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Multisipper
Installation, Operation and Maintenance

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Release History

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Application and Equipment

Application and Equipment

Application

The Multisipper is a sampling accessory that permits liquid samples to be aspirated from any vessel into a flowcell located in the sample radiation beam in the sample compartment of a PerkinElmer UV/Vis (NIR) spectrometer. The Multisipper installs at the front of the spectrometer's sample compartment.

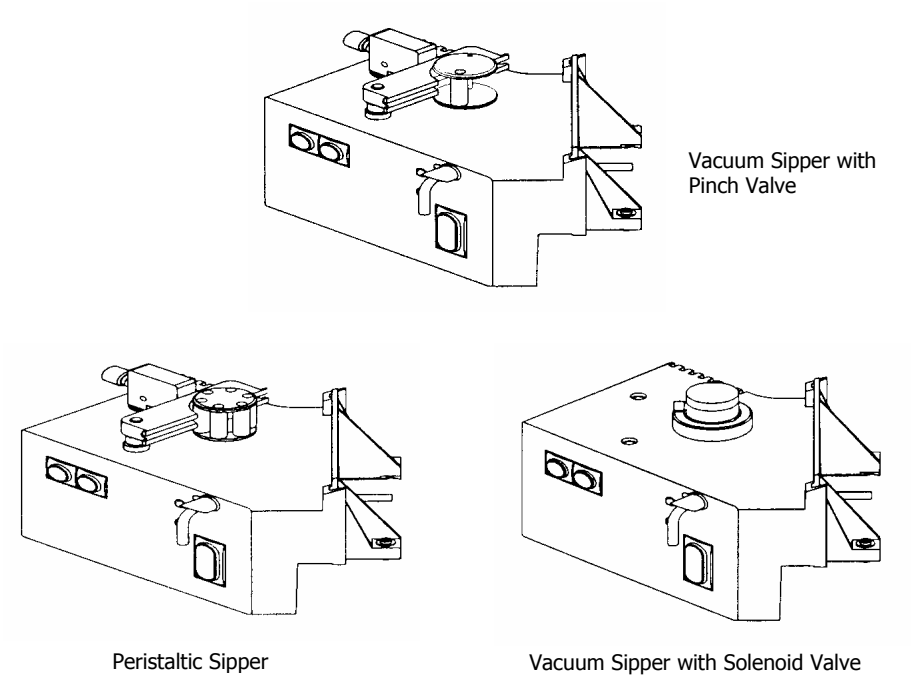


Figure 1 Sipper Models

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*Equipment Provided and Required**

Peristaltic Sipper (B2190036)

Parts Provided	Part Number
Peristaltic pump kit	B2500104
Peristaltic tube kit	B2500103
Pump tube kit (set of 12)	B0199034
Connecting cable	B0167808
Adapter 15-pin/25-pin	B0101247
Sample compartment cover	B0094014
Adaptor B	B0506716
Adaptor L	B0507920
Insulating tube	B0017691
Special connector	B0199233
Hex HD wrench 2.0	B0018041
Hex HD wrench 2.5	B0049586
Documentation	09935025

Additional Parts Required	Part Number
Accessory board kit Lambda 2: LP75/1 or LP75/2 Lambda Bio/11/12/14: LP75/5 or LP75/6	 B0185229 B0198134 B0509681 B2190034
Lambda 800/900 conversion kit	B2500123
Lambda 650/850/950 sipper kit	L6020291
Flowcell of choice (See *Flowcells*, page 10)	

* PerkinElmer reserves the right to alter the schedule of equipment provided without prior notice.

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NOTE: *To order the additional parts required or parts for other spectrometers, please contact your PerkinElmer office.*

Vacuum Sipper with Pinch Valve (B2190037)

Parts Provided	Part Number
Sipping assembly	-
Pinch valve kit	B2500105
Peristaltic tube kit	B2500103
Pump tube kit (set of 12)	B0199034
Connecting cable	B0167808
Adapter 15-pin/25-pin	B0101247
Sample compartment cover	B0094014
Adaptor B	B0506716
Adaptor L	B0507920
Insulating tube	B0017691
Special connector	B0199233
Hex HD wrench 2.0	B0018041
Hex HD wrench 2.5	B0049586
Documentation	09935025

Additional Parts Required	Part Number
Accessory board kit Lambda 2: LP75/1 or LP75/2 Lambda Bio/11/12/14: LP75/5 or LP75/6	 B0185229 B0198134 B0509681 B2190034
Lambda 800/900 conversion kit	B2500123
Lambda 650/850/950 sipper kit	L6020291
Vacuum pump unit	B0084183
Flowcell of choice (See *Flowcells*, page 10)	

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NOTE: *To order the additional parts required or parts for other spectrometers, please contact your PerkinElmer office.*

Vacuum Sipper with Solenoid Valve (B2190038)

Parts Provided	Part Number
Sipping assembly	-
Solenoid valve PTFE	B0174374
Tube kit for solenoid valve	B0198023
Connecting cable	B0167808
Adapter 15-pin/25-pin	B0101247
Sample compartment cover	B0094014
Documentation	09935025

Additional Parts Required	Part Number
Accessory board kit Lambda 2: LP75/1 or LP75/2 Lambda Bio/11/12/14: LP75/5 or LP75/6	 B0185229 B0198134 B0509681 B2190034
Lambda 800/900 conversion kit	B2500123
Lambda 650/850/950 sipper kit	L6020291
Vacuum pump unit	B0084183
Flowcell of choice (See *Flowcells*, page 10)	

NOTE: *To order the additional parts required or parts for other spectrometers, please contact your PerkinElmer office.*

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Flowcells

PerkinElmer offers the following flowcells for use with the Multisipper (other cells on request).

Pathlength / mm	Volume / µL	Window Material	Connectors	Part Number
10	160	Suprasil	Screw fittings	B0181294
10	160	Optical glass	Screw fittings	B0181295
50	650	Suprasil	Tube connectors	B0109944
50	650	Optical glass	Tube connectors	B0107747

Thermostatted Cell Holder

PerkinElmer offers thermostatted cell holders when sample temperature is important for the measurement. For detailed information, please contact your PerkinElmer office.

Automated Systems

PerkinElmer offers autosamplers to create an automated system. For detailed information, please contact your PerkinElmer office.

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Installation

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Installation

Summary of the Installation Procedure

To install the Multisipper:

	Action	Described in Section
1	Unpack and inspect the sipper.	*Unpacking*, page 12
2	Set the DIP switches.	*Setting the DIP Switches*, page 13
3	Install the Sipping Assembly into the sample compartment.	*Sipping Assembly Installation*, page 14
4	If necessary, install the solenoid valve or peristaltic pump.	*Solenoid Valve Installation*, page 15, *Peristaltic Pump and Pinch Valve Installation*, page 15
5	Install the flowcell and the tubing.	*Tubing Installation*, page 16, *Hints for Installing the Tubes (Peristaltic)*, page 17, *Hints for Installing the Tubes (Pinch Valve)*, page 18, *Hints for Installing the Tubes (Solenoid Valve)*, page 21
6	For a vacuum sipper: install the vacuum pump unit.	Do not overtighten the pressure adjustment screw as this shortens the working life of the tubing, and may slow or stop the pump. Release the tension on the pump tubing when the system is not being used. *Vacuum Pump Unit Installation*, page 26.

Unpacking

After you receive the Sipper, unpack the components carefully. Keep the packing materials for possible future storage or reshipment.

Examine the components for any signs of damage in shipment. In the event of damage, file an immediate claim with the authorized carrier, and inform your PerkinElmer office or representative.

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Setting the DIP Switches

On delivery the DIP switches are preset to match the ordered Sipper configuration. The pump speed is preset to 100 min $^{-1}$. If you need another pump speed or changed the Sipper configuration, set the DIP switches accordingly.

The DIP switches are on the underside of the Sipping Assembly.

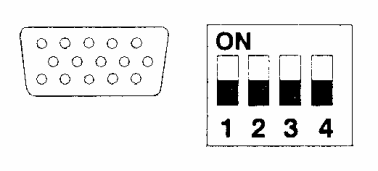


Figure 2 DIP Switches

Option	S1	S2	S3	S4
Pinch valve	*	*	*	OFF
Peristaltic pump	*	*	*	ON
Solenoid valve	*	*	*	*
Peristaltic pump speed:				
50 min^{-1}	ON	ON	*	*
75 min^{-1}	OFF	ON	*	*
100 min^{-1}	ON	OFF	*	*
120 min^{-1}	OFF	OFF	*	*

* DIP Switch is not used.

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Sipping Assembly Installation

Install the Sipping Assembly at the front of the spectrometer's sample compartment as given below:

1. Switch off the spectrometer and disconnect it from the electrical supply.
2. Remove the standard sample compartment cover (see User Documentation for the spectrometer).
3. Demount any accessories that might be installed in the sample compartment.
4. Insert the cable B0167808 into the connector on the underside of the Sipping Assembly.
5. For Lambda 2, Bio/11/12/14, 20, 25, 30, 35, 40, and 45 instruments, slide the Sipping Assembly into the front of the sample compartment. Secure the lugs onto the threaded holes in the floor of the sample compartment with the screws provided.

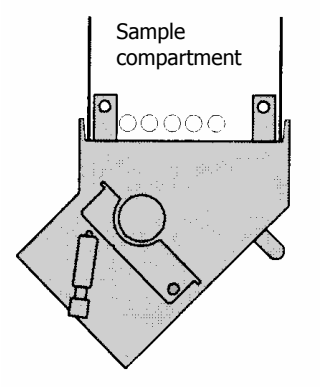


Figure 3 Sipping Assembly

For Lambda 800 and 900 instruments fit the sipper onto the front cover using the brackets provided within the installation kit B2500123.

For Lambda 650, 850 and 950 instruments replace the lid with the smaller lid provided within the sipper kit L6020291. Fit the sipper onto the front metal plate using the brackets provided in the sipper kit.

6. Connect the adapter B0101247 to the cable and insert the adapter into connector J14 on the Spectrometer's accessory connector panel.
7. Install the Accessory Sample Compartment Cover.

   If required, you can draw the spectrometer forward so that the Sipping Assembly projects over the front of the laboratory bench.

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Solenoid Valve Installation

The solenoid valve installs on the top of the Sipping Assembly:

1. Orientate the valve with the connector downwards.
2. Screw in the air filter.
   Air is drawn through the air filter when the system is not sipping to relieve the vacuum pump.

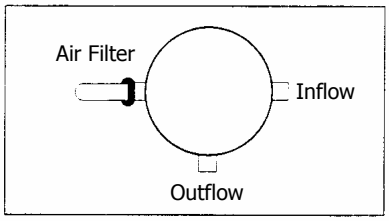


Figure 4 Solenoid Valve

3. Insert the valve into the hole on the top of the Sipping Assembly until the connector fits.

Peristaltic Pump and Pinch Valve Installation

The rotor is pre-installed. Install the tube magazine and the pressure adjustment lever as follows:

1. Slide the distance ring onto the long pivot.
2. Slide the tube magazine onto the long pivot.
3. Slide the pressure adjustment lever onto the short pivot.

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Tubing Installation

Install the tubing as shown in Figure 5. For detailed information about installing the pump tube or the flowcell, see also *Flowcell Installation*, page 22 and *Installing the Pump Tube Magazine*, page 24.

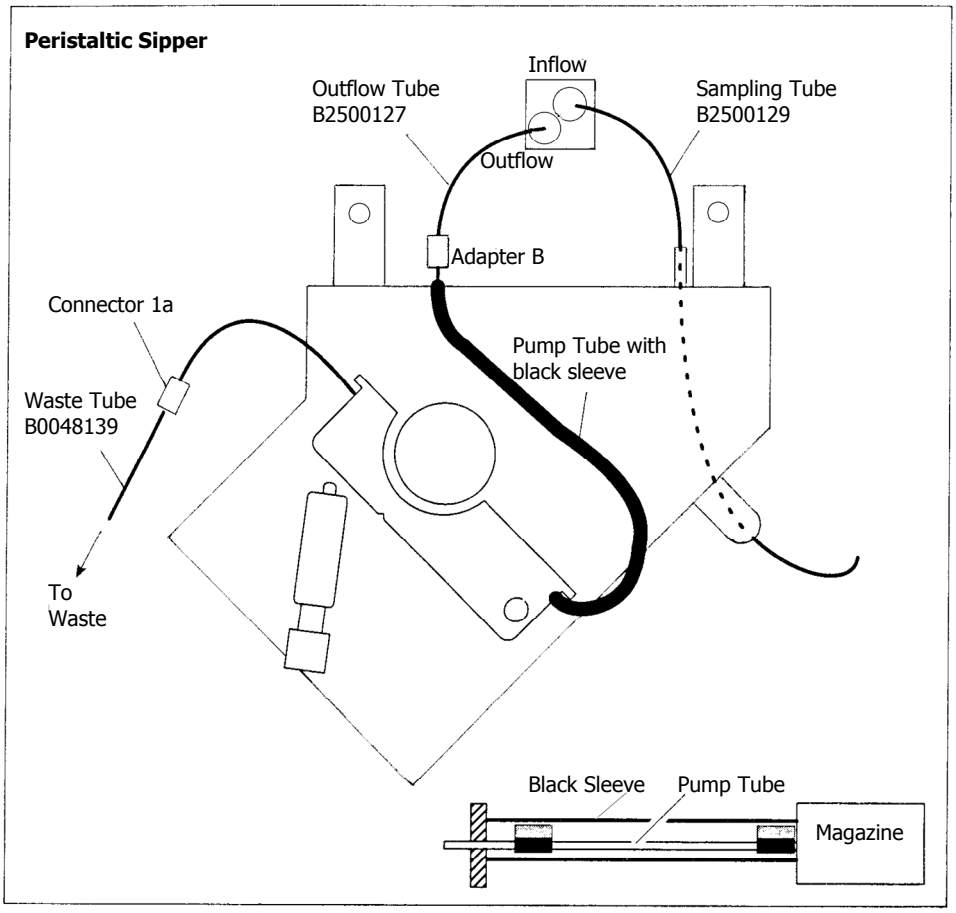


Figure 5 Peristaltic Sipper, Tubing Installation

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Hints for Installing the Tubes (Peristaltic)

The tubes for the Peristaltic Sipper are shown in Figure 5.

Sampling Tube PTFE, 0.5 m, 1.0 mm i.d., 1 screw fitting for flowcell

- Make sure the tube protection sleeves are fitted to both sides of the metal tube guide to prevent damage to the sampling tube.
- From the sample compartment, feed the tube through the metal tube guide, until there is no excess in the sample compartment, but leave it loose enough to assume a natural curve.

  For manual sampling cut the tube to a suitable length using a scalpel to obtain a clean edge – do not use scissors.
- With an Autosampler: use the silicone sleeve B0082178 to connect the sampling tube to the autosampler tube.
- Connect to the flowcell inflow (see *Flowcell Installation*, page 22).

Outflow Tube PTFE, 0.15 m, 1.0 mm i.d., 1 screw fitting for flowcell, 1 blue connector

- Connect the blue connector to Adapter B.
- Connect the other end to the flowcell outflow (see *Flowcell Installation*, page 22).

Pump Tube Black Sleeve – pump tube of choice

- The black sleeve prevents light from entering the sample compartment.
- Cut off a suitable length of the black sleeve and insert the pump tube into the black sleeve.
- Feed the pump tube through the hole into the sample compartment and connect to Adapter B.
- Connect Adapter L or Connector Ia to the other end (depending on the type of waste tube).

Waste Tube PVC TR 75 Shore, 3 mm i.d. (B0048139) or Silicone TR 55 Shore, 4 mm i.d. (B0082178)

- Connect to the pump tube via Connector Ia (PVC tube) or Adapter L (Silicone tube).
- Insert the other end into the waste container.

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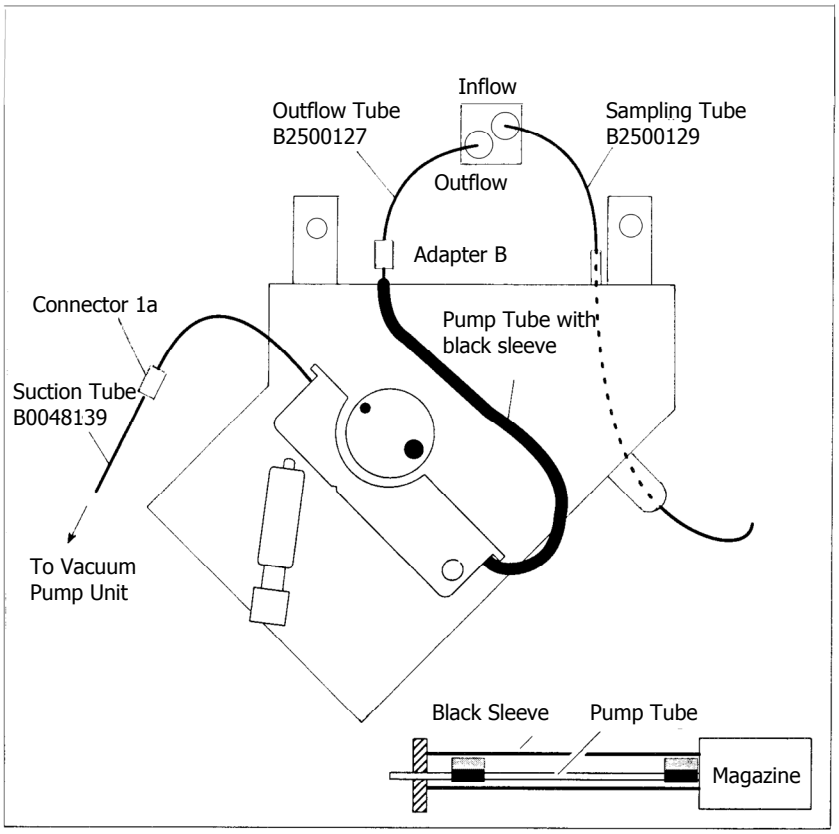


Figure 6 Vacuum Sipper with Pinch Valve, Tubing Installation

Hints for Installing the Tubes (Pinch Valve)

The tubes for use with the Vacuum Sipper with Pinch Valve are illustrated in Figure 6.

Sampling Tube, PTFE, 0.5 m, 1.0 mm i.d., 1 screw fitting for flowcell

- Make sure the tube protection sleeves are fitted to both sides of the metal tube guide to prevent damage to the sampling tube.
- From the sample compartment, feed the tube through the metal tube guide, until there is no excess in the sample compartment, but leave it loose enough to assume a natural curve.

  For manual sampling cut the tube to a suitable length using a scalpel to obtain a clean edge – do not use scissors.
- With an Autosampler: use the silicone sleeve B0082178 to connect the sampling tube to the autosampler tube.
- Connect to the flowcell inflow (see *Flowcell Installation*, page 22).

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Outflow Tube PTFE, 0.15 m, 1.0 mm i.d., 1 screw fitting for flowcell, 1 blue connector

- Connect the blue connector to Adapter B.
- Connect the other end to the flowcell outflow (see *Flowcell Installation*, page 22).

Pump Tube Black Sleeve – pump tube of choice

- The black sleeve prevents light from entering the sample compartment.
- Cut off a suitable length of the black sleeve and insert the pump tube into the black sleeve.
- Feed the pump tube through the hole into the sample compartment and connect to Adapter B.
- Connect Adapter L or Connector Ia to the other end (depending on the type of waste tube).

Suction Tube, PVC TR 75 Shore, 3 mm i.d. (B0048139) or Silicone TR 55 Shore, 4 mm i.d. (B0082178)

- Connect to the pump tube via Connector Ia (PVC tube) or Adapter L (Silicone tube).
- Connect to the Vacuum Pump Unit (see *Vacuum Pump Unit Installation*, page 26).
- Do not overtighten the pressure adjustment screw as this shortens the working life of the tubing, and may slow or stop the pump.
- Release the tension on the pump tubing when the system is not being used.

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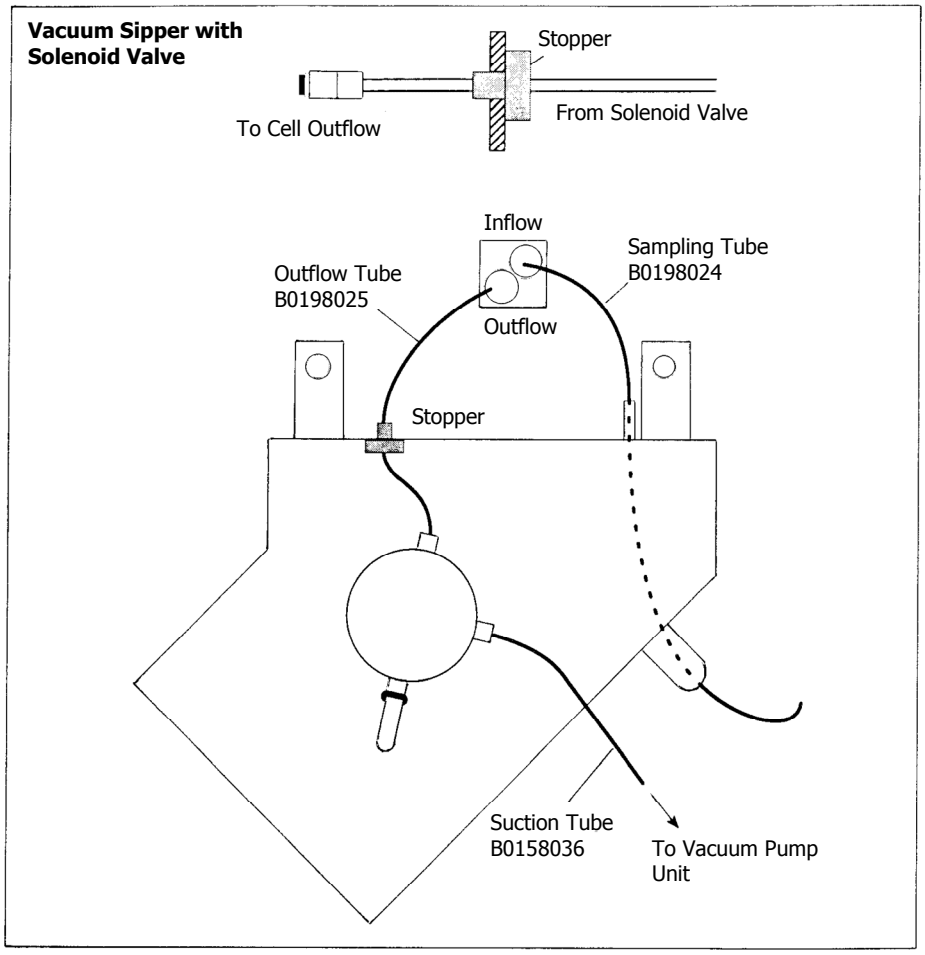


Figure 7 Vacuum Sipper with Solenoid Valve, Tubing Installation

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Hints for Installing the Tubes (Solenoid Valve)

Tubes for use with the Solenoid Valve are illustrated in Figure 7.

Sampling Tube PTFE, 0.5 m, 1.0 mm i.d., 1 screw fitting for flowcell

- Make sure the tube protection sleeves are fitted to both sides of the metal tube guide to prevent damage to the sampling tube.
- From the sample compartment, feed the tube through the metal tube guide, until there is no excess in the sample compartment, but leave it loose enough to assume a natural curve.

  For manual sampling cut the tube to a suitable length using a scalpel to obtain a clean edge – do not use scissors.
- With an Autosampler: use the silicone sleeve B0082178 to connect the sampling tube to the autosampler tube.
- Connect to the flowcell inflow (see *Flowcell Installation*, page 22).

Outflow Tube PTFE, 0.25 m, 1.5 mm i.d., 1 screw fitting for flowcell, 1 red screw fitting for valve

- Feed the screw fitting for the flowcell through the hole into the sample compartment.
- Insert the stopper to prevent light from entering the sample compartment.
- Connect to the flowcell outflow (see *Flowcell Installation*, page 22).
- Connect the red screw fitting to the valve inflow.

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Suction Tube PTFE, 1.5 m, 1.6 mm i.d., 3.2 mm o.d., 1 red screw fitting for valve

- Connect the red screw fitting to the valve outflow.
- Connect to the Vacuum Pump Unit.
- Do not overtighten the pressure adjustment screw as this shortens the working life of the tubing, and may slow or stop the pump.
- Release the tension on the pump tubing when the system is not being used.
- See *Vacuum Pump Unit Installation*, page 26.

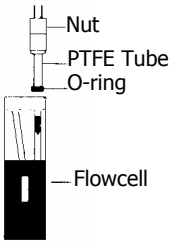
Flowcell Installation

Flowcells with Screw Fittings

These directions describe how to connect tubes to flowcells provided with screw fittings (for example, 10 mm pathlength flowcells B0181294 and B018295).

1. Insert the flowcell into the sample cell holder such that the sample area is correctly orientated in the radiation beam.
2. Carefully slip the end of the outflow tube with the flowcell fitting into the outflow fitting on the top of the flowcell and screw in the nut.
3. Take the PTFE sampling tube, carefully slip the end with the flowcell fitting into the inflow fitting on the top of the flowcell and screw in the nut.

NOTE: *The inflow is marked with an arrow.*



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Flowcells without Screw Fittings

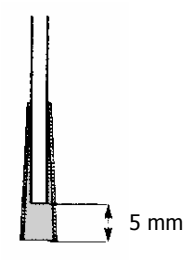
These directions describe how to connect tubes to flowcells that are not provided with screw fittings (for example, 50 mm pathlength flowcells B0107747 and B0109944).

Some Sipper Assemblies are provided with two silicone sleeves about 15 mm long. Some Sipper Assemblies are provided with a short length of silicone tube.

1. If the Sipper Assembly is provided with a short length of silicone tube cut off two pieces about 15 mm long to make sleeves.

2. Take the PTFE sampling tube and cut off the screw fitting at the flowcell end.
   Cut the tube with a scalpel to obtain a clean edge. Do not use scissors.

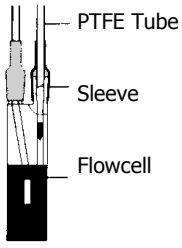
3. Moisten one end of the sampling tube and slide a sleeve onto the tube until the end is about 5 mm short of the end of the sleeve.



4. Push the sleeve over the inflow connector on the flowcell, and then slide the sampling tube to the full depth into the glass nipple.

5. Take the outflow tube and cut off the screw fitting at the flowcell end.
   The tube should be cut with a scalpel to obtain a clean edge. Do not use scissors.

6. Fit a sleeve to this end of the tube and attach the tube to the outflow connector on the flowcell, following the procedure in steps 3 to 4 above.



7. Insert the flowcell into the sample cell holder such that the sample area is correctly orientated in the radiation beam.

Flowcell Alignment

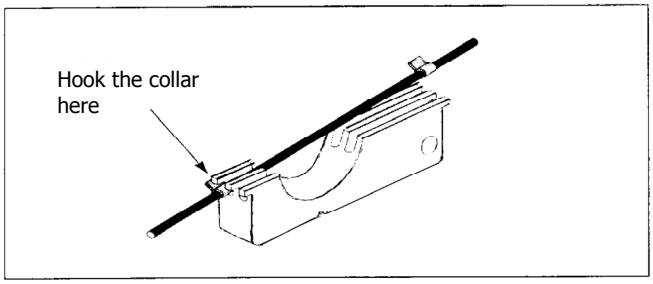
After installation, the flowcell must be aligned in the radiation beam as directed in the User Documentation.

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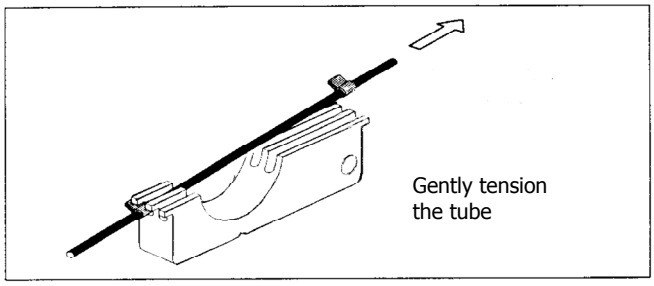
Installing the Pump Tube Magazine

The Pump Tube should be fitted to the Magazine as illustrated:

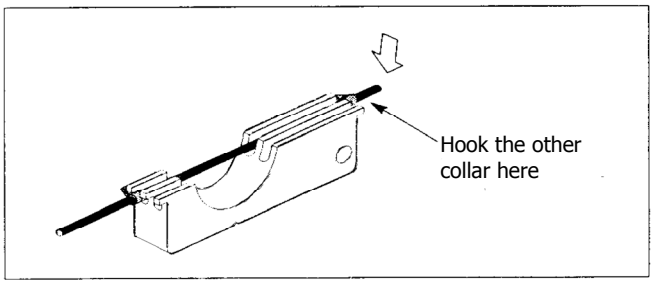
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2



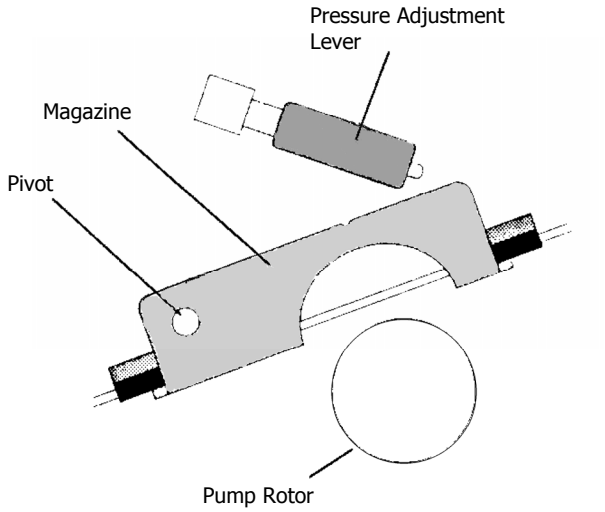
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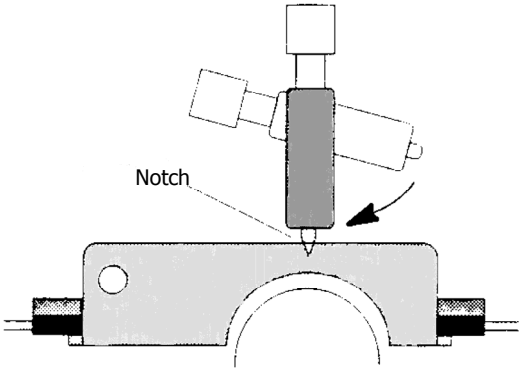
The Magazine should be fitted onto the Pump as follows:

1. Slide the distance ring onto the long pivot.
2. Slide the magazine onto the long pivot.
3. Slide the pressure adjustment lever onto the short pivot.

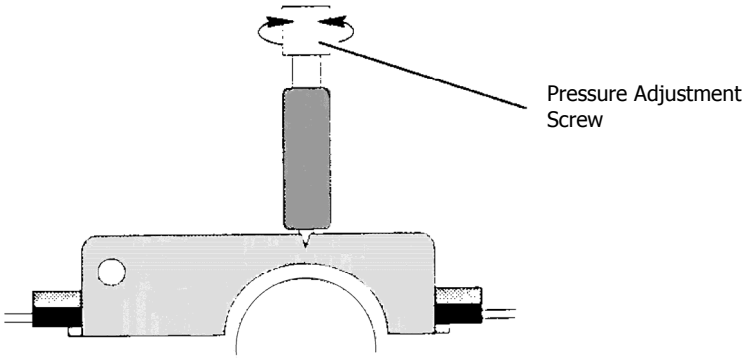
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4. Rotate the pressure adjustment lever until the end of the screw locates in the notch on the back of the magazine.



5. With the pump running, adjust the pressure on the tubing by slowly turning the pressure adjustment screw until a steady flow without bubbles is produced.



Do not overtighten the pressure adjustment screw as this shortens the working life of the tubing, and may slow or stop the pump.

Release the tension on the pump tubing when the system is not being used.

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Vacuum Pump Unit Installation

Install the optional Vacuum Pump Unit as follows:

1. Set up the Vacuum Pump Unit as described in the directions provided with the unit.

2. Using a suitable piece of tube, connect the suction nozzle on the glass reservoir jar to the suction tube coming from the value.

NOTE: *The vacuum pump vents to atmosphere at the base of the unit. If condensation on the benchtop is a problem, a sheet of thick filter paper may be placed under the unit.*

NOTE: *The Vacuum Pump Unit is not suitable for use with highly volatile organic solvents.*

NOTE: *If samples containing ammonia or similar reagents are being run, installation of a suitable washbottle in the tube line upstream of the Vacuum Pump Unit is recommended. This will prevent unpleasant vapors from venting to atmosphere.*

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Operation

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Operation

Related Documentation

When operating a spectrometer system with the Sipper, please refer to the appropriate sections in the User Documentation provided with the spectrometer system.

Setting the Sample Volume

The sample volume depends on the sampling time. To determine the sample volume, try out different settings for the Sample time and record the effect that these changes make to the sample volume.

On the Sipper accessory page, set the Sample time for the sample volume you require.

Additionally, the pump speed for the peristaltic sipper may be varied (see *Setting the Peristaltic Pump Speed*, page 30).

Please refer to the general information in *Parameter Settings*, page 34 when setting the sample volume.

The procedure for setting the sample volume is as follows:

1. Power up the spectrometer system in accordance with the procedure given in the User Documentation provided.
2. For vacuum sippers switch on the vacuum pump.
3. In the UV WinLab software, create or open a suitable method that will use the Sipper.
   The recommended method type is Timedrive. The Method opens in the Workspace. For further information see the online help in UV WinLab.
4. Select **Sipper** from the Tree.
   The Sipper accessory page is displayed.
5. Enter a suitable **Sample time**.

   OR

   Initially, use the default value.
6. Fill a graduated cylinder with deionized water and note the volume in the cylinder.
7. Position the graduated cylinder at the Sipper so that the sampling tube dips into the water.
8. Click **Fill**.
9. When the red sampling indicator goes out, remove the graduated cylinder and note the volume of water aspirated.

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NOTE: *If this volume is less or more than required, a new* **Sample time** *should be entered, or a new pump speed set (see* Setting the Peristaltic Pump Speed*, page 30), and repeat steps 7, 8 and 9. Any required sample volume may be set.*

NOTE: *The selected Sample time is suitable for all solutions having similar properties to water. For solutions with other physical properties (such as viscosity or surface tension) you may have to adjust the Sample time accordingly.*

Testing for Carryover

To test the configuration for a carryover, measure the absorbance of a dye solution several times, as follows:

1. In UV WinLab, create or open a Wavelength Program method that will use the Sipper.
   The Method opens in the Workspace. See *Setting the Sample Volume* on page 28 and *Parameter Settings* on page 34.
2. Select **Corrections** from the Tree.
   The Corrections page is displayed.
3. In the Frequency section, select the **Always at task start** check box.
   This performs a background correction before the sample measurements.
4. Select **Instrument** from the Tree.
   The Instrument page is displayed.
5. In the Method Settings section, enter a wavelength at which the dye solution absorbs strongly.
6. Select **Sample Info** from the Tree.
   The Sample page is displayed.
7. Enter **4** into the Samples field.
   This method should be used to measure the absorbance of the dye solution 3 times.
   The absorbance should be reproducible. The fourth sample should be used to measure the absorbance of deionized water. The absorbance of deionized water should be 0.
8. Fill the cell with dye solution and then place in the spectrometer.
9. Execute the Wavelength Program scan by clicking  on the toolbar.

If you encounter a carryover, change the parameter settings (see *Parameter Settings*, page 34) and repeat the test.

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Setting the Peristaltic Pump Speed

On delivery the pump speed is preset to 100 min^{-1}.

If viscous liquids or liquids giving off gases are being pumped, a slower speed should be set.

Set the pump speed with the DIP switches on the underside of the Sipping Assembly.

Peristaltic Pump Speed / min^{-1}	**S1**	**S2**
50	ON	ON
75	OFF	ON
100	ON	OFF
120	OFF	OFF

Operation with the Multisipper



WARNING

Chemical Hazard

It is possible that a hazardous chemical reaction can occur in the waste container when various types of sample material are mixed.

Always empty and clean the waste container when changing from one method to another.

Measurements with the Sipper are performed in the same manner as given for the respective method (for example Wavelength Program or Timedrive) as described in the User Documentation. The only difference is that with the Sipper, solutions to be investigated are aspirated rapidly and automatically into the flowcell rather than being inserted manually.

Pump Tubing

Observe the hints given for pump tubing (see *Installing the Pump Tube Magazine*, page 24 and *Tubing and Peristaltic Pump*, page 43).

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Pressure Adjustment Lever

Pressure Adjustment Lever – Peristaltic Sipper	With the pump running, adjust the pressure on the tubing by slowly turning the pressure adjustment screw until a steady flow without bubbles is produced. Do not overtighten the pressure adjustment screw, as this shortens the working life of the tubing, and may slow or stop the pump.
Vacuum Sipper with Pinch Valve	The pressure adjustment screw should only be tightened if the valve is not closing correctly.

Operation

1. Power up the spectrometer system as described in the User Documentation provided.
2. Empty and clean the waste container.
3. For the vacuum sippers switch on the vacuum pump.
4. In UV WinLab, create or open a method that will use the Sipper.
   The Method opens in the Workspace.
5. Select **Sipper** from the Tree.
   The Sipper accessory page is displayed.
6. Enter values for **Sample time**, **Delay time** and any other required parameters.
7. Select **Sample Info** from the Tree.
   The Sample page is displayed.
8. Enter the number of samples that you wish to analyze in the method.
9. Place a cell filled with blank solution in the REFERENCE cell holder, if required (with double-beam instruments).
   The cell must have the same pathlength as the flowcell.
10. If the system has been left filled with deionized water, on the Sipper press the ▶| key or the purge key for five seconds.
    This purges the flowcell.
11. Execute the method by clicking  on the toolbar.
12. When a message is displayed, position a vessel containing the appropriate solution (blank, reference, or sample solution) at the Sipper.
    The sampling tube should dip into the solution.
13. When a message is displayed requesting subsequent solutions, change the vessel to the appropriate solution.

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NOTE: *If samples are being handled that tend to leave deposits in the flowcell or tubes, intermediate rinses with a blank solution should be performed at regular intervals.*

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Parameters

- Parameters for the operation of the Sipper with PC-driven spectrometers, such as Lambda 16 and Lambda 19, are included in the Data Acquisition Methods (see User Documentation for the respective spectrometer). The parameters are presented only when the Sipper is connected to the spectrometer.
- Parameters for operation of the Sipper with spectrometers in the Lambda 2 series are presented in sequence during parameter entry when the appropriate accessory has been selected and the Sipper is connected to the spectrometer (see User Documentation for the respective spectrometer).
- For the Lambda 2/2S: select **SI-SIP** for the Accessory parameter.
- For the Lambda Bio/11/12/14: select **Sipper** for the Accessory parameter.
- For earlier soft-key-operated spectrometers in the Lambda series, such as Lambda 5 and Lambda 7, the parameters and soft keys for operation of the Sipper are automatically included in the Methods when the Sipper is connected to the spectrometer (see User Documentation for the respective spectrometer).

Description of Sipper Parameters in UV WinLab

Parameter	Function
Type	To select the type of sipper from the drop-down list.
Description	To enter a description of the sipper.
Sample time	To enter the required sample aspiration time. The aspiration time governs the volume of solution drawn through the flowcell.
Delay time	To enter the required delay time. The delay time is the time between the completion of sampling and the start of the measurement.
Flush	To select a forward flush. Occurs after data collection. The available time range is 0.01 – 99.99 seconds.
Sample return	To select a backwards flush. Occurs after data collection. The sample is returned to the original reservoir. This saves sample liquid. The available time range is 0.01 – 99.99 seconds.
Fill	Allows you to control the sipper directly. Starts to fill the flowcell based on the entry in the **Sample time** field.
Flush	Allows you to control the sipper directly. Starts to flush the flowcell in the direction determined by the selection of **Flush** or **Sample return**. The rate is based on the entry in the **Sample time** field.

NOTE: *See also* Parameter Settings*, page 34.*

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Parameter Settings

Sample Volume

- If the volume of sample solution for each measurement is restricted to 1.5 – 2.0 mL, and the flowcell is given an air purge between measurements, the error when going from solutions of relatively high concentration to those of low concentration will be less than 1%.

- If the volume of sample solution is less than 1.5 mL, the error due to incomplete washing of the flowcell will probably be higher. In this case, the flowcell should be purged manually between measurements using a blank solution.

  This also reduces the risk of sample drying in the flowcell.

- If the volume of sample solution is not restricted, the flowcell may be flushed with the next sample solution after each measurement.

- **Sample time** must be sufficiently long to ensure that the flowcell is thoroughly flushed and that there is a discrete sample in the flowcell.

Delay Time

- A delay time is normally required after sample aspiration to allow the sample to reach equilibration before the measurement starts.

- The appropriate Delay time depends on the nature of the sample. For most aqueous and non-aqueous samples, five seconds delay is sufficient, particularly if the sample temperature does not deviate markedly from the flowcell temperature.

- If the sample temperature deviates noticeably from the flowcell temperature, a longer Delay time is necessary to allow equilibrium to be reached.

- In extreme cases it may be preferable to use a thermostatted or thermoregulated cell holder to maintain the flowcell temperature close to that of the samples, or to pre-thermostat the samples prior to aspiration.

- For viscous samples and samples that contain entrained air bubbles, a longer Delay time should be used.

Thermostatted Flowcell

If a constant sample temperature must be maintained during the measurement, a thermostatted cell holder should be used. Detailed information may be obtained from your PerkinElmer representative.

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System Description

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System Description

The following illustrations show system controls:

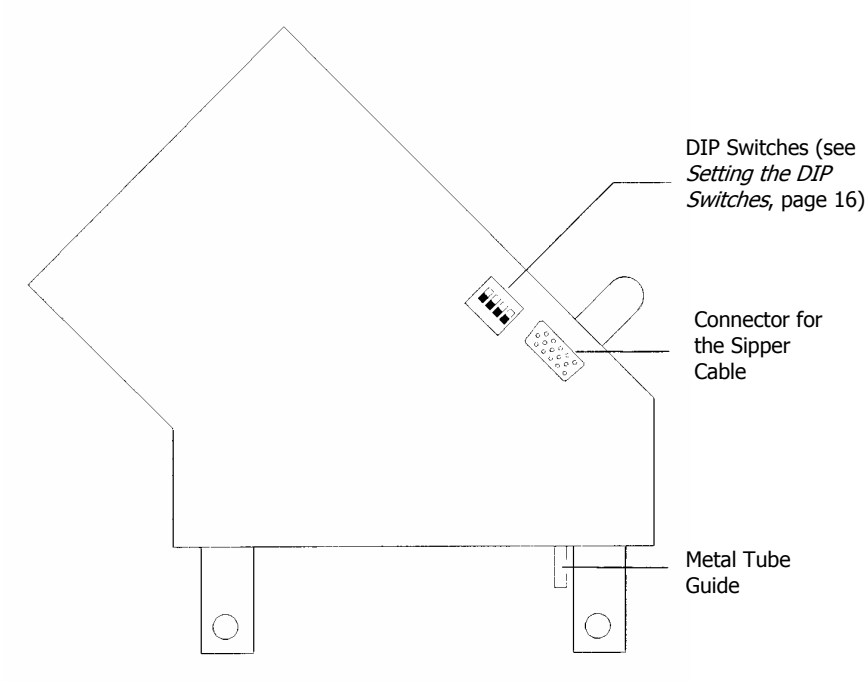


Figure 8 Controls on the Underside of the Sipper

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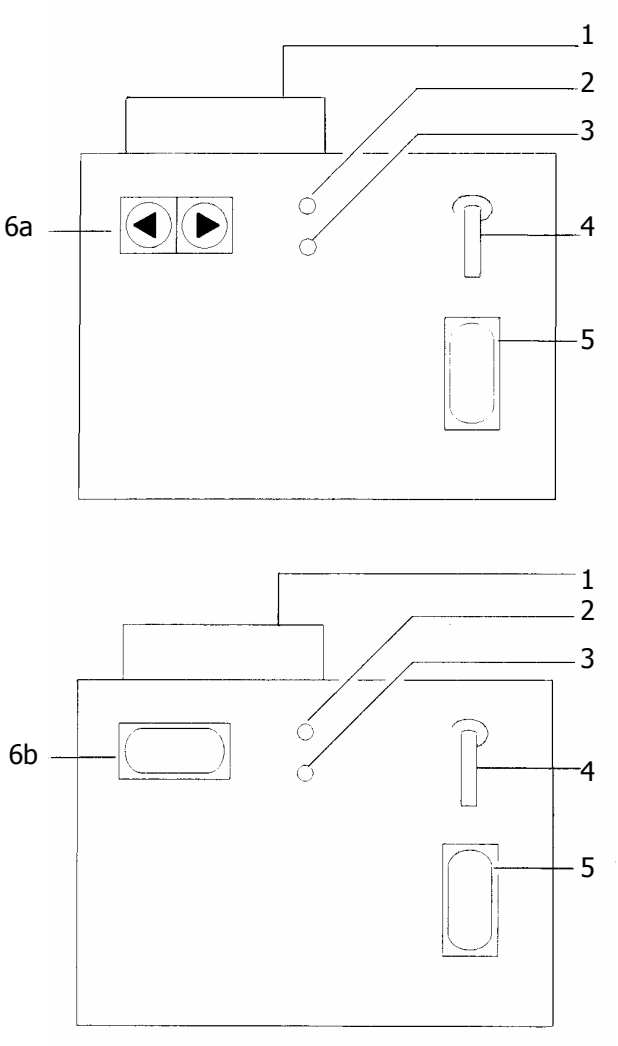
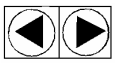
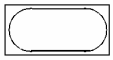


Figure 9 Controls on the Front of the Sipper

NOTE: *The numbered labels in Figure 9 are explained in the table on the next page.*

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Item No.	Symbol	Description
1		Valve or peristaltic pump.
2	○	Green indicator light **READY**. Illuminates at the completion of a sampling cycle to indicate that the next sample can be aspirated.
3	○	Red indicator light **SAMPLING**. Lit while sample is being aspirated, and during auto and manual purge.
4		Throughput for the sampling tube.
5		Sample Actuator key. Press this key to start a manual sampling cycle. The key only functions when the green indicator is lit.
6a		Arrow keys. Peristaltic pump: The ▶ key provides manual filling or purging of the flowcell as long as it is pressed. The ◀ key provides manual return sipping. The pump rotates in the reverse direction as long as this key is pressed. Pinch valve: The ▶ key opens the valve. The ◀ key shuts the valve. The keys only function when the green indicator is lit.
6b		Purge key. For the solenoid valve only. This key provides manual purging of the flowcell. The flowcell is purged with air for as long as the key remains pressed. By positioning a vessel filled with solution (for example, blank) at the Sipper, the flowcell may also be purged with solution. This function can also be used to fill the flowcell with solution. (If you press the sample actuator key, the flowcell will fill, but will also initiate a measurement cycle at the spectrometer.)

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Principle of Operation

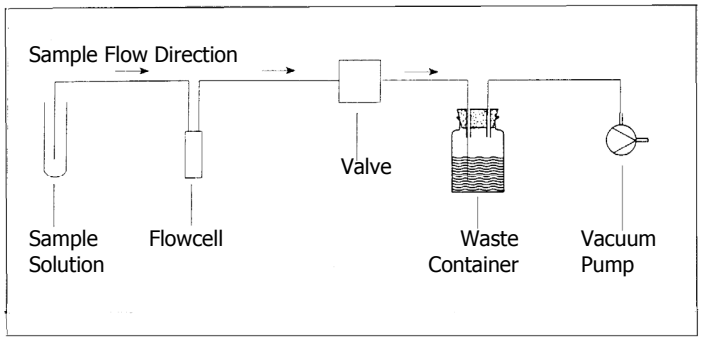


Figure 10 Block Diagram of Vacuum Sipper

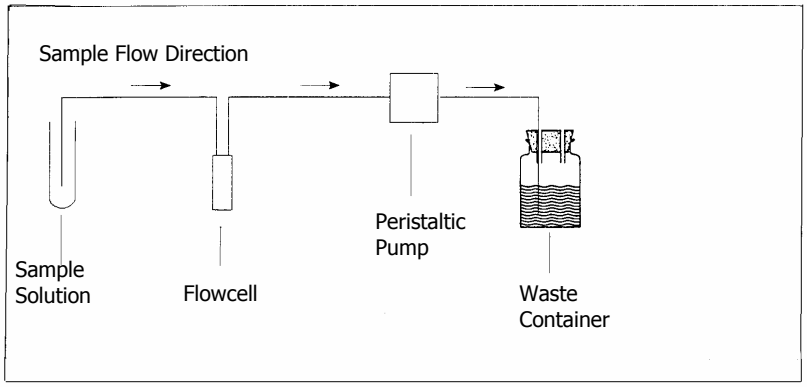


Figure 11 Block Diagram of Peristaltic Sipper

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Care and Maintenance

Maintenance



WARNING

Unauthorized Adjustments and Servicing
Do not attempt to make adjustments, replacements or repairs to this instrument except as described in the accompanying User Documentation.
Only a PerkinElmer service representative or similarly trained and authorized person should be permitted to service the instrument.

Flowcell

A good spectrometer cell is an optical device forming part of the optical system of the instrument with which it is used. It must be afforded the careful treatment applied to any optical component. Minor optical faults including scratches, lint, and fingermarks, on the optical surfaces, can easily introduce substantial analytical errors.

Precision flowcells will perform properly over long periods of time if they are kept clean and free of defects.

Ideally, the flowcell should be cleaned as part of the system. This obviates any need to handle the flowcell and ensures that tubes and other flow-through components are also cleaned.

Sipper System

During normal daily operation:

- Rinse the system frequently using blank solution.
- Do not let the flowcell or system dry out.
- Before starting measurements, rinse the system with blank solution.

- Any spilled materials should be immediately cleaned from the affected area, which should be wiped dry with a lintless paper or cloth.
- Check the tubing regularly for signs of deterioration and replace when necessary.
- Do not allow corrosive solutions to remain in the flowcell for longer than is necessary.
- When proteins or similar biological samples are being run, rinse the system frequently to prevent buildup. Never allow protein solutions to dry within the flowcell or system.
- Clean the system thoroughly at the end of each work period. This is particularly important if the samples are prone to leaving deposits, films, or other forms of contamination.
- If the system is to be left idle for more than a few hours, for example overnight or over the weekend, perform the appropriate wash procedure before shutting the system down.
    - Leave the flowcell filled with deionized water.

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- Do not leave the system unpurged or uncleaned for long periods.

Wash Procedures

The complete system should be cleaned regularly. The frequency will depend on the workload and on the nature of the samples.

- Thoroughly rinse the system using the same solvent as used for the samples. Follow with a thorough rinsing with deionized water.

  If you have been using a solvent that is immiscible with water, use an intermediate rinse with a solvent such as isopropanol.

- For thorough cleansing, rinse the system with a suitable laboratory detergent solution. Follow with a very good rinsing using deionized water.

- After the analysis of proteins, first wash the system with an 0.5% solution of hydrochloric acid containing a pepsin additive of 1 g per 100 mL.

Tubing and Peristaltic Pump

- Check the tubing and connectors regularly for leaks or damage.

- Do not squash or kink PTFE tubing.

- Make sure the tube protection sleeves are fitted onto both sides of the metal tube guide to prevent damage of the sampling tube.

- The pump tubing has three collars giving two sides that can be fitted to the pump magazine.

  If one side of the tube becomes deformed, the other side may be used provided there is no other damage.

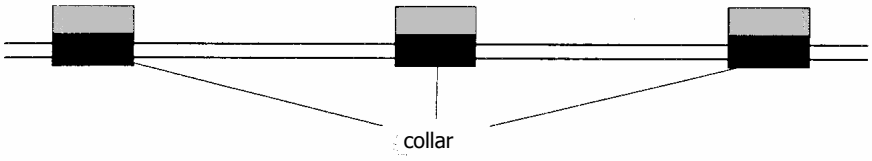


Figure 12 Pump Tubing with Collars Fitted

- Place a drop of a silicone oil on the tubing in contact with the pump rollers to reduce wear.

- Replace all damaged tubing.

- Thoroughly clean the tubing, or use new tubing, when changing solutions.

- Release the tension on the pump tubing when the system is not being used.

- Wipe the pump rollers with a dry lint-free cloth to remove any dirt.

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Vacuum Pump Unit

- Empty and clean the glass reservoir jar at regular intervals.

CAUTION	*Never allow the jar to overfill. If this happens, sample solution can run into the vacuum pump, causing corrosion.*

- Switch off the Pump Unit during longer pauses in operation.
- Always empty the jar when changing from one sample type to another to prevent the possible occurrence of dangerous chemical reactions in the jar.

Converting a Peristaltic Sipper to a Pinch Valve Sipper

You can convert the peristaltic sipper into a vacuum sipper with a pinch valve, using the Pinch Valve Kit B2500105.

NOTE: *You cannot convert a sipper with a solenoid valve.*

Removing the peristaltic pump

1. Slide off the pressure adjustment lever and the tube magazine.
2. Locate the socket head screw at the shaft of the pump rotor and loosen the screw.
3. Slide off the pump rotor.

Installing the pinch valve

1. Set the DIP switch S4 to OFF.
2. Loosen the socket head screw at the pinch valve rotor.
3. Slide the rotor over the shaft so that the socket head screw fits onto the notch of the shaft.
   Do not tighten the screw.
4. Make sure that the distance ring is located on the long pivot.
5. Slide the tube magazine onto the long pivot.
6. Lift the rotor slightly so that the tube magazine fits into the rotor.
7. Tighten the socket head screw at the rotor.
8. Turn the rotor by hand until the large roller is at the front and the small roller stops against the magazine at the rear.
9. Slide the pressure adjustment lever onto the short pivot.

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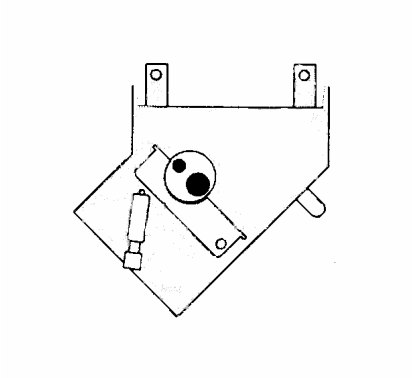


Figure 13 Position of large and small rollers for pinch valve installation

Converting a Pinch Valve Sipper to a Peristaltic Sipper

A vacuum sipper with a pinch valve can be converted into a peristaltic sipper using the Peristaltic Pump Kit B2500104.

NOTE: *You cannot convert a sipper with a solenoid valve.*

Removing the pinch valve

1. Slide off the pressure adjustment lever and the tube magazine.
2. Locate the socket head screw at the shaft of the pinch valve rotor and loosen the screw.
3. Slide off the rotor.

Installing the peristaltic pump

1. Set the DIP switch S4 to ON.
2. Loosen the socket head screw at the pump rotor.
3. Slide the pump rotor over the shaft so that the socket head screw fits onto the notch of the shaft.
   Do not tighten the screw.
4. Make sure that the distance ring is located on the long pivot.
5. Slide the tube magazine onto the long pivot.
6. Lift the rotor slightly so that the tube magazine fits into the rotor.

NOTE: *To prevent damage, make sure that there is some clearance between the pump rotor and the sipper surface.*

7. Tighten the socket head screw.
8. Slide the pressure adjustment lever onto the short pivot.

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Troubleshooting

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Troubleshooting

General

If the system apparently fails to yield reliable results with an established analytical method, make certain that this is not due to faulty materials, such as reference solutions and chemicals for color reactions, or faulty associated instruments or accessories.

It is good practice to monitor system performance regularly using a series of known reference materials.

Check the Troubleshooting Chart to see if the problem can be easily corrected.

If, after checking the system, the source of the difficulty appears to be an instrument malfunction, it is strongly recommended that the local PerkinElmer representative is contacted. Servicing of the instrument by other than PerkinElmer trained personnel will render the warranty null and void.



WARNING

Unauthorized Adjustments and Servicing
Do not attempt to make adjustments, replacements or repairs to this instrument except as described in the accompanying User Documentation.
Only a PerkinElmer service representative or similarly trained and authorized person should be permitted to service the instrument.

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Troubleshooting Chart

Symptom	Cause	Remedy
System does not function	Cable between Sipper and Spectrometer not connected properly.	Check all connections.
	Fuse in Spectrometer blown.	Replace with identical fuse.
	Other malfunction of the Spectrometer.	Check the Troubleshooting Chart in the Spectrometer User Documentation.
	DIP switches incorrectly set.	Set the DIP Switches.
	Pinch lever incorrectly installed.	Re-install the pinch lever.
Sample flow is inadequate or stops	Reservoir jar is full.	Empty jar.
	Tubing kinked or clogged.	Replace tubing. Make sure that the sleeves are on the metal tube guide.
	Sample viscosity is too high.	Dilute sample or increase **Sample time** or decrease pump speed.
	Stopper in reservoir jar is loose.	Push stopper in tighter.
	Adapter clogged.	Replace adapter.
	Solenoid valve clogged.	Clean the valve.
	Pump pressure too high.	Slacken the pressure adjustment screw.
Pump is not turning	Pump tube pressure too high.	Slacken the pressure adjustment screw.
System is leaking/ flowcell is leaking	Screw fittings are not tight.	Tighten screw fittings.
	Tube flange is damaged.	Replace tube.
	Flowcell is damaged.	Replace flowcell.

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Replacement Parts

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Replacement Parts

Supplies, accessories, and replacement parts can be ordered directly from PerkinElmer. PerkinElmer offers a full selection of high-quality ultraviolet, fluorescence, and polarimetry supplies in the *e-ssential supplies for UVVisible, Fluorescence and Polarimetry* catalog.

To place an order, request a free catalog, or ask for information:

If you are located within the U.S., call toll free **1-800-762-402**, 8 a.m. to 8 p.m. EST. Your order will be shipped promptly, usually within 24 hours.

If you are located *outside of the U.S.,* call your local PerkinElmer sales office.

Standard Tube Kits

Item	Part Number
Peristaltic tube kit	B2500103
Pump tube kit (set of 12)	B0199034
Tube kit for solenoid valve	B0198023

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Pump Tubing

i.d (mm)	Color (Collars)	Material	Part Number
0.38	Orange/green	Tygon®	B0506736
0.51	Orange/yellow	Tygon®	B0506737
0.64	Orange/white	Tygon®	B0506738
0.76	Black/black	Tygon®	B0506739
0.89	Orange/orange	Tygon®	B0506740
0.95	White/black	Tygon®	B0506741
1.02	White/white	Tygon®	B0506742
1.14	Red/red	Tygon®	B0193160
1.52	Yellow/blue	Tygon®	B0193161
2.06	Violet/violet	Tygon®	B0199034
3.18	Black/white	Tygon®	B0508310

NOTE: *Tygon® tubing is resistant to aqueous acid and alkali solutions with a maximum concentration of 2 M. See* Appendix: Tygon Tubes Properties *on page 58 for detailed information.*

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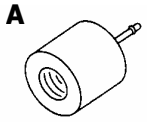
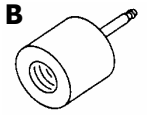
PTFE Connecting Tubes

NOTE: *Use the recommended tubes as shown in the installation chapter. If the application needs another tube length or diameter, PerkinElmer offers the following PTFE connecting tubes.*

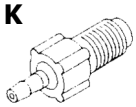
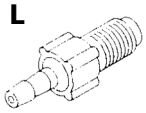
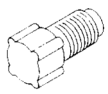
i.d. (mm)	Color (Screw Fittings)	Length (mm)	Part Number
0.5	Red	100	B0506706
0.5	Red	180	B0506707
0.5	Red	170	B0506708
0.5	Red	220	B0506709
1.0	Blue	110	B0191058
1.0	Blue	300	B0198097
1.0	Blue (1 fitting)	700	B0191059
1.0	Blue	1000	B0191060
1.0	Blue (1 fitting)	1500	B2500115
1.0	Blue/white	150	B2500117
1.0	Blue/white	1300	B2500116
1.0	White (1 fitting)	500	B2500129
1.50	Red/white	150	B0198025
1.50	White (1 fitting)	500	B0198024
1.75	Black	250	B0198099
1.75	Black	450	B0198100

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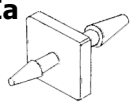
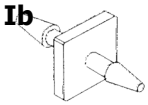
Adapter with Internal Thread

Type	Description	Part Number
A 	¼ inch – 28 UNF internal screw thread, 1.8 mm o.d. nipple.	B0193342
B 	¼ inch – 28 UNF internal screw thread, 3.3 mm o.d. nipple.	B0506716

Adapter with External Thread

Type	Description	Part Number
K 	¼ inch – 28 UNF external screw thread, 1.8 mm o.d. nipple.	B0507918
L 	¼ inch – 28 UNF external screw thread, 2.8 mm o.d. nipple.	B0507920
	Screw Plug, $^{1}/_{3}$ inch – 28 UNF external screw thread.	B0507921

Connectors

Type	Description	Part Number
Ia 	Connector with nipples for 1.7 to 3.2 mm i.d. tubes.	B0199233
Ib 	Connector with nipples for 2.4 to 3.2 mm i.d. tubes.	B0196882

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Flowcells

NOTE: *PerkinElmer offers the following flowcells for use with the Sipper (other cells are available on request).*

Pathlength / mm	Volume / µL	Window Material	Connectors	Part Number
10	160	Suprasil	Screw fittings	B0181294
10	160	Optical glass	Screw fittings	B0181295
50	650	Suprasil	Tube connectors	B0109944
50	650	Optical glass	Tube connectors	B0107747

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Appendix

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Appendix: Tygon Tubes Properties

NOTE: *The details in the following tables are general guidelines without guarantee. If in doubt, we recommend that the following test is performed:*

Place a short piece of the tube in the liquid to be pumped for 48 hours. If there is a loss in weight or a change in the elasticity, the tube is not compatible with the liquid.

Temperature Compatibility and Lifetime of Tygon Tubes (General Guidelines)

	Lifetime at 100 min^{-1} and		
Temperature Range	**0 psig 0 kPa 0 bar**	**10 psig 70 kPa 0.7 bar**	**20 psig 140 kPa 1.4 bar**
-45 °C to +65 °C	300 h	200 h	160 h

The lifetime was determined in water at 21 °C. The lifetime can change markedly, depending on the temperature and viscosity of the liquid, and on the age of the tube.

Chemical Durability of Tygon Pump Tubes

Liquid	**Durability** ++ very good + good - satisfactory ○ not suitable
Acetic acid (> 5%)	+
Acetone	–
Aliphatic hydrocarbons	○
Aromatic hydrocarbons	–
Benzyl alcohol	+
Butanol	+
Carbon bisulfide	–
Carbon tetrachloride	–
Chloroform	–
Ethanol	+

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Liquid	**Durability** ++ very good + good - satisfactory ○ not suitable
Ethylamine	–
Ethylene glycol	+
Formaldehyde	+
Formic acid	+
Freon (TMS)	–
Gasoline (non aromatic)	–
Gasoline (high aromatic)	–
Hydrochloric acid	++
Hydrochloric acid (med. conc.)	++
Hydrochloric acid (conc.)	++
Hydrofluoric acid (50%)	+
Hydrofluoric acid (75%)	+
Hydrogen peroxide (dil.)	++
Hydrogen peroxide (90%)	–
Methanol	○
Mixed acid (40% sulfuric, 15% nitric)	+
Nitric acid (dil.)	++
Nitric acid (med. conc.)	++
Nitric acid (conc.)	+
Nitrous acid	++
Oils (animal)	–
Oils (mineral)	–
Oils (vegetable)	+
Perchloric acid	–

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Liquid	**Durability** ++ very good + good - satisfactory ○ not suitable
Phenol	+
Phosphoric acid (50%)	++
Polyglycol	++
Silicone oil	+
Sodium hydroxide (25%)	++
Sodium hydroxide (conc.)	++
Sodium hypochlorite (>5%)	+
Sulfuric acid (dil.)	++
Sulfuric acid (med. conc.)	++
Sulfuric acid (90%)	–
Toluene	–
Xylene	–

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