
Experiment Settings
Installation and Introduction Runs
Select Experiment ID
Default Settings.mth
Select Method
Instructions
Generate Balance Plate
Step
Instruction
1
Set up the Bravo Deck so that it matches the Deck Layout and Labware Table sections shown on the right.
2
Fill the Water Reservoir at deck location 4 with 80 mL of DI Water.
3
Fill the Test Solution Reservoir plate at deck location 7 with 35 mL of AssayMAP Syringe Test Solution (P/N 5190-7471).
4
Click the Run Syringe Test button to start the test.
5
When the run is finished, remove the Results Collection Plate and Centrifuge Balance Plate from the Bravo deck, and place them in a plate centrifuge.
6
Spin at 500 x g for 1 min to remove air bubbles.
7
Transfer the Results Collection Plate to a plate reader.
8
Read of the Results Collection Plate at 405 nm or 425 nm, and save the data in a text (TXT) file format.
9
Click Analysis Tool, and click Select Data. Follow the instructions of the import wizard.
Deck Layout
1. Wash Station
2. Seating Station (Empty)
3. Empty
4. Water Reservoir
5. Empty
6. Resin-Free Cartridges
7. Test Solution Reservoir
8. Centrifuge Balance Plate
9. Results Collection Plate
Labware Table
Deck Location
Labware Type
1
96AM Wash Station
2
96AM Seating Station (Empty)
3
No Labware
4
Reservoir, Seahorse 201254-100, PP, no walls, pyramid bottoms
5
No Labware
6
96AM Cartridge Rack and Receiver Plate - Resin Free
7
Reservoir, Seahorse 201254-100, PP, no walls, pyramid bottoms
8
96 Greiner 655101 PS Clr Rnd Well Flat Btm
9
96 Greiner 655101 PS Clr Rnd Well Flat Btm
Status
<Default Settings> loaded successfully
Run Protocol
Pause
Clear All
Toggle Full Screen
App Library
Utility Library
Workflow Library
Experiments Editor
Add Experiment Note
Analysis Tool
Save Method

Running the Shutdown utility

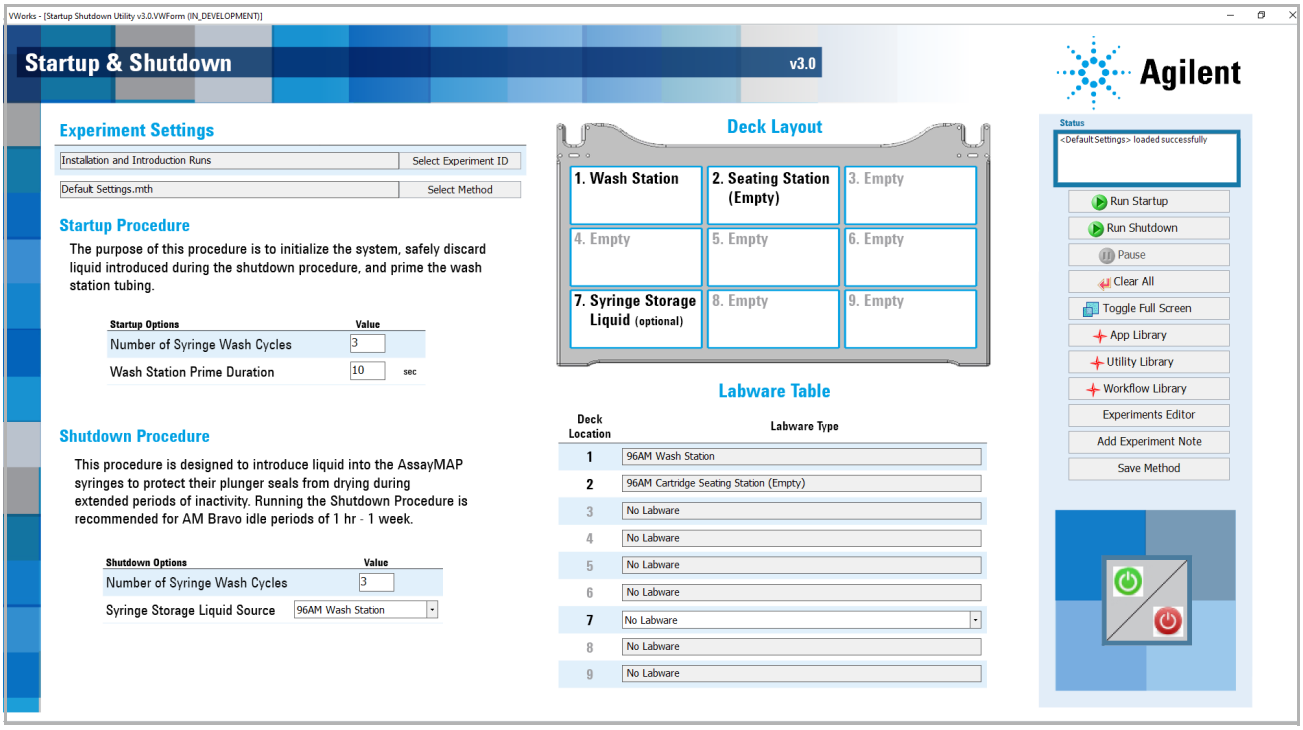
You should run the Shutdown utility before leaving.

The Shutdown utility prepares the AssayMAP Bravo Platform for idle time by:

- Washing the syringes the specified number of wash cycles.
- Aspirating 200 µL of Syringe Storage Liquid into the syringes. The Syringe Storage Liquid prevents residual reagents from forming salts and corroding the syringe seals.

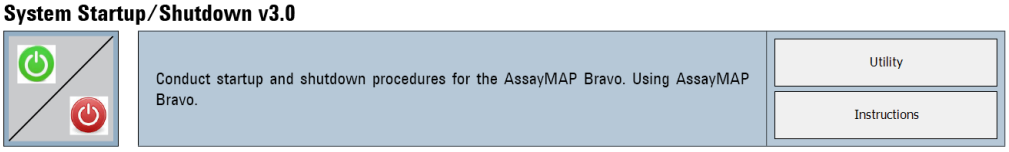
Setting up the Shutdown protocol

The following figure shows the settings you use for the Shutdown protocol run.



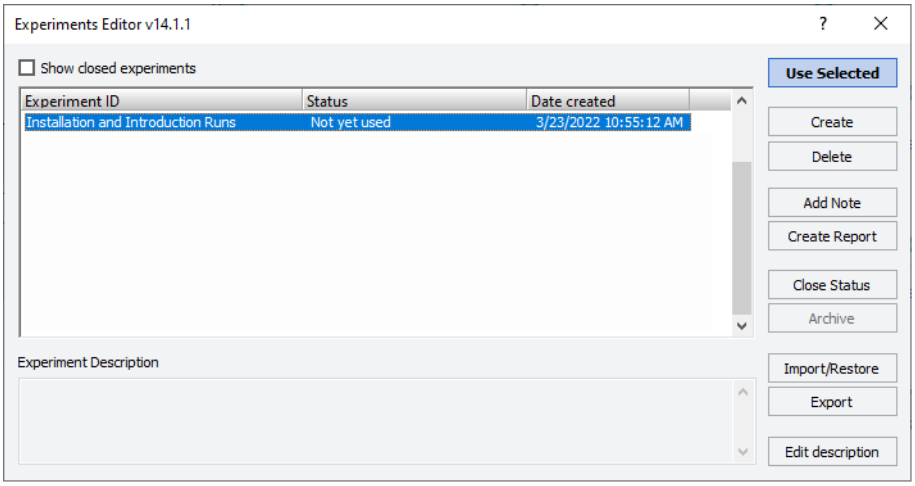
To set up the Shutdown protocol:

1 In the **Utility Library**, locate the **System Startup/Shutdown** utility, and then click **Utility**.



2 *VWorks Plus*. In the form, click **Select Experiment ID**. The Experiments Editor opens.

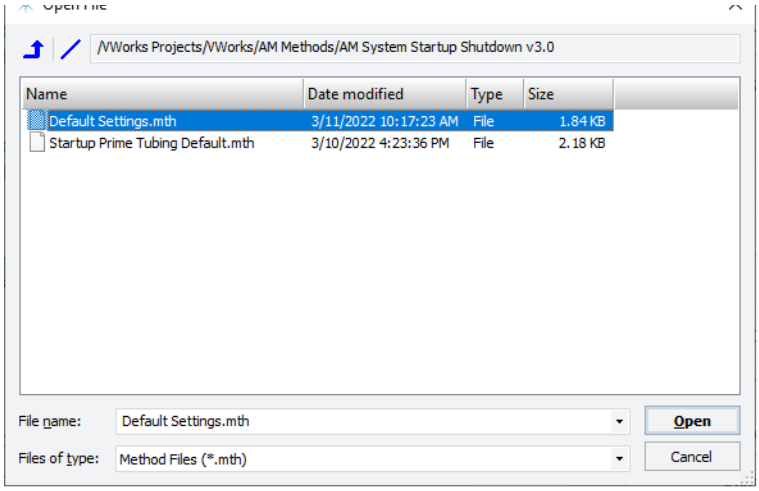
In the **Experiments Editor**, select **Installation and Introduction Runs**, and then click **Use Selected**.



The Experiments Editor closes.

3 In the form, click **Select Method**. The Open File dialog box opens.

In the **Open File** dialog box, select the **Default Settings**, and then click **Open**.

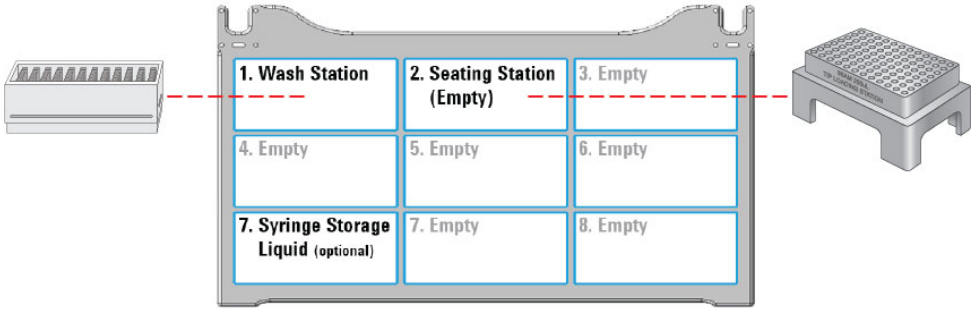


VWorks Plus. If you make any changes to the method, the method must be saved using a different name before you can run the updated method.

Starting the Shutdown protocol run

To start the protocol run:

1 Confirm that the physical layout on the AssayMAP Bravo deck matches the display in the **Deck Layout** area of the form.



2 Click Run Shutdown.

In This Guide

This guide describes how to

- Install the AssayMAP Bravo Platform
- Set up the software
- Set the teachpoints
- Verify the platform

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