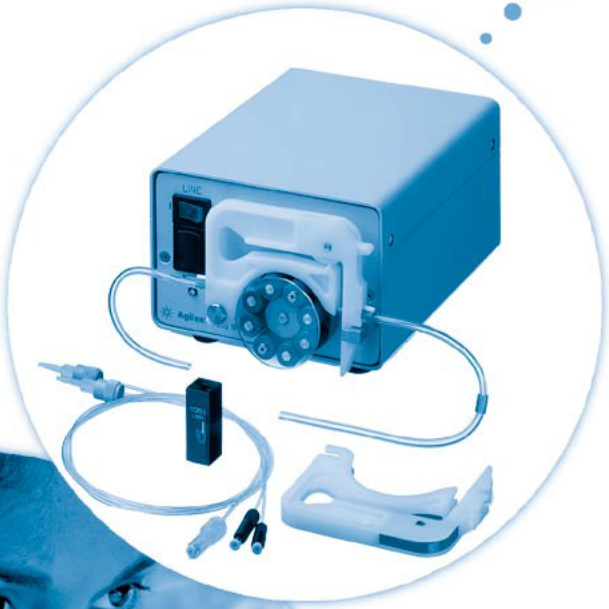
Sipper System for Agilent 8453 UV-visible Spectrophotometer



Operator's Manual

Notices

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CAUTION

A **CAUTION** 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 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.

WARNING

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.

In This Guide...

This handbook contains specifications of the sipper system and describes what you have to do to install your sipper system with the Agilent 8453 spectrophotometer. Operating guidelines for checking-out and using the sipper system in manual and remote mode are given as well as information for connecting an autosampler. Part numbers are given for replacing parts and for making your own customized tubings. For details of operating the sipper system through your Agilent ChemStation, refer to the help system.

You can use the sipper system with the spectrophotometer in two different ways—as an automatic sipper system or together with an autosampler from Agilent or Gilson. Each of these provides a different level of automation.

1 Specifications

Use this chapter if you want to know about the specifications of the sipper system.

2 Installing Your Sipper System

Use this chapter for installation of the sipper system, including all tubing and cable connections with the spectrophotometer, pump, flow cell and autosampler.

3 Operating Your Sipper System

Use this chapter for operation of the sipper system with or without an autosampler, manually and remotely.

4 Maintenance and Repair

Use this chapter for hints about cleaning the instruments and the flow cell—this chapter also describes how you make your own custom tubings.

5 Parts and Supplies

Use this chapter to locate parts and find out their part numbers.

A Safety Information

Use this chapter for information about safety aspects.

Contents

1
Specifications

Sipper System Specifications

By eliminating the handling of cuvettes and the errors that can result from cuvette repositioning, the sipper system provides a simple method of improving the productivity and reproducibility of spectrophotometric analyses. The sipper system comprises a single-channel peristaltic pump, quartz flow cell, PTFE tubing and remote cables.

In operation, the sipper system quickly aspirates a liquid sample into a flow cell where it is measured and then returned, or pumped to waste.

Table 1 Pump Specifications

Type	Specification	Comments
Pumping Speed	10.3 ml/min (110 V, 60 Hz version) 8.6 ml/min (220 V, 50 Hz version)	Using 2.06 mm i.d. tubing supplied without any additional flow resistance, such as other tubing connected
Minimum Sample Volume	500 µl	
Cross Contamination	< 1 %	Using 1 ml sample
Dimensions	13 cm (5.1 inches) wide 18.5 cm (7.3 inches) deep 9.5 cm (3.7 inches) high	
Weight	2 kg (4.4 lbs)	
Line Voltage	100–120 V or 220–240 V, ±10 %	
Line Frequency	50 or 60 Hz, ±5 %	
Power Consumption	22 VA maximum	
Ambient Operating Temperature	0–40 °C (32–104 °F)	
Humidity	5–85 %, at 25– 40 °C (77–104 ° F)	Non-condensing

Total automation of sample handling can be achieved by adding an autosampler. Specifications of the autosamplers from Agilent are given in Table 2 and Table 3. For specifications and more information of Gilson autosamplers, contact your Gilson International representative.

Table 2 89072A Autosampler Specifications

Type	Specification	Comments
Sample Capacity	114	
Tube Size	10–12 mm	
Manual Advance	< 35 s	From sample 1 to 114
Dimensions	29 cm (11.5 inches) wide 26 cm (10 inches) deep 43 cm (17 inches) high	
Weight	10 kg (22 lbs)	
Line Voltage	110, 117 or 234 V, ±10 %	
Line Frequency	50 or 60 Hz, ±5 %	
Power Consumption	200 VA maximum	
Ambient Operating Temperature	0–40 °C (32–104 °F)	
Humidity	5–85 %, at 25– 40 °C (77–104 ° F)	Non-condensing
Transit Time: Sample to Sample	< 0.5 s (within rack) < 0.7 s (rack to rack)	
Pipette Control Signals: Sample to Wash Wash to Sample Lower Pipette Raise Pipette	 < 0.5 s < 0.5 s < 2.5 s < 3.0 s	

Table 3 G1811A XY Autosampler Specifications

Type	Specification	Comments
Autosampler type	XYZ robot with stationary rack design	
Front panel	One yellow LED	
Needle rinse	Dedicated rinse station for cleaning the inside and outside of the needle. Selectable rinse volume and flow rate	
Needle positioning performance	Resolution in X, Y and Z: ± 1 mm. Repeatability in X, Y and Z: ± 0.25 mm.	
Arm speed	X- and Y-axes: 250 mm/s. Z-axis: 126.9 mm/s	
Sample Capacity	4 racks	4 * rack capacity (240)
Rack Capacity	60 tubes	rack type 21
Tube Size	13 * 100 mm (9ml)	
Control	Computer control via RS-232 port	
Dimensions (width × depth × height*)	53.5 × 43.7 × 37.1 cm (21 3/32 × 17 3/16 × 14 5/8 inches)	
Weight	10 kg (22 lbs)	
Line Voltage	100/120 or 220/240 VAC	
Line Frequency	50/60 Hz	
Current rating	2.0 A for 100/200 V or 1.0 A for 220/240 V	
Temperature range	5 – 40 °C	
Humidity	not more than 75%	Non-condensing

* Height without vertical arm installed

2
Installing Your Sipper System

This chapter describes the following topics:

- "Site Requirements for Your Sipper System" contains information about electrical requirements, for example, power lines, power cords, and so on. It also gives recommendations for minimum available bench space and environmental conditions in the laboratory.
- "Unpacking Your Sipper System" contains information about what you do when the packing material is damaged or the shipment is incomplete. It also gives a list of items that come with the sipper system.
- "Installing Your Peristaltic Pump" gives an overview of the peristaltic pump and explains the buttons, indicator and line power switch. It gives instructions where and how to do the line power and remote connections.
- "Setting Up Your Sipper System" gives an overview of the instruments that are part of the sipper system and where and how to do the remote connections, and how to install the flow cell and tubing.
- "Setting Up the Sipper System With an 89072A Autosampler" gives an overview of the instruments and explains where and how to do the remote connections, and how to install the flow cell and tubing.

Site Requirements for Your Sipper System

Power Considerations of the Peristaltic Pump

Your peristaltic pump operates at a line voltage of 100–120 V or 220–240 V AC ±10 % with a line frequency of 50 or 60 Hz ±5 %. Maximum power consumption is 22 VA.

For your autosampler operation please see Table 2 on page 9 or Table 3 on page 10.

WARNING **Shock hazard or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified. To disconnect the instrument from line, disconnect the power cord.**

Power Cords

The appropriate power cords is supplied with the sipper system. It plugs into the power-input socket at the rear of the instrumentation. The male end of each of the power cords is different and designed to match the wall socket of a particular country or region.

WARNING **Never operate your instrumentation from a power outlet which has no ground connection. Never use a power cord other than the power cord designed for your region.**

Space

The peristaltic pump is 13 cm (5.1 inches) wide, 18.5 cm (7.3 inches) deep and 9.5 cm (3.7 inches) high. It fits best on the laboratory bench at the left side of the spectrophotometer or in front of the 89072A autosampler (if used). It needs an additional 8 cm (3.1 inches) at the rear for electrical connections.

The 89072A autosampler is the biggest part of the sipper system and is 29 cm (11.5 inches) wide, 26 cm (10 inches) deep and 43 cm (17 inches) high. It weighs 10 kg (22 lbs) and fits on almost any desk or laboratory bench. It needs an additional 8 cm (3.1 inches) at the rear for electrical connections.

Environment

Your sipper system operates within specifications at ambient temperatures of 0–40 °C (32–104 °F).

WARNING **Do not store, ship or use your instrumentation under conditions where temperature fluctuations could cause condensation within the pump or autosampler. Condensation will damage the electronics. If your instrumentation was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.**

You can operate your sipper system in environments with relative humidity up to 85 % (non-condensing) provided the temperature is between 25–40 °C (77–104 °F).

Unpacking Your Sipper System

Upon receipt of your sipper system, inspect the shipping containers for any signs of damage. If the containers or cushioning material are damaged, save them until the contents have been checked for completeness and the instrumentation has been mechanically and electrically checked. If the shipping container or cushioning material is damaged, notify the carrier as well as Agilent. Save the shipping material for the carrier's inspection.

Check the contents of the shipping container against the list below. If any items are missing or obviously damaged, call Agilent.

1 Unpack the sipper system. You should have the following components:

- Peristaltic pump.
- Power cord to connect the peristaltic pump to line power.
- Two remote cables, one to connect your peristaltic pump only to the spectrophotometer and one to connect your pump and the 89072A autosampler to the spectrophotometer.
- Quartz flow cell with 3 mm aperture and 80 µl volume.
- Tygon pump tubings with 2.06 mm inner diameter (12 per pack) and a tubing kit with contents shown in Table 6.

Table 4 Sipper/Sampler Tubing Kit

Type of Tubing	Tubing Length	Fitting Type
Inlet tubing	1.5 m	Fingertight fitting–open end
Inlet tubing	0.35 m	Fingertight fitting–open end
Flow cell–pump tubing	0.35 m	Fingertight fitting–hexagonal fitting
Waste tubing	1.5 m	2 hexagonal fittings

2 Unpack the 89072A autosampler. You should have the following components:

- Power cord to connect the autosampler to line power.
- Pipette rod, wash station assembly, actuator arm assembly which are part of the autosampler but are packed as individual items (see your *Autosampler Instruction Manual* from Isco Incorporation for a detailed description).
- Glass wash vessel to wash the tubing guide and sample tubing between the measurements.
- PTFE tubing guide to guide the sample tubing into the vials.
- Eighteen white racks and one red rack to hold the vials.

Installing Your Peristaltic Pump

The peristaltic pump, shown in Figure 1, is recommended for use in sipper systems. It is a fixed-speed pump that can be reversed to return a sample to its container. You can operate the pump manually using a switch on the pump. You can also connect the pump to your spectrophotometer with a cable. With this cable connected, you can control the pump from your UV-Visible application software.

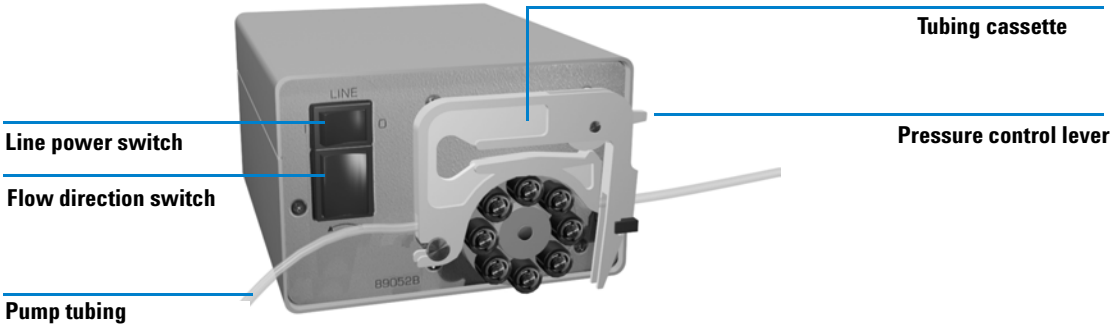

Figure 1 Front View of Peristaltic Pump

The front-panel controls are a line power switch and a flow direction switch, see Figure 1. The tubing cassette holds the pump tubing in place and presses it against the pressure wheel to generate flow through the pump tubing. The tubing-cassette has a pressure control lever, and slots for the tubing with locating holes for the fixing collars.

The rear panel has a line power socket and a remote cable connector for the sipper system cable.

Figure 2 Rear View of Peristaltic Pump

Installing the Pump Cables

1 Read the label on the rear panel of your pump to check the pump has the correct voltage option (100–120 V, 60 Hz or 220–240 V, 50 Hz) for operation from your line power supply.

CAUTION It is not possible to select a line voltage different from that on the label of your pump.

2 Push the connector of the power cord into the line power connector on the rear panel of the pump, see Figure 3.

3 Push the other plug of the power cord into the line power source.

4 Push the connector of the sipper-GPIO cable (G1103-61609) or sipper/sampler-GPIO cable (part number G1103-61608) into the remote control connector on the rear of the pump, see Figure 3.

When this cable is connected, the control switch on the front panel does not function. This prevents you using the pump manually during automatic operation.

5 Connect the other end of the cable to the GPIO connector on the rear of the spectrophotometer.

Figure 3 Rear View of Spectrophotometer

Installing the Pump Tubing

The standard tubing for the pump is 2.06 mm i.d. The peristaltic pump includes one pack of tubing, 12 pieces per pack (part number 5041-2166). For other pump tubings and the flow your pump will deliver, see "Parts and Supplies" on page 46. There are three fixing collars on each piece of tubing. This allows you to use each tubing in two positions.

1 Remove the tubing cassette from the pressure wheel on the front of the pump by pressing the snap-lock lever to the left and upwards.

Figure 4 Removing the Tubing Cassette

2 Move the pressure-control lever of the tubing cassette (see Figure 6) clockwise to the right-most position, that is, the lever is horizontal.

3 Put the pump tubing in the tubing cassette, locating the fixing collars on each side of the cassette in the locating holes. Make sure the fixing-collars are pointing upwards and the tubing cannot slide out of the cassette.

Figure 5 Tubing Cassette with Pump Tubing

4 Make sure the pressure control lever of the tubing cassette is in the right-most position, that is, the lever is horizontal.

5 Put the tubing cassette on the pressure wheel by placing the cassette on the mounting pivot.

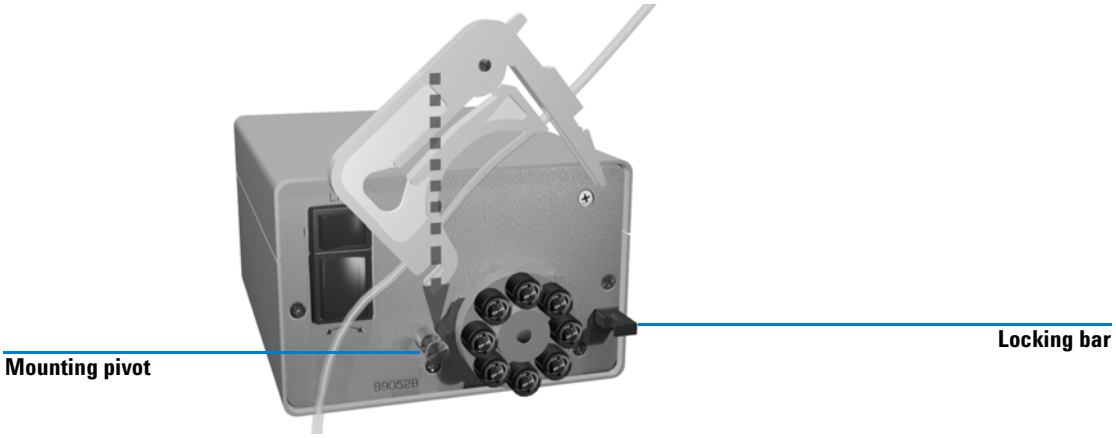

Figure 6 Replacing the Tubing Cassette

6 Press the cassette down to lock the right-side snap lever, on the locking bar.

7 Connect the pump tubing to the other accessories, see relevant handbook.

Setting Up Your Sipper System

The manual sipper system uses the manually-activated peristaltic pump to move samples in and out of a flow cell for measurements. The automated sipper system uses the peristaltic pump controlled by your software through the spectrophotometer. Figure 15 on page 27 outlines the sample flow for the automated sipper system.

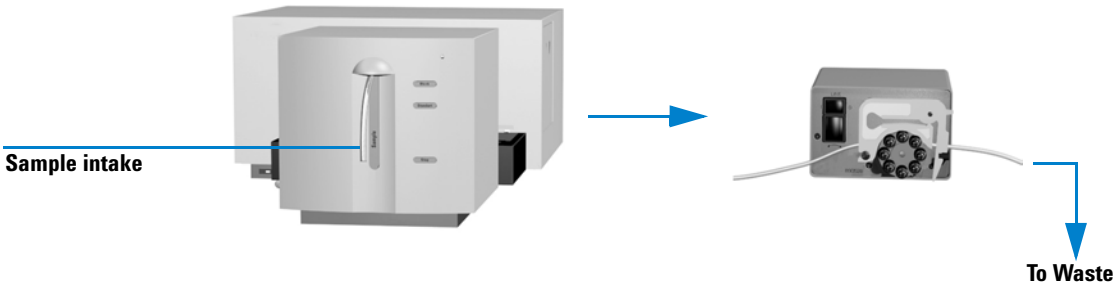

Figure 7 Automated Sipper System

The direction of flow for your samples is from the sample container through the flow cell and the pump tubing to the waste.

For a manual sipper system, you do not use the electrical wiring connection between spectrophotometer and pump.

1 Set your peristaltic pump up according to the instructions given in "Installing Your Peristaltic Pump" on page 16.

2 Connect the sipper-GPIO cable (part number G1103-61609) to the remote connector at the rear of the peristaltic pump.

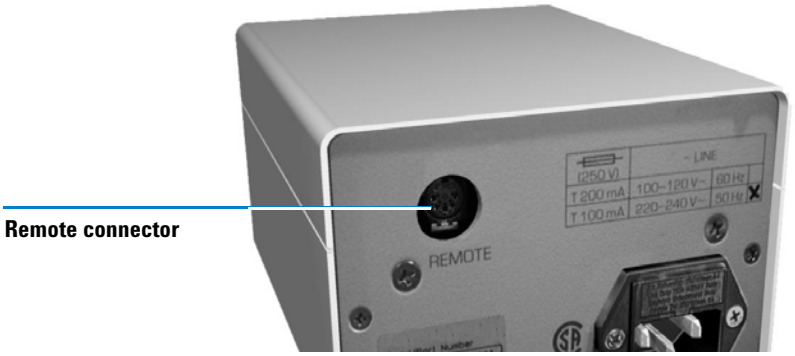

Figure 8 Peristaltic Pump Remote Connector

WARNING **Never use cables other than those supplied by Agilent to ensure proper functionality and compliance with safety regulations.**

3 Connect the other end of the cable to the GPIO connector at the rear of the spectrophotometer.

Figure 9 GPIO Connector at Rear of Spectrophotometer

Connecting the Sipper Tubing

The contents of the sipper/sampler tubing kit is shown in Table 6 on page 30.

Table 5 Sipper/Sampler Tubing Kit

Type of Tubing	Tubing Length	Fitting Type
Inlet tubing	0.35 m	Fingertight fitting–open end
Flow cell–pump tubing	0.35 m	Fingertight fitting–hexagonal fitting
Waste tubing	1.5 m	2 hexagonal fittings
Not used for sipper	1.5 m	Fingertight fitting–open end

The hexagonal fittings are used to connect tubings with each other or with the pump tubing through a union. The fingertight fittings (cell fittings) are used to connect the tubing to the flow cell. Inlet tubing (tubing which deliver sample to the flow cell) have a longer fingertight fitting than the outlet tubing. For ease of use, always screw the short fitting into the flow cell first.

1 Connect the tubing with the short cell fitting to the outlet of the flow cell. The outlet of the flow cell is the connector that is *not* marked with an arrow.

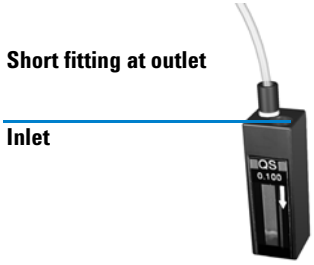

Figure 10 Connecting Tubing to Flow Cell

2 Insert the flow cell into the cell holder of the spectrophotometer.

3 Connect the fitting and ferrule to a union.

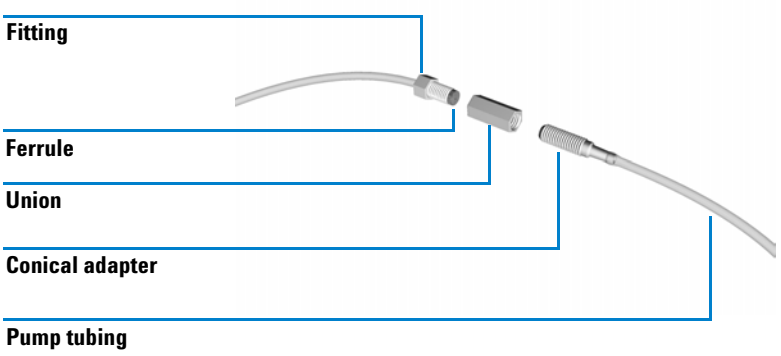

Figure 11 Connecting Tubing to Pump

4 Connect the conical adapter to the union and insert the conical adapter in the pump tubing at the inlet side (left side) of the pump.

5 Choose the 0.35 m long tubing with the long cell fitting on one end and the other end open. Connect the long cell fitting to the inlet. The inlet of the flow cell is at connector that is marked with an arrow.

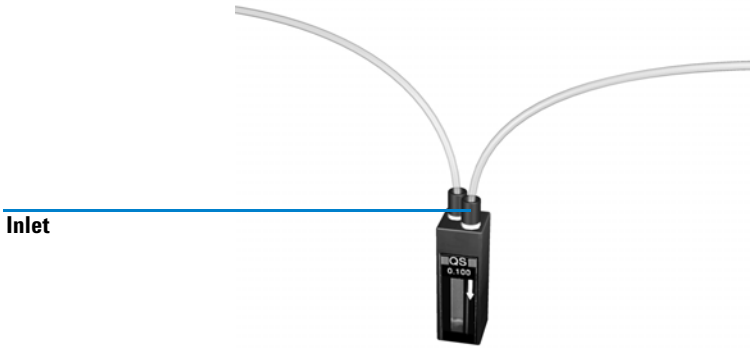

Figure 12 Connecting Tubing to Flow Cell

6 Insert the other end of the tubing in the hole in the front cover of the spectrophotometer and push in the tubing until it comes out at the top part of the front panel of the spectrophotometer.

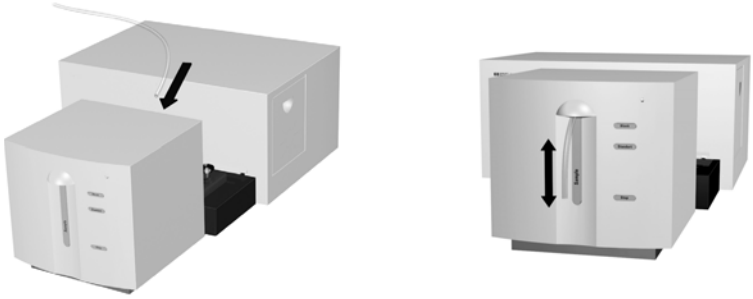

Figure 13 Installing Tubing in the Spectrophotometer

7 Adjust the length of the sipper tubing that comes out of your front panel until it meets with the requirements of your sample containers.

Waste Tubing Connection

1 To install waste tubing, choose the 1.5 m long tubing with the two hexagonal fitting on either end. On one end of the tubing, connect the fitting and ferrule to a union.

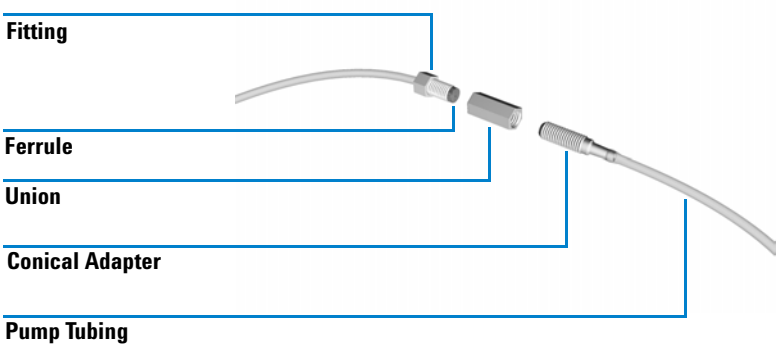

Figure 14 Connecting Waste Tubing to the Pump

2 Connect the conical adapter to the union and insert the conical adapter in the pump tubing at the outlet side (right side) of the pump.

3 Put the other end of the waste tubing in your waste container.

Setting Up the Sipper System With an 89072A Autosampler

This fully-automated system uses the autosampler and the peristaltic pump, both controlled by your software through the spectrophotometer. Figure 15 shows the sample flow for the sipper system with an 89072A autosampler. If you have a Gilson autosampler, see "Using the Sipper System With an G1811A XY Autosampler or a Gilson Autosampler" on page 34.

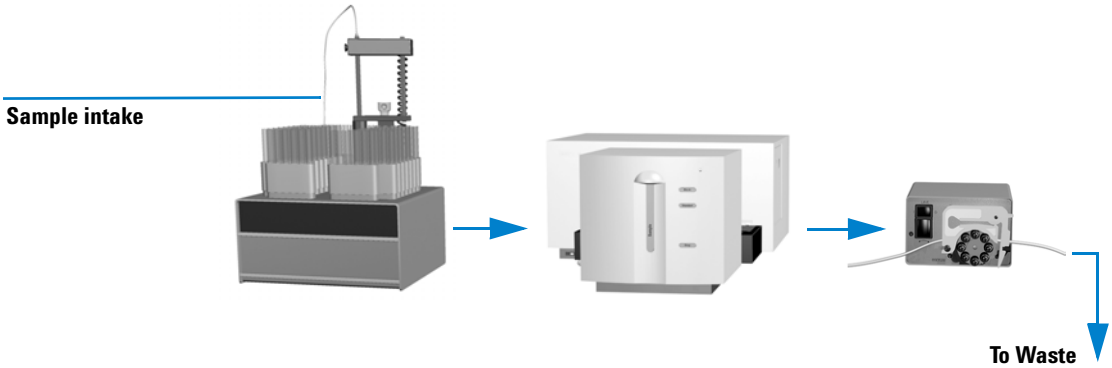

Figure 15 89072A Autosampler System

The direction of flow for your samples is from the autosampler through the flow cell of the spectrophotometer and the pump tubing to waste.

1 Set up your peristaltic pump according to the instructions given in "Installing the Pump Cables" on page 18.

2 Read the label on the rear panel of your autosampler to check the autosampler has the correct voltage option (100 V, 120 V or 220–240 V) for operation from your line power supply.

CAUTION It is not possible to select a line voltage different from that on the label of your autosampler.

3 Push connector of the power cord in the line power socket on the rear panel of the autosampler.

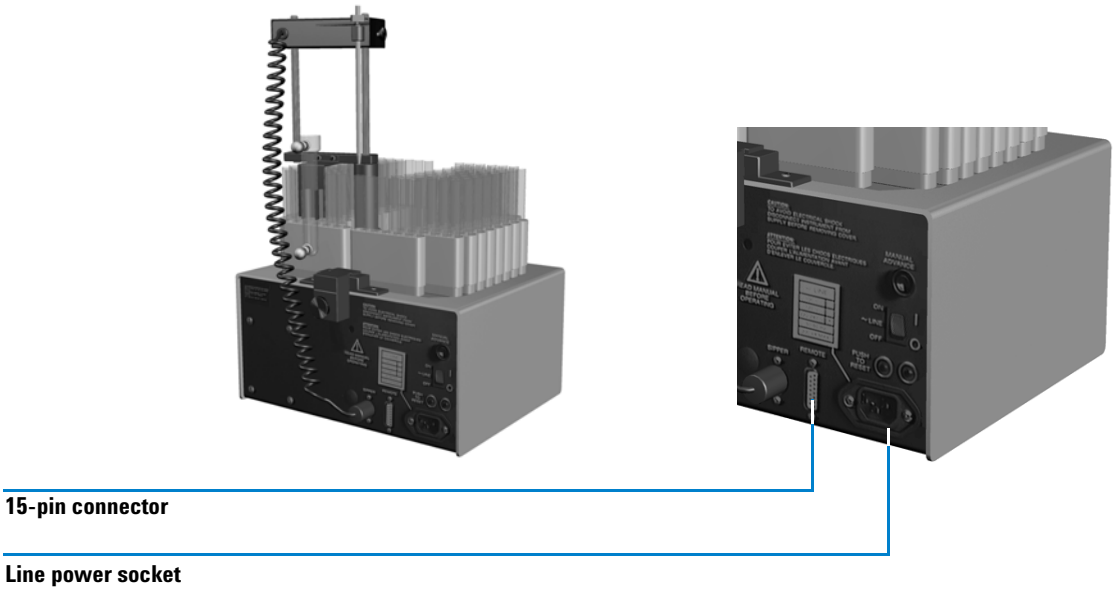

Figure 16 89072A Autosampler Connectors

4 Push the other plug of the power cord in the line power source.

5 The sipper/sampler-GPIO cable (part number G1103-61608) has three plugs. Connect the end with the 15-pin connector (the plug where only one cable comes out) to the rear of the autosampler.

WARNING **Never use cables other than those supplied by Agilent to ensure proper functionality and compliance with safety regulations.**

6 Connect the round DIN connector to the rear of the peristaltic pump.

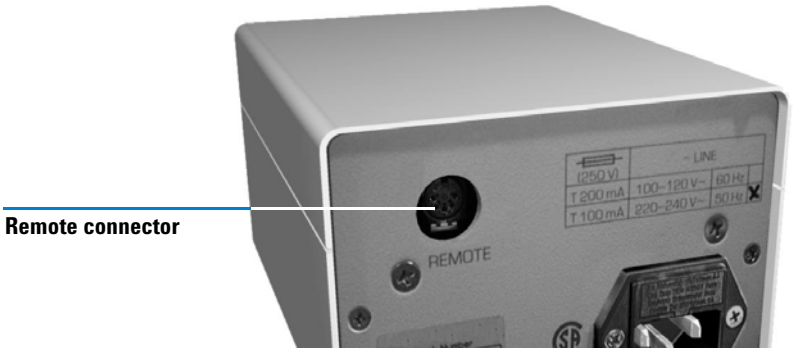

Figure 17 Peristaltic Pump Connector

7 Connect the other end of the cable with the 15-pin plug (the plug where two cables come out) to the GPIO connector at the rear of the spectrophotometer.

Figure 18 GPIO Connector at Rear of the Spectrophotometer

Connecting the Sampler Tubing

The contents of the sipper/sampler tubing kit is shown in Table 6.

Table 6 Sipper/Sampler Tubing Kit

Type of Tubing	Tubing Length	Fitting Type
Inlet tubing	1.5 m	Fingertight fitting–open end
Flow cell–pump tubing	0.35 m	Fingertight fitting–hexagonal fitting
Waste tubing	1.5 m	2 hexagonal fittings
Not used for sampler	0.35 m	Fingertight fitting–open end

The hexagonal fittings are used to connect tubings with each other or with the pump tubing through a union. The fingertight fittings (cell fittings) are used to connect the tubing to the flow cell. Inlet tubing (tubing which deliver sample to the flow cell) have a longer fingertight fitting than the outlet tubing. For ease of use, always screw the short fitting into the flow cell first.

1 Connect the tubing with the short cell fitting to the outlet of the flow cell. The outlet of the flow cell is the connector that is *not* marked with an arrow.

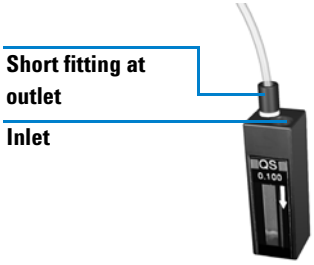

Figure 19 Connecting Tubing to Flow Cell

2 Insert the flow cell in the cell holder of the spectrophotometer.

3 Connect the fitting and ferrule to a union.

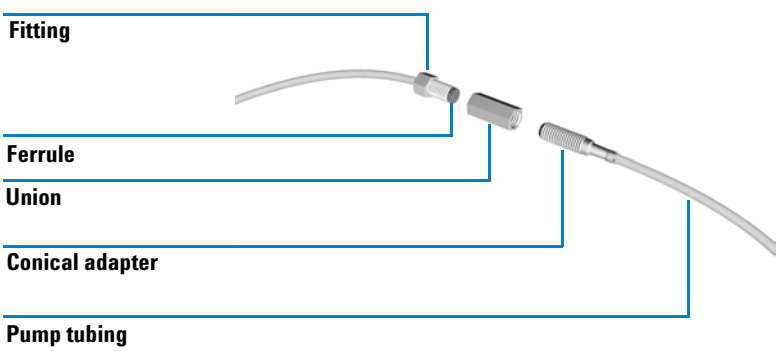

Figure 20 Connecting Tubing to Pump

4 Connect the conical adapter to the union and in sert the conical adapt er into the pump tubing at the inlet side (left side) of the pump.

5 Choose the 1.5 m long tubing with the long cell fitting on one end and the other end open. Connect the long cell fitting to the inlet. The inlet of t he flow cell is the connector that is marked with an arrow.

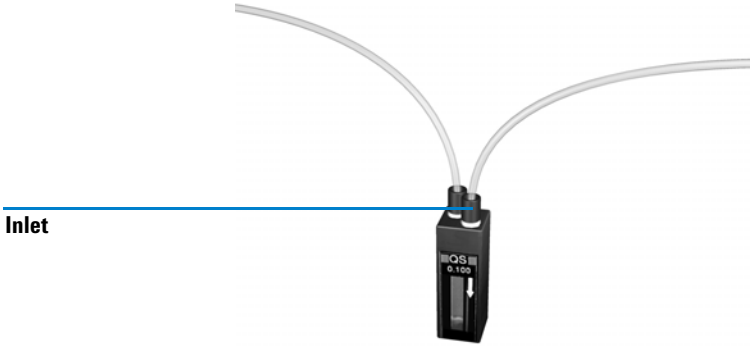

Figure 21 Connecting Tubing to Flow Cell

6 Insert the other end of the tubing in the PTFE tubing guide of the autosampler and push the tubing in until it comes out of the tubing guide.

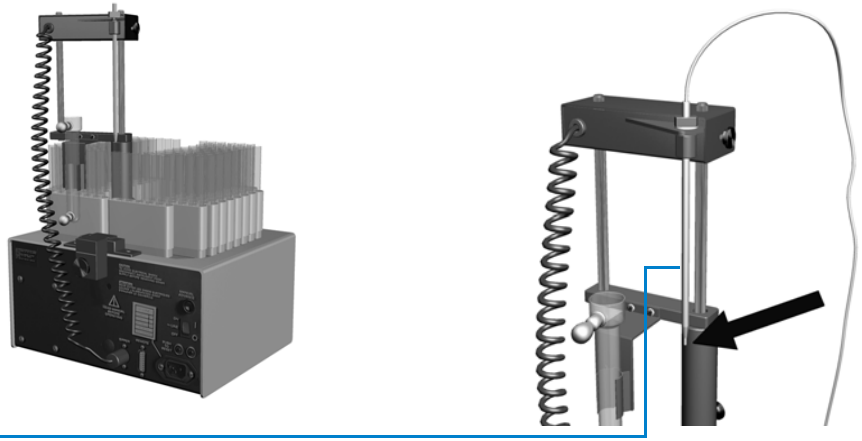

Figure 22 Connecting Tubing to Autosampler

7 Adjust the length of the tubing and tighten the nut of the actuator arm assembly that secures the tubing guide.

8 Adjust the position of the tubing guide relative to the vials as described in your autosampler instruction manual. Use your UV-Visible ChemStation software to move the actuator arm and the racks.

Waste Tubing Connection

1 To install waste tubing, choose the 1.5 m long tubing with the two hexagonal fitting on either end. On one end of the tubing, connect the fitting and ferrule to a union.

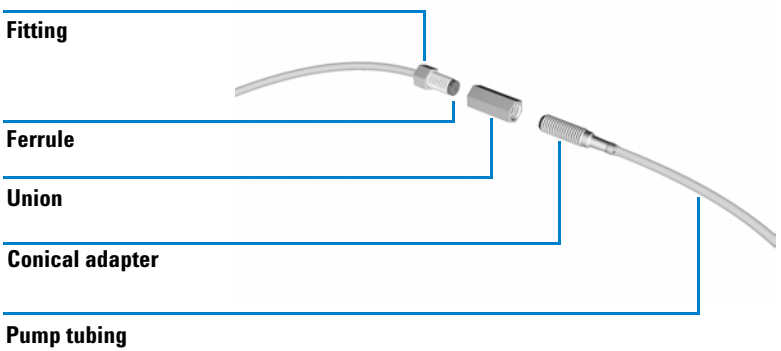

Figure 23 Connecting Waste Tubing to Pump

2 Connect the conical adapter to the union and insert the conical adapter in the pump tubing at the outlet side (right side) of the pump.

3 Put the other end of the waste tubing in your waste container.

Using the Sipper System With an G1811A XY Autosampler or a Gilson Autosampler

If you want to use your sipper system with an G1811A XY autosampler or a Gilson autosampler, you can generally use the procedure "Setting Up the Sipper System With an 89 072A Autosampler" on page 27. Instead of the sipper/sampler- GPIO cable, you use the sipper- GPIO cable to make a connection between the peristaltic pump and the spectrophotometer only.

The G1811A XY autosampler or the Gilson autosampler is connected to the computer directly through a RS232 cable (part number 5181- 1520).

NOTE For details please see also your *Agilent XY Autosampler Operator's Manual* or your Gilson operator's manual.

Setting Up the Autosampler

When you have set up t he sipper system according to the procedure "Setting Up the Sipper System With an 89072A Autosampler" on page 27 and the additional information given above, proceed with the following steps.

1. Turn off the autosampler.
2. Connect the RS232 cable to the COM1 connector of your computer and plug the other end into the RS232 connector located at the rear panel of t he autosampler.
3. Make sure the dip switch at the rear panel of t he autosampler are set to RS232 communication mode and a baud rat e of 19200.
4. Turn on the autosampler.
5. Follow the intructions given with your Agilent ChemStation software to control the XY autosampler.
6. Start your UV- Visible Chemstation software and check your sipper system and the autosampler is operable. For operational assistance, refer to the online help system in t he UV- Visible ChemStation software.

3
Operating Your Sipper System

This chapter describes:

- manual and remote operation of the peristaltic pump,
- operation of the sipper and autosampler, and
- operational checkout of the sipper system.

Operating the Peristaltic Pump

Manual Pump Control

1. Turn on line power at the line power switch on the front panel of the pump.
2. Make sure the remote cable is *not* connected at the rear of the pump. When the remote cable is connected, the control switch on the front panel does not function.
3. Place one end of the tubing into a reservoir of liquid and the other in a waste container.
4. Press the flow direction switch to rotate the pump in the desired direction. Pressing the switch to the right turns the pump motor clockwise and pressing the switch to the left turns the pump motor counterclockwise.

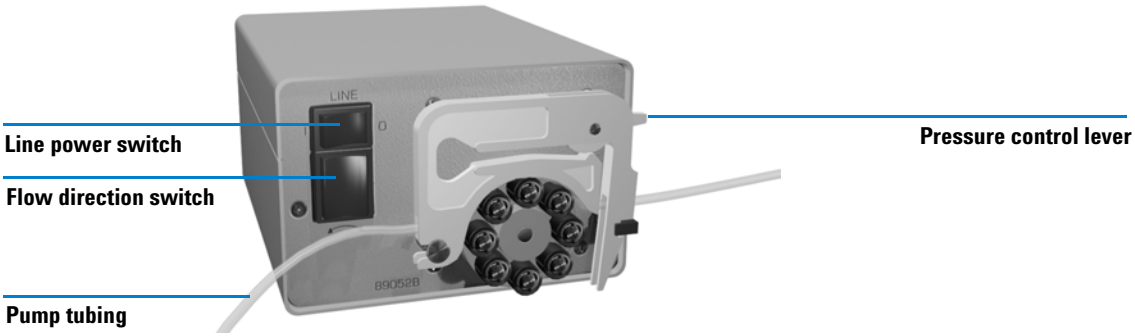

Figure 24 Peristaltic Pump

5. Bring the pressure control lever (see Figure 24) to a horizontal position—so that no liquid flows.
6. Adjust the pressure control lever stepwise until liquid flows. Increase the pressure an additional 2–3 steps to ensure constant flow. Increasing the pressure more than 2–3 steps may cause a decrease in flow.

   You will need to do this from time to time, because of wear on the pump tubing.

CAUTION A too high force of the pressure control lever causes a flow reduction and also reduces tubing lifetime.

When you cannot increase the pressure to maintain flow use the second part of the tubing or replace it.

Remote Pump Control

1. Operate your pump manually before you operate it remotely to ensure constant flow.
2. Connected the remote cable to the rear of the pump. When the remote cable is connected, the direction contr ol switch on the front panel does not function.
3. Place one end of the tubing into a reservoir of liquid and the other in a waste container.
4. See your software documentation and online help for information on the commands used to operate the pump remotely.

Operating the Sipper and Autosampler

When using water as solvent we recommend using UV-grade or HPLC-grade water to reduce unwanted absorbance from the water. The water should be degassed to avoid bubble formation in the flow cell, especially if the water comes from a pressurized water supply.

1. Place the inlet tubing of the sipper or the autosampler into a reservoir of liquid and the waste tubing which comes from the pump in a waste container.
2. Operate your pump manually before you operate it remotely to ensure constant flow. Operating the peristaltic pump is described above.
3. Connect the remote cable to the rear of the pump. When the remote cable is connected, the direction control switch on the front panel does not function.
4. Use your UV-Visible operating software to try remote operation of the sipper or autosampler system.
5. For your Agilent autosampler—before you start a sequence of measurements, make sure that the tubing guide correctly moves into the vials when lowering the actuator arm and advance the tray. This is especially important for the first and the last vial in the rack. For adjusting the position of the actuator arm, see the autosampler instruction handbook from Isco Incorporated.

Operational Checkout

To determine the optimum pumping time and to make sure there is no contamination between sequentially measured samples, there is a flow test implemented in your UV-Visible ChemStation software. For further information, see your software documentation and online help in the software.

4
Maintenance and Repair

This chapter describes:

- simple maintenance, for example, how to clean the instruments, flow cell and tubing,
- how to make custom tubings, and
- how to repair the sipper system.

Simple Maintenance

Cleaning the Instruments

The pump and autosampler case and the autosampler trays should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and a mild detergent. Do not use an excessively damp cloth so that liquid can drip into the instruments.

WARNING **Do not let liquid drip into the instruments. It could cause shock hazard and it could damage the instruments.**

Cleaning the Flow Cells

If your flow cell is dirty and/or you observe that air bubbles stick on the quartz window and are not purged out of the flow cell with the sample flow, you may apply the following cleaning procedure with the cell cleaning fluid (part number 5062-8529). The procedure is applied to the complete sipper system including tubings and flow cell.

You can operate the peristaltic pump from the UV-Visible ChemStation software or manually. For manual operation, disconnect your remote connector from the rear of the peristaltic pump.

1. Prepare a 2 % solution of the cell cleaning fluid in distilled water.
2. Transfer your sample inlet tube to the beaker filled with water and pump for a few minutes. Make sure your waste tubing leads to the waste container.
3. Transfer your sample inlet tube to the beaker containing the solution of cell cleaning fluid.
4. Pump the solution of cell cleaning fluid at least for 10 minutes. The tubings may show a lot of air bubbles now, because the cell cleaning fluid contains a detergent.
5. Transfer your sample inlet tube to the beaker filled with water and pump for 3 minutes.

Making Custom Tubings

If you want to make your own custom tubings or if you want to replace tubing and change fittings and ferrules, you will need the PTFE tubing kit. This section describes how you attach the fittings and ferrules to the tubing. The PTFE tubing kit contains sandpaper, a scalpel, and 10 m of PTFE tubing.

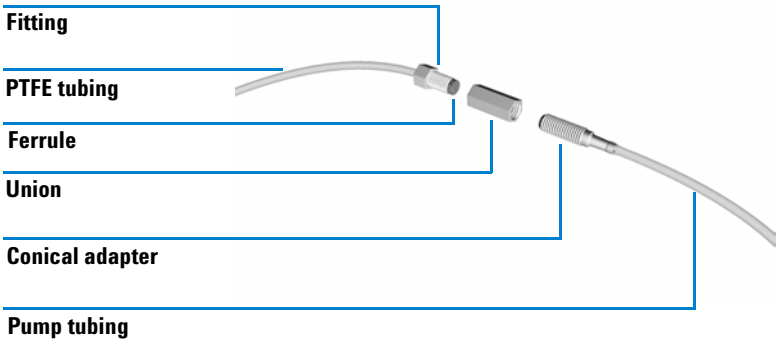

Figure 25 Tubing and Fittings

Special fittings and ferrules for the flow cells and normal ferrules fittings and adapters can be ordered using part numbers given in "Parts and Supplies" on page 45.

Removing Fittings from the Tubing

Remove the fitting and ferrule from the tubing by either sliding the ferrule and fitting off your tubing or cutting the tubing level with the fitting.

Replacing Ferrules and Fittings

There are two ways you can prepare your tubing to make it thinner so that it slides easily into the ferrules:

- stretching the tubing and cutting it at a thin area, or
- cutting the tubing at an angle.

1 The PTFE tubing kit contains sandpaper, a scalpel to stretch and cut the tubing. Hold the tubing with the sandpaper and pull the end of the tubing to stretch it slightly. The tubing becomes thinner where it is stretched. Cut the tubing between the pieces of sandpaper, at a thin area.

Figure 26 Stretching the Tubing

Alternatively you can cut the tubing at a shallow angle at the end.

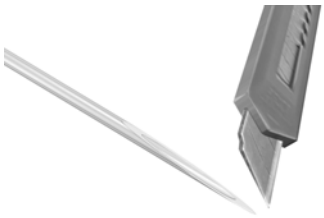

Figure 27 Cutting the Tubing at an Angle

2 Slide a fitting over the end of the tubing, and slide a ferrule over the end of the tubing.

3 Pull the tubing through the ferrule using the sandpaper to grip the tubing. The ferrule must be over the normal diameter of the tubing.

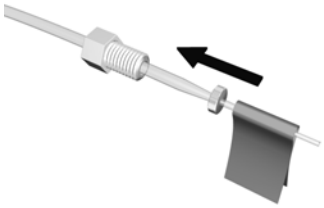

Figure 28 Sliding a Fitting and Ferrule over the Tubing

4 Cut the tubing level with the ferrule, see Figure 29. Take care not to cut the PTFE surface of the ferrule, because this may result in solvent or air leaks.

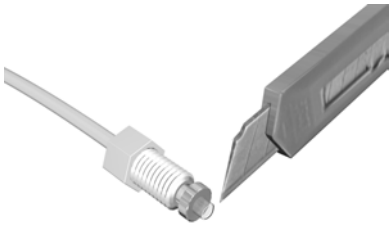

Figure 29 Cutting the Tubing Level with the Ferrule

Repairing the Sipper System

For repairing the peristaltic pump and the Agilent autosampler there are complete exchange units available. If you observe a defect in the hardware, please refer to "Parts and Supplies" on page 46 for exchange part numbers.

In the same chapter there are replacement part numbers for tubings etc. given which you may want to exchange from time to time.

5
Parts and Supplies

This chapter gives part number listings for ordering replacement and exchange parts which may be used to repair the sipper system hardware. In addition it gives the most frequently used supplies.

Parts and Supplies

Use the following tables for part numbers related to the Agilent autosampler, sipper and PTFE tubings and to find out about pump rates using tubing other than the standard pump tubing.

Table 7 89072A Autosampler Parts

Description	Part Number
Replacement autosampler (110 V)	89072-69001
Replacement autosampler (220 V)	89072-69002
PTFE tubing guide	1535-4878

Table 8 G1811 XY Autosampler Parts

Description	Part Number
Needle	8G1811-23200
RS 232 connector cable	5181-1520
Fuse (110 V / 220 V)*	2110-0303

* You need two fuses for connecting the X-Y Autosampler to 220 V power lines.

Table 9 Sipper Parts

Description	Part Number
Replacement peristaltic pump (110 V, 60 Hz)	89052-69003
Replacement Peristaltic Pump (220 V, 50 Hz)	89052-69004
Cassette, fixed pressure	5041-2167
Cassette, variable pressure	5042-1356
Peristaltic pump tubing	see Table 10 below

Table 9 Sipper Parts (continued)

Description	Part Number
Sipper/Sampler tubing kit	5041-8368
Sipper-GPIO cable	G1103-61609
Sipper/Sampler-GPIO cable (89072A sampler)	G1103-61608
80 µl flow cell	0100-1225
Cell cleaning fluid	5062-8529

Table 10 Tygon Pump Tubings and Flow Rates

Tubing Size (i.d.)	Flow Rate for 60 Hz	Flow Rate for 50 Hz	Part Number
1.30 mm	4.1 ml/min	3.4 ml/min	5041-2184
2.06 mm	10.3 ml/min	8.6 ml/min	5041-2166
2.80 mm	19.0 ml/min	15.9 ml/min	5041-2185

Use the following table in case you want to make your own custom tubings. For a assembly procedure, see "Making Custom Tubings" on page 41..

Table 11 Supplies to Make Custom Tubings

Description	Part Number
PTFE Tubing Kit, 1.59 mm o.d., 10 m	5041-2191
Flow cell fittings (4/pack)	5041-2192
Flow cell ferrule (4/pack)	5041-2199
Fittings (10/pack)	5041-2195
Ferrules (10/pack)	5041-2198
Union (10/pack)	5041-2197
Conical adapter (2/pack)	5041-2196

A
Safety Information

Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies Company assumes no liability for the customer's failure to comply with these requirements.

General

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed:

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible. When inevitable, this should be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

Safety Symbols

Table 12 shows safety symbols that are used on the instrument and throughout the documentation.

Table 12 Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.

WARNING **A warning alerts you to situations that could cause physical injury or damage to the equipment. Do not proceed beyond a warning until you have fully understood and met the indicated conditions.**

CAUTION A caution alerts you to situations that could cause a possible loss of data. Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/ 1991 (Type Test)

Solvent Information

Observe the following recommendations on the use of solvents.

Flow Cell

Avoid the use of alkaline solutions (pH >9.5) which can attack quartz and thus impair the optical properties of the flow cell.

Solvents

Always filter solvents, small particles can permanently block the capillaries. Avoid the use of the following steel-corrosive solvents:

- Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on).
- High concentrations of inorganic acids like nitric acid, sulfuric acid especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).
- Halogenated solvents or mixtures which form radicals and/or acids, for example:

  $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.
- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1% solution of acetic acid in methanol will attack steel.

- Solutions containing strong complexing agents (for example, EDTA, ethylene diamine tetra-acetic acid);
- Mixtures of carbon tetrachloride with 2-propanol or THF.

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In This Book

This handbook contains specifications of the sipper system and describes what you have to do to install your sipper system with the Agilent 8453 spectrophotometer. Operating guidelines for checking-out and using the sipper system in manual and remote mode are given as well as information for connecting an autosampler. Part numbers are given for replacing parts and for making your own customized tubings. For details of operating the sipper system through your Agilent ChemStation, refer to the help system.

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