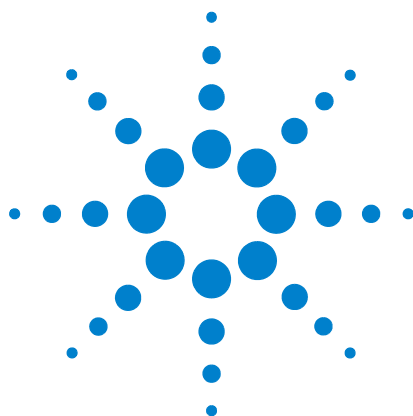




Pump Module

User Guide

Original Instructions



Agilent Technologies

Notices

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

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

Pump Module User Guide

This guide describes the Agilent Pump Module, which fills and empties Agilent autofilling accessories.

This guide contains the following topics:

- “General safety information” on page 2
- “Laboratory setup requirements” on page 6
- “Pump Module overview and components” on page 8
- “Autofilling options” on page 9
- “Setup workflow” on page 14
- “Installing an autofilling reservoir or wash station” on page 14
- “Connecting power and communication” on page 15
- “Routing the tubing” on page 17
- “Installing a Weigh Station” on page 25
- “Maintenance and troubleshooting” on page 27

For instructions on how to configure the autofilling parameters and how to use the Pump Module in a protocol, see the user documentation for your automation software and liquid-handling device. You can search the product knowledge base or download the latest version of a PDF file from the Agilent Technologies website at:

www.agilent.com/chem/askb



General safety information

Before installing and using the Pump Module

Before installing and using the Pump Module, 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.

Intended product use



WARNING Do not remove the device's exterior covers or otherwise disassemble the system or device. Doing so can expose you to hazards that could cause serious injury and damage the device.

Agilent Technologies products must only be used in the manner described in the Agilent Technologies product user guides. Any other use may result in damage to the product or personal injury. Agilent Technologies is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent Technologies product user guides, or use of the products in violation of applicable laws, rules or regulations. Except as otherwise expressly provided in Agilent Technologies product user guides, any alteration, adjustment or modification to the products will void the product warranty and may invalidate the safety compliance certification.

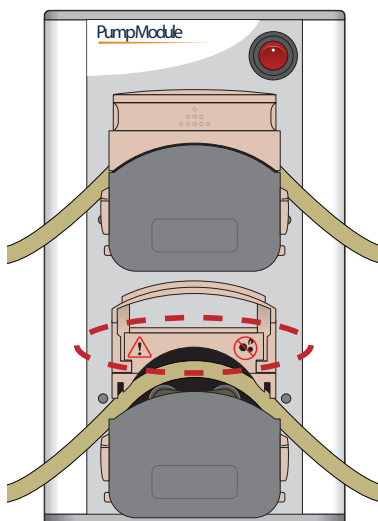
The Pump Module is not intended or approved for diagnosis of disease in humans or animals. You assume full responsibility for obtaining any regulatory approvals required for such use and assume all liability in connection therewith.

Safety labels

Pay attention to any safety labels affixed to your device. A safety label consists of a warning symbol that indicates a risk of danger. A description of the warning and information that will help you to avoid the safety hazard are provided in this user guide.

The following figure shows the location of the warning labels on the Pump Module.

Figure Safety symbols under the opened pump head cover



Warnings in the user documentation or on the device must be observed during all phases of operation, service, and repair of this device. Failure to comply with these precautions violates safety standards of design and the intended use of the product. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

The following table lists the common symbols you might find on the system or device. The symbol on the label indicates the type of hazard. A description of the warning and information that will help you avoid the safety hazard are provided in this guide.

Symbol	Description
	Indicates that you must read the accompanying instructions (for example, the safety guide) for more information before proceeding.
	Indicates hazardous voltages.
	Indicates pinch, crush, or cut hazard.
	
	
	
	Indicates laser hazard.

Symbol	Description
	Indicates hot surface hazard.
	Indicates that to prevent serious injury, guards, interlocks, and safety devices should be restored to correct operation when installing parts or making repairs. Refer to user or service documentation for additional information.
	Indicates protective conductor terminal, which is bonded to conductive parts of an equipment for protection against electric shock in case of a fault and is intended to be connected to an external protective earthing system.
	Indicates frame or chassis terminal, which is bonded to conductive parts of an equipment for safety purposes.
	Indicates that you must not discard this electrical/electronic product in domestic household waste.



WARNING Pinch hazard! Do not allow fingers to contact moving parts.



WARNING Ensure that the Pump Module is turned off before lifting the flip-top cover on a pump head. Keep the covers closed while the pumps are running.



WARNING Do not remove the exterior Pump Module covers or otherwise disassemble the device. Doing so can expose you to hazardous-voltage electronics and damage the Pump Module.



WARNING Ensure that protective clothing and eye protection are worn if hazardous products are being pumped.



WARNING Ensure that liquid does not contact the device electronics. Periodically inspect the tubing for leaks.

CAUTION Do not lift the Pump Module by the peristaltic pumps that are mounted on the front of the device. Doing so could damage the Pump Module.

Safety and regulatory compliance

Compliance standards

The Pump Module complies with the applicable EU Directives and bears the CE mark. See the Declaration of Conformity or Declaration of Incorporation, as applicable, for details. The Pump Module is designed to comply with the regulations and standards listed in the following table.

Regulatory Compliance	Standard
EMC	
European Union	EMC Directive 2004/108/EC
	IEC 61326-1:2005 / EN 61326-1:2006
Canada	ICES/NMB-001:2004
Australia/New Zealand	AS/NZS CISPR 11:2004
Safety	
European Union	Machinery Directive 2006/42/EC
	Low Voltage Directive 2006/95/EC
	IEC 61010-1:2001 / EN61010-1:2001
	IEC 61010-2-081:2001+A1:2003 / EN 61010-2-081:2002+A1:2003
Canada	CAN/CSA-C22.2 No. 61010-1-04
	CAN/CSA-C22.2 No. 61010-2-081-04
USA	ANSI/UL 61010-1:2004

Electromagnetic compatibility

If the Pump Module causes interference with radio or television reception, which can be determined by turning the device off and on, try one or more of the following measures:

- Relocate the radio or television antenna.
- Move the device away from the radio or television.
- Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- Make sure that all peripheral devices are also certified.
- Make sure that appropriate cables are used to connect the device to peripheral equipment.
- Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound emission declaration

Sound pressure: $L_p < 70$ dB according to EN ISO 779:2010.

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

South Korean Class A EMC declaration

A 급 기기 (업무용 방송통신기자재)

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Laboratory setup requirements

Placement considerations

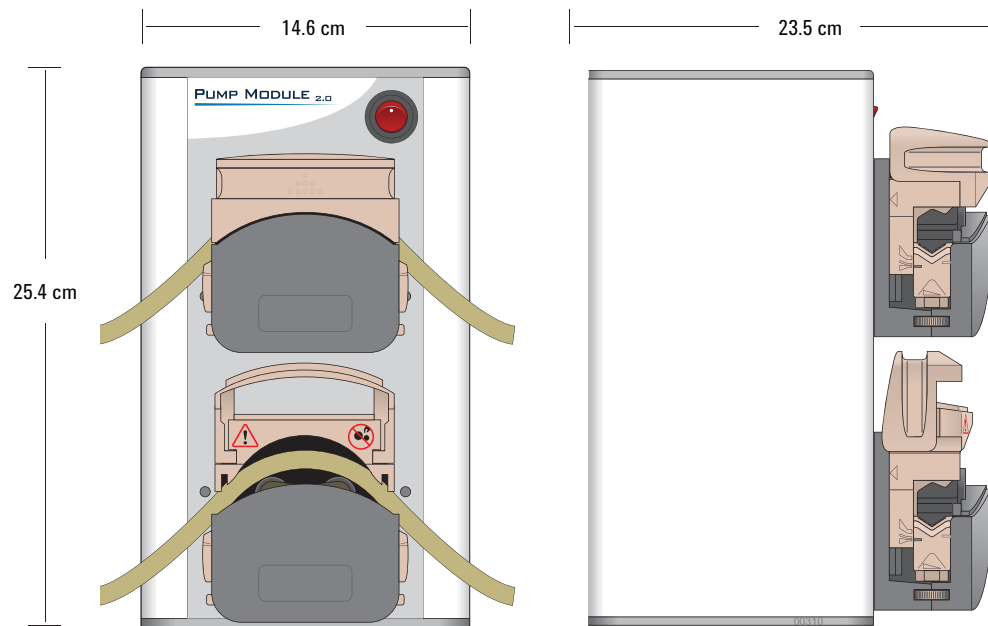
The Pump Module must be located near a power source to connect the power cord, and near the controlling liquid-handling device to connect the communication cable. If applicable, the Pump Module must be positioned to enable connecting the cable from the Agilent Weigh Station, Weigh Pad, or Weigh Shelf.

IMPORTANT Make sure the Pump Module is located away from heat and air conditioning ducts and away from direct sunlight, as these conditions could interfere with the Pump Module performance.

Specifications

The following figure shows the Pump Module dimensions.

Figure Pump Module dimensions (front and side view)



The dimensions and additional site requirements are as follows.

Specification	Value
Dimensions	
Height	25.4 cm (10.0 in)
Width	14.6 cm (5.75 in)
Depth	23.5 cm (9.25 in)
Electrical	100–240 V~, 50/60 Hz, 1.5 A

Environmental requirements

Ambient environment

The Pump Module is for indoor use only. The following table lists the operating and storage specifications.

If you have integrated devices, your system might require additional cooling depending on the number and types of integrated devices.

Operating	Specification
Pollution degree	2
Installation category	II
Temperature	0–40 °C
Humidity	10–90% RH, non-condensing
Altitude	1–2000 m

Related information

For information about...	See...
Safety guidelines	“General safety information” on page 2
Pump Module maintenance	“Maintenance and troubleshooting” on page 27

Pump Module overview and components

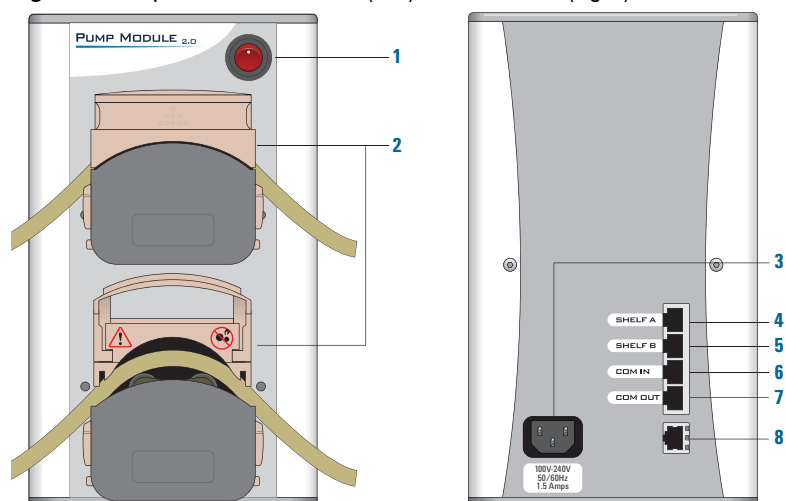
Overview

The Pump Module contains two peristaltic pumps, one that pumps the fresh source fluid into a reservoir, and a second one that pumps the waste fluid from the reservoir. Optionally, you can use the Pump Module with an Agilent Weigh Station, Weigh Shelf, or Weigh Pad to provide precise liquid-level control for an autofilling reservoir or wash station.

Components

The following figure shows the primary components and the table provides descriptions of each component.

Figure Pump Module front view (left) and rear view (right)



Item	Feature	Description
1	Power switch	Turns on or turns off the power.
2	Peristaltic pump	Pumps fluid in either a forward or reverse direction, as specified in the automation control software. Each pump has a flip-top cover that enables you to route the tubing.
3	AC power connector	Connects the power cable.
4	SHELF A port	Connects the communication cable from a Weigh Shelf, Weigh Station, or Weigh Pad to the Pump Module.

Item	Feature	Description
5	SHELF B port	Connects the communication cable from a second Weigh Shelf, Weigh Station, or Weigh Pad. IMPORTANT Agilent Technologies recommends one Pump Module for each pairing of reservoir and Weigh Shelf, Weigh Station, or Weigh Pad.
6	COM IN port	Connects the communication cable from a Pump Module to the controlling liquid-handling device to enable communication.
7	COM OUT port	Connects the communication cable from one Pump Module to another Pump Module in a series. Up to five Pump Modules and three Weigh Stations can be connected and controlled through one liquid-handling device. For details, see “Connecting power and communication” on page 15 .
8	Port	Not used

IMPORTANT The ports described in items 4-7 are not Ethernet ports.

Related information

For information about...	See...
Pump Module specifications	“Laboratory setup requirements” on page 6
Pump Module maintenance	“Maintenance and troubleshooting” on page 27

Autofilling options

About this topic

This topic describes the following reservoirs and wash stations that can be automatically filled and emptied using the Pump Module:

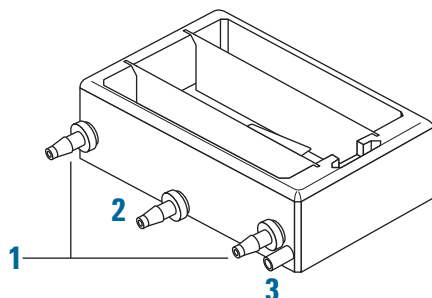
- Agilent Auto Filling Reservoir
- Agilent Tip Wash Station (formerly known as the MicroWash Reservoir)
- Agilent 8-Channel Wash Station
- Agilent Open Wash Reservoir

Agilent reservoirs are approved for use with most reagents and solvents. If you have questions on the use of a particular chemical or solvent, contact Automation Solutions Technical Support before use.

Auto Filling Reservoir

The Auto Filling Reservoir is an open tray that can be installed on a platepad or a Weigh Station for precision liquid-level control. The reservoir can supply reagents to single-channel pipettors and multichannel pipette heads.

Figure Auto Filling Reservoir



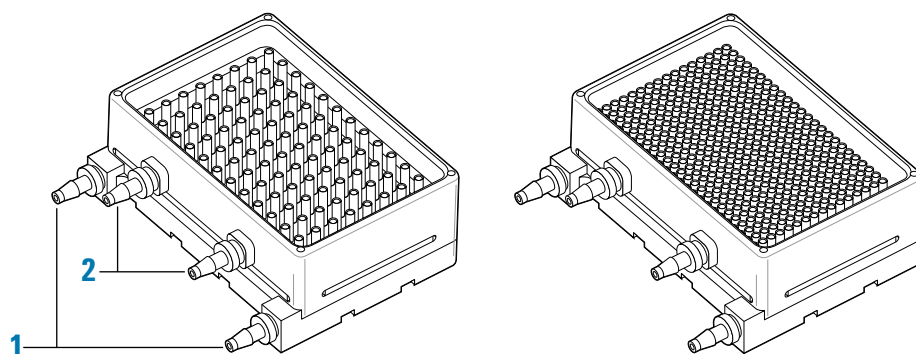
Item	Description
1	<i>Inlet ports.</i> Connects to the input tubing from the Pump Module that fills the reservoir.
2	<i>Outlet port.</i> Connects to the output tubing from the Pump Module that empties the reservoir.
3	<i>Overflow drain.</i> Uses gravity to drain excess fluid.

When properly configured in the automation software, the Pump Module automatically fills and drains the Auto Filling Reservoir. As the figure shows, two inlet ports are available to supply reagents to the reservoir. An outlet port is used to pump the waste and excess fluid from the reservoir. An overflow drain port can also be connected to drain the excess fluid. If the overflow port is not connected, it must be plugged.

Tip Wash Station

The Tip Wash Station is available in 96-chimney or 384-chimney formats.

Figure Tip Wash Station: 96-chimney (left) and 384-chimney (right)



Item	Description
1	<i>Inlet ports.</i> Fills the wash station. Liquid flows up through the chimneys.
2	<i>Outlet ports.</i> Empties the wash station. The overflow of the chimneys flows out through the two upper output ports.

You can use the 96- and 384-chimney Tip Wash Stations with any of the Agilent 96-channel pipette heads. However, the 384-channel pipette head is limited to the 384-chimney Tip Wash Station.

Note: The AssayMAP Bravo Platform uses a 96-chimney Tip Wash Station that is scaled for the 96AM head as part of the AssayMAP Bravo Platform.

Note: For single-channel pipettors, you use the 8-Channel Wash Station.

CAUTION Attempting to use the 384-channel pipette head with a Tip Wash Station other than the 384-chimney format can cause equipment damage.

Make sure the pipette tips do not touch the bottom of the Tip Wash Station. To adjust the distance from the bottom, you can set parameters in the automation software. For instructions, see the user documentation for the device automation software.

CAUTION To prevent potential damage to the tips, ensure that the pipette tips do not touch the bottom of a reservoir.

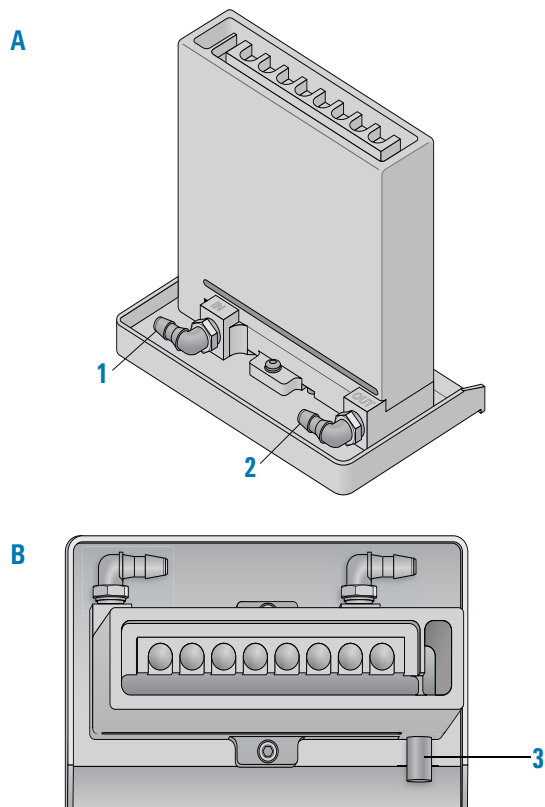
The chimneys in the wash station prevent carryover and reduce contamination. The Pump Module pumps wash liquid into the Tip Wash Station through two inlet ports. The wash liquid flows up through the chimneys in the Tip Wash Station to wash the tips. The waste overflows from the chimneys and is removed through two outlet ports.

The Tip Wash Station can be installed on a platepad or on a Vertical Pipetting Station shelf. Optionally, the Tip Wash Station can be used on a Weigh Station or Weigh Shelf for precision liquid-level control.

8-Channel Wash Station

The 8-Channel Wash Station is an auto filling wash station available for use on the Encore Multispan Liquid Handling System and is capable of washing all Agilent tip types used by the system.

Figure 8-Channel Wash Station: (A) side view and (B) top view



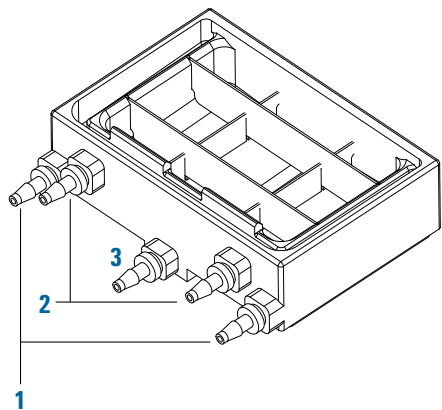
Item	Description
1	<i>Inlet port.</i> Fills the wash station. Liquid flows up through the eight channels.
2	<i>Outlet port.</i> Empties the wash station. The fluid in the waste trough flows out through this port.
3	<i>Overflow drain.</i> Gravity drain for fluid that enters the overflow trough.

Open Wash Reservoir

The Open Wash Reservoir is an open tray that can be installed on a platepad or on a Vertical Pipetting Station shelf. For precision liquid-level control, you can install the Open Wash Reservoir on a Weigh Station or Weigh Shelf.

CAUTION *Vertical Pipetting Station only.* Ensure that the baffles are installed in the reservoir to prevent potential splashing when the shelf moves.

Figure Open Wash Reservoir



Item	Description	Overflow mode	Fill and empty mode
1	Inlet ports	Connected to input (fill) tubing	Connected to input (fill) tubing
2	Outlet ports	Connected to output (empty) tubing	Plugged
3	Bottom center port	Plugged	Connected to output (empty) tubing

When properly configured in the automation software, the Pump Module automatically fills and drains the reservoir. The Open Wash Reservoir can be set up to run in either of two modes:

- *Overflow mode.* Fresh wash solution enters the reservoir from the two inlet ports (1), overflows into the overflow trough, and is pumped through the two outlet ports (2) to waste.
- *Fill and empty mode.* Fresh wash solution enters the reservoir from the two inlet ports (1), but is drained via the bottom center port (3). In this mode the reservoir is filled and emptied one or more times between each wash cycle. The reservoir design ensures maximal emptying to reduce the contamination load in the wash fluid between each cycle.

Related information

For information about...	See...
Setup workflow	“Setup workflow” on page 14
Maintaining the Pump Module	“Maintenance and troubleshooting” on page 27

Setup workflow

This topic describes the workflow for setting up an Agilent autofilling reservoir or wash station on an Agilent liquid-handling device using the Pump Module.

Step	Procedure	See...
1	Ensure that you are familiar with the input and output ports for the type of autofilling reservoir or wash station.	“Autofilling options” on page 9
2	If applicable, install the Weigh Station or Weigh Shelf. <i>Note:</i> Agilent Technologies installs the Weigh Pad, if applicable.	• <i>Weigh Station.</i> See “Installing a Weigh Station” on page 25 • <i>Weigh Shelf.</i> See the Vertical Pipetting Station User Guide.
3	Install the reservoir or wash station.	“Installing an autofilling reservoir or wash station” on page 14
4	Connect the Pump Module cables.	“Connecting power and communication” on page 15
5	Route the tubing.	“Routing the tubing” on page 17
6	In the automation software, configure the Pump Module, reservoir, or wash station and associated resources.	User documentation for the automation software at www.agilent.com/chem/askb
7	<i>Weigh Station and wash stations.</i> Verify the teachpoint accuracy.	User documentation for the liquid-handling device at www.agilent.com/chem/askb
8	Verify the autofilling function of the completed setup by performing a pump fill and empty task using the automation software.	User documentation for the automation software at www.agilent.com/chem/askb

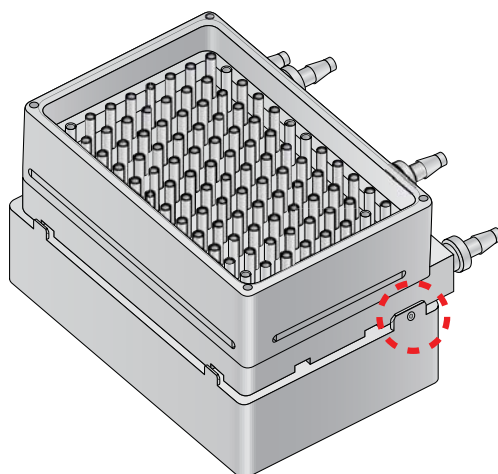
Installing an autofilling reservoir or wash station

Auto Filling Reservoir, 96- or 384-Chimney Tip Wash Station, or Open Wash Reservoir

To install the reservoir or Tip Wash Station:

- 1 Place the reservoir or wash station on the platepad or shelf at the desired location on the liquid-handling device.
Note: For the Encore Multispan System, the reservoir is installed within the pipettable area.
- 2 Using a 1.5-mm hex wrench, tighten the setscrew on the platepad tab or shelf tab to secure the container.

Figure Tip Wash Station secured to a platepad



96AM Wash Station

The 96AM Wash Station is a 96-chimney Tip Wash Station that is scaled for the Bravo 96AM head as part of the AssayMAP Bravo Platform. The 96AM Wash Station requires a bracket to secure it to the platepad. Typically, an Agilent representative will set up the 96AM Wash Station when installing the AssayMAP Bravo Platform. For setup instructions, see the user documentation for the liquid-handling device at www.agilent.com/chem/askb.

8-Channel Wash Station

The 8-Channel Wash Station is a wash station used on the Encore Multispan System. For installation instructions, see the section on setting up accessories in the Encore Multispan System knowledge base located at www.agilent.com/chem/askb.

Connecting power and communication

Before you begin

- Ensure that the Pump Module location meets the site requirements. See “Laboratory setup requirements” on page 6.
- Make sure you have the Pump Module power cord and communication cable.



WARNING Ensure that the power cords are in good condition and are not frayed. Use of frayed or damaged power cords can cause injury.



WARNING Ensure that the Pump Module and the associated liquid-handling device are turned off before connecting the cables and routing the tubing.

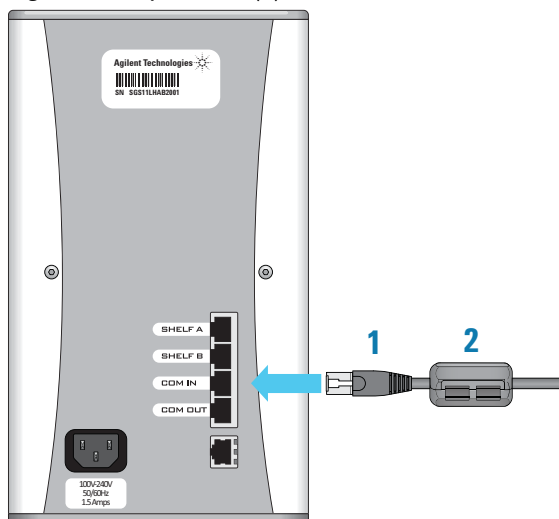
CAUTION Before operating the Pump Module, ensure that the communication cable plug with the EMI filter is connected to the COM IN port. Failure to do so will cause the Pump Module to be non-compliant with the EU Directives for electromagnetic emissions and may cause interference with nearby instruments.

Connecting the cables

To connect the power and communication cable:

- 1 Ensure that the liquid-handling device and the Pump Module are turned off.
- 2 Connect the end of the communication cable with the EMI filter to the Pump Module COM IN port, and connect the other end of the cable to the pump I/O port on the liquid-handling device.

Figure Pump Module (1) communication cable with (2) EMI filter



- 3 To connect multiple Pump Modules, use a second serial cable to connect the COM OUT port on the first Pump Module to the COM IN port on the second Pump Module.

CAUTION Ensure that the communication cable plug that has the EMI filter is connected to the Pump Module COM IN port.

Repeat this step for each Pump Module that is to be controlled by the same device. Up to five Pump Modules and three Weigh Stations can be controlled in this manner.

- 4 Connect the provided power cable to the AC power connector on the back of the Pump Module and into an appropriately grounded electrical receptacle.
- 5 If you are using a Weigh Shelf, Weigh Station, or Weigh Pad, connect its cable to the SHELF A port on the back of the Pump Module.

Routing the tubing

About this topic

This topic explains how to route the tubing from the reservoir or wash station to the Pump Module and source and waste containers. This topic includes the following sections:

- [“Before you start” on page 17](#)
- [“Components” on page 17](#)
- [“Workflow for routing the tubing” on page 19](#)
- [“Connecting tube A to a reservoir or wash station on a platepad or Weigh Station” on page 19](#)
- [“Connecting tube A to a reservoir installed on the Vertical Pipetting Station” on page 20](#)
- [“Connecting tube A to the 8-Channel Wash Station” on page 21](#)
- [“Positioning tube B in the pump heads” on page 21](#)
- [“Connecting tube B between the Pump Module and the reservoir” on page 23](#)
- [“Connecting tube B to source and waste bottles” on page 24](#)
- [“\(Auto Filling Reservoir only\) Connecting tube B to the gravity drain” on page 24](#)
- [“Completing the Pump Module setup” on page 24](#)

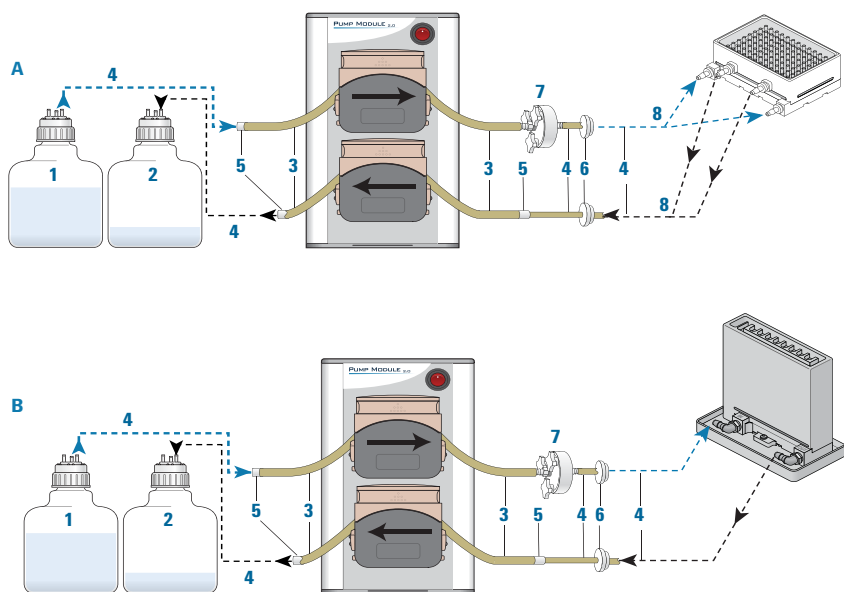
Before you start

- Make sure you are familiar with the input and output ports for the type of reservoir or wash station. See [“Autofilling options” on page 9](#).
- Ensure that you have the tubing kit (tubing, connectors, and quick-disconnect fittings) and source and waste bottles.
- If you are using a Tip Wash Station, make sure you have the inline pump filter.
- Make sure the reservoir or wash station is installed on the liquid-handling device. See [“Installing an autofilling reservoir or wash station” on page 14](#).

Components

The following figure shows tubing configuration examples. The table describes the components shown in the figure.

Figure Example tubing configuration for (A) Tip Wash Station and (B) 8-Channel Wash Station



Item	Component	Description
1	Source bottle	Supplies the fill liquid for an autofilling wash station, such as the Tip Wash Station or 8-Channel Wash Station.
2	Waste bottle	Collects the waste liquid that is pumped from the reservoir.
3	Tube B	The 8-mm (5/16-in) Marprene tubing. Use tube B (larger diameter tubing) for the lengths of tubing in the pump heads and for the gravity drain on an Auto Filling Reservoir.
4	Tube A	The 6.4-mm (4/16-in) Marprene tubing. Use tube A (smaller diameter tubing) for the input and output tubing connections to the reservoir and the source and waste bottles.
5	Connector, union	Joins tube A to tube B. Over time, the tubing in the pump heads deteriorates and requires replacement. By placing a union connector on either side of the pump head, you can minimize the length of tubing that requires replacement.
6	Quick-disconnect fitting	Enables easy removal of an autofilling reservoir. The quick-disconnect fittings include an automatic-close valve. Fluid can flow only if a positive connection is made.
7	Inline pump filter	Removes the particulates that can clog the chimneys in the Tip Wash Station or channels in the 8-Channel Wash Station. As the pump operates, the inside of the tubing sheds particulates that must be filtered downstream to prevent the chimneys from clogging.

Item	Component	Description
8	3-way connector	<i>Reservoirs with two inlet or outlet ports.</i> Enables one tube to branch into two tubes at the input and output ports on an autofilling reservoir, such as the Tip Wash Station.

Workflow for routing the tubing



WARNING Ensure that the Pump Module and the liquid-handling device are turned off before routing the tubing.

Perform the following procedures in the order given:

Step	For this task...	See...
1	Connect tube A (smaller diameter tubing) to the reservoir ports.	Use one of the following: “Connecting tube A to a reservoir or wash station on a platepad or Weigh Station” on page 19 “Connecting tube A to a reservoir installed on the Vertical Pipetting Station” on page 20 “Connecting tube A to the 8-Channel Wash Station” on page 21
2	Position tube B (larger diameter tubing) in the pump heads.	“Positioning tube B in the pump heads” on page 21
3	Connect tube B from the pump heads to tube A from the reservoir.	“Connecting tube B between the Pump Module and the reservoir” on page 23
4	Connect tube B from the pump heads to tube A from source and waste bottles.	“Connecting tube B to source and waste bottles” on page 24
5	<i>Auto Filling Reservoir only.</i> Connect a length of tube B from the overflow gravity-drain to a waste bottle.	“(Auto Filling Reservoir only) Connecting tube B to the gravity drain” on page 24
6	Complete the Pump Module setup.	“Completing the Pump Module setup” on page 24

Connecting tube A to a reservoir or wash station on a platepad or Weigh Station

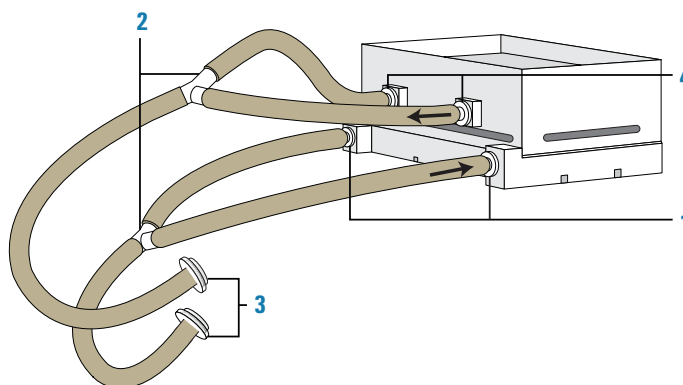
Refer to the following figure for this procedure.

To connect tube A to a reservoir or wash station on a platepad or Weigh Station:

- 1 *Fill (input).* Cut three lengths of tube A. Two lengths of tubing are for the measured distance from the reservoir input ports (1) to a 3-way connector (2). The third length of tubing is for the distance between the 3-way connector and either a quick-disconnect fitting (3) or tubing connector (not shown). Connect the tubing.
- 2 *Empty (output).* Cut three lengths of tube A. Two lengths of tubing are for the measured distance from the reservoir output ports (4) to a 3-way connector (2). The third length of tubing is for the distance between the 3-way connector and either a quick disconnect fitting or tubing connector. Connect the tubing.

Note: If the reservoir has one output port, cut one length of tube A for the output tubing.

Figure Example tubing configuration for a Tip Wash Station: (1) input ports, (2) 3-way connectors, (3) quick-disconnect fittings, and (4) output ports



Note: The liquid enters the Tip Wash Station through the two lower input ports and flows up through the chimneys. The overflow of the chimneys flows out through the two upper output ports.

Connecting tube A to a reservoir installed on the Vertical Pipetting Station

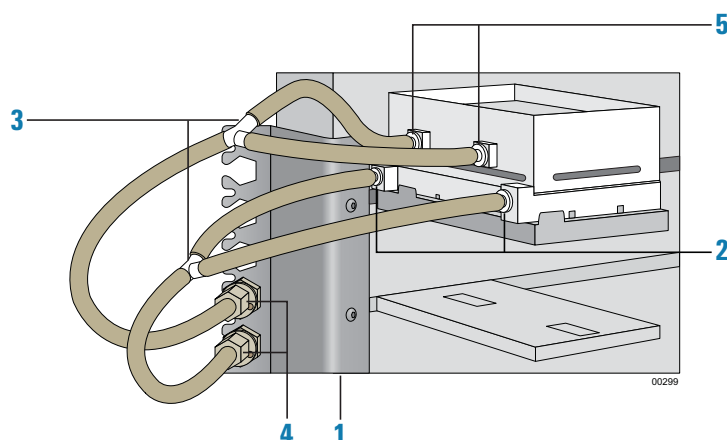
Refer to the following figure to route the tubing from the reservoir to the Tubing Rack (1).

To connect tube A to a reservoir installed on a shelf:

- 1 *Fill (input).* Cut three lengths of tube A. Two lengths of tubing are for the measured distance from the reservoir input ports (2) to the 3-way connector (3). The third length of tubing is for the distance between the 3-way connector and a quick-disconnect fitting (4) on the Tubing Rack. Connect the tubing as the figure shows.
- 2 *Empty (output).* If the reservoir has two output ports (5), cut three lengths of tube A. Two lengths of tubing are for the measured distance from the reservoir output ports (5) to the 3-way connector (3). The third length of tubing is for the distance between the 3-way connector and a quick-disconnect fitting (4) on the Tubing Rack.

Note: If the reservoir has one output port, cut one length of tube A.

Figure Example tubing configuration for Vertical Pipetting Station with Tip Wash Station



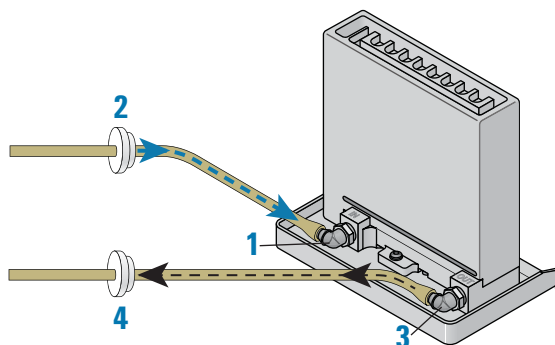
Connecting tube A to the 8-Channel Wash Station

Refer to the following figure for this procedure.

To connect tube A to an 8-Channel Wash Station:

- 1 *Fill (input).* Cut a length of tube A to go from the input port (1) to a quick-disconnect fitting (2). Connect the tubing as shown in the figure.
- 2 *Empty (output).* Cut a length of tube A to go from the output port (3) to another quick-disconnect fitting (4). Connect the tubing as shown in the figure.

Figure Tubing configuration for the 8-Channel Wash Station



Positioning tube B in the pump heads



WARNING Pinch hazard! Keep your fingers clear of the pump head interior when you close the pump head cover. Keep the pump head cover closed while the pump is running.

CAUTION Ensure that the tubing is not kinked, twisted, or stretched against the rollers. Make sure that the tube is not crushed in the clamps.

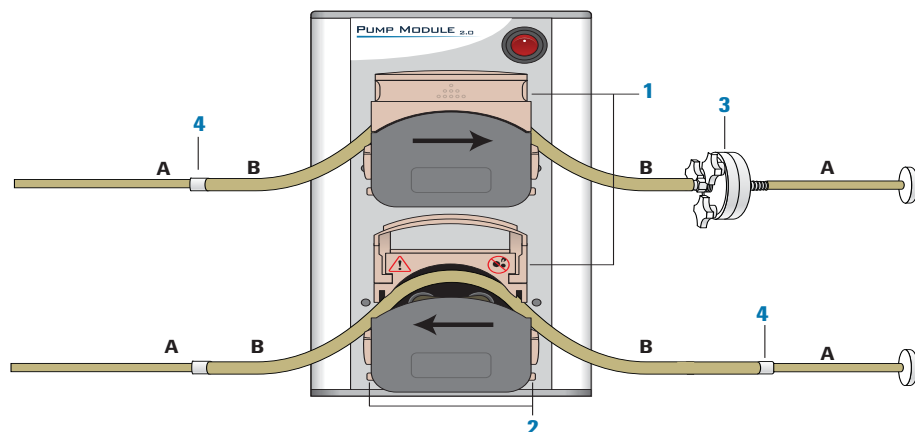
To position tube B in the pump heads:

- 1 Determine which of the two pump heads (1) will control the input flow (fill direction) to the reservoir and which will control the output flow (empty direction) to the waste bottle.

Each pump head can be configured in the software to flow in either direction. In the following figure, the lower pump head controls the output flow to the reservoir, and the upper pump head controls the input flow.

96AM Wash Station. Agilent Technologies recommends using the lower pump for the output and the upper for the input as the figure shows.

Figure Inserting tubing into the pump heads



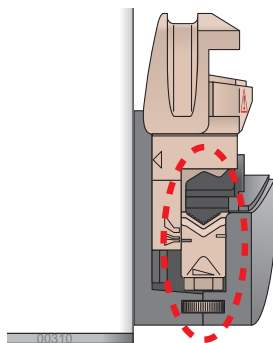
- 2 For each pump head, cut a length of tube B that is long enough so that the tubing can gently arch over the rollers in the pump head and still have plenty of slack on either side of the pump head for a connection to tube A.
- 3 To insert tube B into a pump head:
 - a Lift up the flip-top cover on the pump head so that it is fully open.
 - b On each side of the pump head, turn the dial to open the clamps (V-grooves) fully to accommodate the diameter of tube B. See the preceding figure for the dial location (2).
 - c Insert a portion of tube B so that the tubing 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.

Repeat this step for the other pump head.

CAUTION Ensure that the pump head clamps are set properly for the diameter of the tubing. Incorrectly adjusted clamps can constrict the flow or damage the tubing when the pump head is closed.

Note: If any creeping of the tubing occurs during operation, tighten the clamps slightly using the clamp dials (2).

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



- 4 *Tip Wash Station only.* For the input flow (fill direction) into the Tip Wash Station, connect the inline filter (3) to tube B between the Pump Module and the Tip Wash Station as the preceding figure shows.

Ensure that the filter is oriented so that the three thumbscrews face toward the Pump Module and the other side of the filter faces toward the Tip Wash Station.

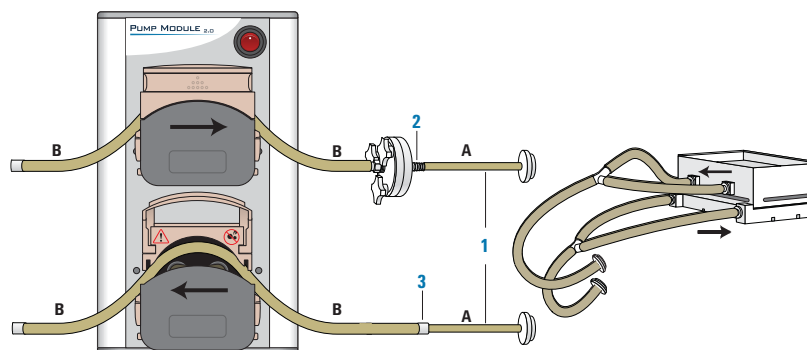
- 5 Insert a tubing connector (4) on each open end of tube B, as the preceding figure shows.

Connecting tube B between the Pump Module and the reservoir

To connect tube B between the Pump Module and the reservoir:

- 1 Cut two lengths of tube A measured for the distance between the end of tube B and the connector on the end of tube A from the reservoir, as the following figure shows (1).

Figure Tubing from Pump Module to reservoir



- 2 For the fill direction:
 - a Connect one length of tube A to the tube B connector or to the inline filter (2), if applicable, on the input tubing (fill direction) from the Pump Module.
 - b Connect the other end of tube A to the quick-disconnect fitting on the end of tube A to be connected to the reservoir input ports.
- 3 For the empty direction:
 - a Connect the other length of tube A to the tube B connector (3) on the empty-direction tubing going into the Pump Module.

- b** Connect the other end of tube A to the quick-disconnect fitting on the end of tube A to be connected to the reservoir output ports.

Connecting tube B to source and waste bottles

To connect the source and waste bottles to tube B:

- 1** Cut a length of tube A measured for the distance from the source bottle to the Pump Module. Allow plenty of slack in the tubing.
- 2** Attach a quick-disconnect fitting to one end of tube A, and insert the quick-disconnect fitting into the output port of the source bottle.
- 3** Connect the other end of tube A to the tube B connector on the input line.
- 4** Repeat steps 1 to 3 for the waste bottle, ensuring that you connect tube A from the waste bottle to the tube B connector on the output line at the Pump Module.

(Auto Filling Reservoir only) Connecting tube B to the gravity drain

To route the overflow gravity-drain tubing:

- 1** Cut tube B to the measured length from the reservoir drain port to a waste bottle.
Vertical Pipetting Station only. Cut a length of tube B for the distance from the reservoir drain port to the Tubing Rack, and from the Tubing Rack to the waste bottle. Attach the tubing using the quick-disconnect fittings.
- 2** Attach a quick-disconnect fitting to one end of the tubing, and insert the fitting into one of the ports on the waste bottle. Make sure the waste bottle is vented.
- 3** Attach the other end of the tubing to the reservoir drain port connection.

CAUTION Do not connect the overflow line to the empty line, or else the overflow will not drain properly. To enable the gravity drain system to work effectively, the drain tubing must always travel downward.

Completing the Pump Module setup

To complete the Pump Module setup:

- 1** *Vertical Pipetting Station only.* Slide the reservoir shelf back and forth to ensure the shelf has enough tubing for unrestricted travel.
- 2** Turn on the Pump Module, and then turn on the liquid-handling device.
- 3** Start the automation software, and then configure the autofilling accessory parameters.

IMPORTANT When using Marprene tubing, reset the tension after you run the Pump Module for the first 30 minutes. To reset the tension on the tubing, open the flip-top cover of the pump head, allow the tube to settle naturally across the rollers, and then reclamp the tube.

IMPORTANT When the Pump Module is not in use, lift the flip-top cover on each pump head to prevent flattening the tubing and to help maximize the tubing life.

Removing a Pump Module

To remove the Pump Module:

- 1 Using the automation control software, run the Pump Module and drain the reservoir until empty.
- 2 Turn off the Pump Module, and then turn off the liquid-handling device.
- 3 Disconnect the Pump Module power and communication cable. Unplug the Weigh Station cable from the Pump Module.
- 4 Disconnect the tubing from the reservoir.
- 5 Remove the reservoir.
- 6 Remove the tubing from the Pump Module and from the source and waste bottles.

Related information

For information about...	See...
Autofilling reservoirs	“Autofilling options” on page 9
Configure the Pump Module, reservoir, and associated resources	User documentation for the automation software at www.agilent.com/chem/askb
Routine maintenance	“Maintenance and troubleshooting” on page 27

Installing a Weigh Station

About this topic

This topic describes the Weigh Station and how to install and remove it from the physical workspace.

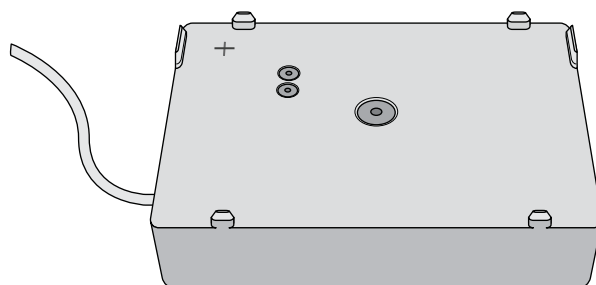
For details on connecting the cable, see [“Connecting power and communication” on page 15](#).

About the Weigh Station

A Weigh Station measures the weight of a Agilent autofilling reservoir that is placed on it. When appropriately configured in the software, the Weigh Station works with the Pump Module to ensure that the reservoir is filled to a constant liquid level during the pump reagent task in a protocol. By monitoring the weight of the reservoir that sits on it, the Weigh Station controls when the Pump Module is activated.

Use one Pump Module for each pairing of reservoir and Weigh Station.

Figure Weigh Station



Installing the Weigh Station

Before you start

Determine where to install the Weigh Station. The Weigh Station must be close enough to the Pump Module, so that the Weigh Station cable can be connected to the Pump Module SHELF A port.

Make sure you have the following:

- Sockethead screw (supplied with the Weigh Station)
- M4 hex or T30 hexalobular wrench, as applicable
- M5 hex wrench



WARNING Turn off the Pump Module and the liquid-handling device or system before you install or remove an accessory within the physical workspace.

To install a Weigh Station:

- 1 If you are replacing a platepad with a Weigh Station, remove the screw in the center of the platepad with the M4 or T30 wrench, as applicable, and then remove the platepad.
- 2 Place the Weigh Station at the installation location.
Make sure the side with the cable faces towards the Pump Module and that the Weigh Station sits level.
- 3 Insert the supplied sockethead screw into the center of the Weigh Station and use the M5 hex wrench to tighten the screw.

Removing the Weigh Station

To remove a Weigh Station:

- 1 Disconnect the Weigh Station from the Pump Module.
- 2 Using the M5 hex wrench, remove the screw in the center of the Weigh Station.
- 3 Remove the Weigh Station.

Related information

For information about...	See...
Verifying the teachpoint accuracy of the Weigh Station	User documentation for the liquid-handling device at www.agilent.com/chem/askb
Calibrating the Weigh Station	User documentation for the automation software at www.agilent.com/chem/askb
Installing a Weigh Shelf	<i>Vertical Pipetting Station User Guide</i>
Connecting the cables and tubing	"Connecting power and communication" on page 15

Maintenance and troubleshooting

About this topic

This topic includes the following:

- "Periodic maintenance and inspection" on page 27
- "Troubleshooting" on page 28
- "Pump head tube size adjustment" on page 29
- "Reporting problems" on page 30

Periodic maintenance and inspection

Periodically, perform the routine maintenance listed below. Your schedule might vary depending on the frequency of Pump Module use.

Maintenance task	Schedule	Symptoms
Clean the Pump Module using standard laboratory wipes and a mild detergent or isopropyl alcohol on the painted white surfaces and the aluminum surfaces. Clean up any spills immediately.	Weekly or as needed	Dust, grime, or chemical deposits on exterior

Maintenance task	Schedule	Symptoms
Inspect the Pump Module tubing for wear and leaks. Replace the tubing as necessary.	Monthly	Tube deterioration, or liquid fails to pump or fails to drain properly IMPORTANT When the Pump Module is not in use, lift the flip-top cover on each pump head to prevent flattening the tubing and to help maximize the tubing life.
Calibrate the Weigh Station, if applicable.	Bimonthly	Deterioration of liquid-level accuracy in reservoir



WARNING Ensure that the Pump Module is turned off before you clean the device.

CAUTION Use only recommended cleaning materials. Using other cleaning solutions and materials can damage the device. Do not use abrasive, corrosive cleaning agents. Do not use metal brushes.

Troubleshooting

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

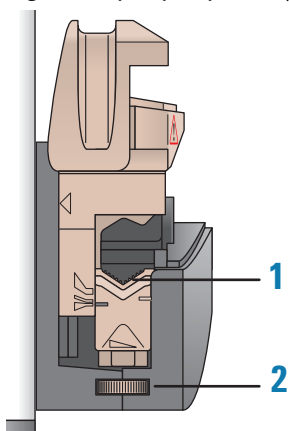
Problem	Potential cause	Solution
Tubing creeps through the pump head instead of being secured in place.	The pump head clamp is too loose for the tube size.	Adjust the tubing clamp for the tube size. See “Pump head tube size adjustment” on page 29.
The tubing is crushed or damaged in the pump head.	The pump head clamp is too tight for the tube size.	Adjust the tubing clamp for the tube size. See “Pump head tube size adjustment” on page 29.

Problem	Potential cause	Solution
The liquid flow is constricted or liquid fails to pump or drain properly.	The tubing is deteriorated or the pump head clamp is too tight for the tube size.	Inspect the tubing for wear and leaks. Replace the tubing as necessary. If necessary adjust the pump head clamp, see “Pump head tube size adjustment” on page 29. IMPORTANT When the Pump Module is not in use, lift the flip-top cover on each pump head to prevent flattening the tubing and to help maximize the tubing life.
The liquid-level is no longer accurate for a reservoir on a Weigh Station.	The Weigh Station requires recalibration.	Calibrate the Weigh Station. For details, see the user documentation for your automation software.

Pump head tube size adjustment

The pump head clamps can be adjusted to accommodate different tubing sizes. A properly adjusted clamp opening secures the tubing in the pump head while allowing an efficient flow of liquids. The preceding troubleshooting table describes the potential problems that can result from incorrectly adjusted clamps.

Figure Open pump head (side view) showing (1) open clamp and (2) clamp dial



To change the tube clamp adjustment:

- 1 Lift the flip-top cover on the pump head so that it is open fully.
- 2 On each side of the pump head, turn the dial to open the clamp fully.
- 3 Ensure that the tubing gently arches over the rollers and is located in the center of the track (V-groove) on each side of the pump head.
- 4 Set the tube clamps to the correct size, making sure to align the scale on both sides of the pump head.

- 5 Carefully lower the cover to clamp the tube in place.

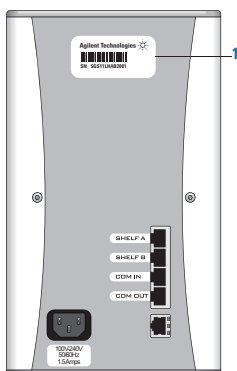
When the pump head top closes on the tubing, the tubing is clamped and stretched to locate it in the correct position and with the correct tension. The correct tension is essential for good tube life.

IMPORTANT A new Marprene tube in the pump head requires re-tensioning after the first 30 minutes of running. To re-tension the tubing, open the flip-top cover of the pump head, allow the tube to settle naturally across the rollers, and then reclamp the tube.

Reporting problems

If you are unable to resolve a problem, contact Automation Solutions Technical Support. For contact details, see the [Notices](#) section of the title page.

Make sure you have the serial number of the device when contacting Automation Solutions Technical Support. You can find the serial number on the back of the device (1).



Related information

For information about...

Power and environmental requirements

Safety guidelines

See...

[“Laboratory setup requirements” on page 6](#)

[“General safety information” on page 2](#)



User Guide

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