

FlowPrep 060

Operator's Manual

WARRANTY

MICROMERITICS INSTRUMENT CORPORATION warrants for one year from the date of shipment each instrument it manufactures to be free from defects in material and workmanship impairing its usefulness under normal use and service conditions except as noted herein.

Our liability under this warranty is limited to repair, servicing and adjustment, free of charge at our plant, of any instrument or defective parts when returned prepaid to us and which our examination discloses to have been defective. The purchaser is responsible for all transportation charges involving the shipment of materials for warranty repairs. Failure of any instrument or product due to operator error, improper installation, unauthorized repair or alteration, failure of utilities, or environmental contamination will not constitute a warranty claim. The materials of construction used in MICROMERITICS instruments and other products were chosen after extensive testing and experience for their reliability and durability. However, these materials cannot be totally guaranteed against wear and/or decomposition by chemical action (corrosion) as a result of normal use.

Repair parts are warranted to be free from defects in material and workmanship for 90 days from the date of shipment.

No instrument or product shall be returned to MICROMERITICS prior to notification of alleged defect and authorization to return the instrument or product. All repairs or replacements are made subject to factory inspection of returned parts.

MICROMERITICS shall be released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own authorized service personnel unless such work is authorized in writing by MICROMERITICS.

The obligations of this warranty will be limited under the following conditions:

1. Certain products sold by MICROMERITICS are the products of reputable manufacturers, sold under their respective brand names or trade names. We, therefore, make no express or implied warranty as to such products. We shall use our best efforts to obtain from the manufacturer, in accordance with his customary practice, the repair or replacement of such of his products that may prove defective in workmanship or materials. Service charges made by such manufacturer are the responsibility of the ultimate purchaser. This states our entire liability in respect to such products, except as an authorized person of MICROMERITICS may otherwise agree to in writing.
2. If an instrument or product is found defective during the warranty period, replacement parts may, at the discretion of MICROMERITICS, be sent to be installed by the purchaser, e.g., printed circuit boards, check valves, seals, etc.
3. Expendable items, e.g., sample tubes, detector source lamps, indicator lamps, fuses, valve plugs (rotor) and stems, seals and O-rings, ferrules, etc., are excluded from this warranty except for manufacturing defects. Such items which perform satisfactorily during the first 45 days after the date of shipment are assumed to be free of manufacturing defects.

Purchaser agrees to hold MICROMERITICS harmless from any patent infringement action brought against MICROMERITICS if, at the request of the purchaser, MICROMERITICS modifies a standard product or manufactures a special product to the purchaser's specifications.

MICROMERITICS shall not be liable for consequential or other type damages resulting from the use of any of its products other than the liability stated above. This warranty is in lieu of all other warranties, express or implied, including, but not limited to, the implied warranties of merchantability or fitness for use.

4356 Communications Drive • Norcross, GA 30093-1877 • Fax (770) 662-3696

Domestic Sales - (770) 662-3633
International Sales - (770) 662-3660

Domestic Repair Service - (770) 662-3666
Customer Service - (770) 662-3636

INDEX

1. GENERAL INFORMATION

Description	1-1
Conventions	1-2
Specifications	1-3

2. INSTALLATION

Unpacking and Inspection	2-1
Equipment Damage or Loss During Shipment	2-1
Equipment Return	2-1
Selecting the Input Power	2-2
Rear Panel Connections	2-4
Attaching the Gas Delivery Tubes	2-6

3. OPERATION AND SAMPLE PREPARATION

Operation	3-1
Front Panel Controls	3-1
Rear Panel Controls	3-2
Controlling the Temperature of Heating Stations	3-3
Sample Preparation	3-4
Cleaning Sample Tubes	3-4
Weighing the Sample	3-6
Inserting and Removing Heating Station Adapters	3-8
TriStar and ASAP Series Sample Tubes	3-10
Inserting Adapters	3-10
Removing Adapters	3-11
Gemini Sample Tubes	3-12
Inserting Adapters	3-12
Removing Adapters	3-12
Degassing Samples	3-13

4. TROUBLESHOOTING AND MAINTENANCE

Troubleshooting	4-1
Temperature Controller	4-3
Error Messages	4-3
Maintenance	4-4
Checking Gas Flow	4-4
Cleaning and Replacing Gas Delivery Tubes	4-5
Replacing Flexible Tubing	4-6
Connecting or Replacing Valve Inlet Tubing	4-7

5. Ordering Information

INDEX

1. GENERAL INFORMATION

Description

The FlowPrep 060 Degasser prepares samples for adsorption analysis. It uses flowing gas passed over a heated sample to remove moisture and other contaminants. The degasser has six heating stations for degassing samples and six cooling stations. The desired degassing temperature is easily set on the temperature controller pad located on the front of the instrument. Gas flow control valves are readily accessible and provide a constant indication of the valve state.

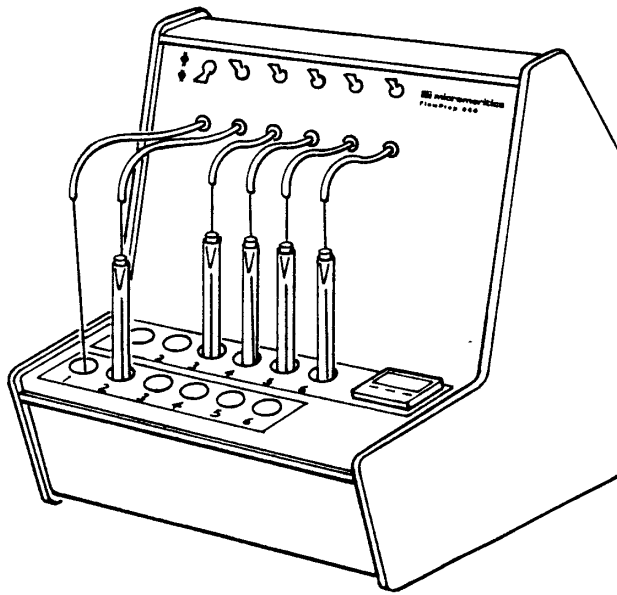


Figure 1-1. FlowPrep 060 Degasser

Conventions

This manual uses the symbols shown below to identify notes of importance, warnings, and cautions.



Notes contain important information pertinent to the subject matter.



Warnings contain information that help you prevent actions that may cause personal injury.



Cautions contain information that help you prevent actions that may damage the analyzer.

Specifications

The following table gives the specifications of the FlowPrep 060 Degasser.

Table 1-1. Specifications

Characteristic	Specification
Sample Tubes	Up to 3.0-cm (1.18-in.) OD
Heating Block Temperature: Temperature Accuracy:	10 °C above ambient to 400 °C ± 10 °C
Electrical Voltage: Power: Frequency:	100, 120, 220, 240 VAC ± 10% 250 VA maximum 50/60 Hz
Environment Temperature: Humidity:	10 to 35 °C operating; 0 to 50 °C non-operating 45 to 80% relative, non-condensing
Gases Used	Helium, nitrogen, argon, or any other pure gas that does not adsorb at room temperature
Flow Rate	Up to 50 cm ³ /min. No vacuum required
Sample Capacity	6 heating stations and 6 cooling stations
Physical Height: Width: Depth: Weight:	45 cm (16.93 in.) 36 cm (14.17 in.) 30 cm (11.81 in.) 8.6 kg (19 lbs)

2. INSTALLATION

Unpacking and Inspection

When you receive the shipping cartons, carefully compare the Packing List with the equipment actually received and check the equipment for any damage during shipment. Be sure to sift through all packing material before declaring equipment missing.



If you need to declare equipment as damaged or lost, save the shipping cartons. The claims investigator must examine the cartons in order to complete the inspection report.



When the FlowPrep leaves the factory, stabilizing tubes are placed in heating stations 1 and 6 to prevent the heater block from shifting during shipment. Be sure to remove these tubes before turning on the FlowPrep.

Equipment Damage or Loss During Shipment

If equipment is damaged or lost in transit, you are required to make note of the damage or loss on the freight bill. The freight carrier, not Micromeritics, is responsible for all damage or loss occurring during shipment. If you discover damage or loss of equipment during shipment, report the condition to the carrier immediately.

Equipment Return

Micromeritics strives to ensure that all items arrive safely and in working order. Occasionally, due to circumstances beyond our control, a customer may receive equipment which is not in working order. When equipment has been damaged (either during shipment or in use) and you wish to return the equipment to Micromeritics for repair or replacement, please follow the steps below:

1. Tag or otherwise identify the defective equipment, noting the defect and, if possible, the circumstances under which the defect occurs.
2. Make reference to the sales order or purchase order for the equipment, and provide the date the equipment was received.
3. Notify a Micromeritics Service Representative of the defect and request shipping instructions. The Service Department will assign a Return Authorization (RA) number to your return and provide shipping information.

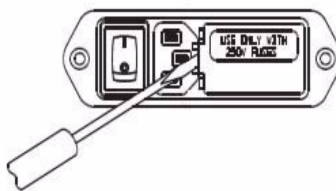
Selecting the Input Power

All instruments leave the factory set for 120 VAC and with the line fuse removed. The correct setting of the universal power entrance must be checked and the appropriate fuse(s) installed before the degasser can be operated. The degasser is designed to operate with 100, 120, 220, or 240 VAC at 50 or 60 Hz. Voltage selection and fusing are made at the power connector, which is located on the rear panel of the unit.

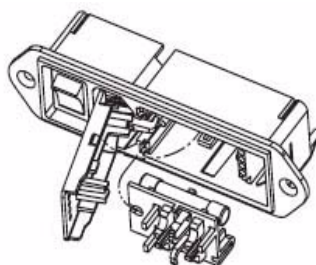


The power cord should be disconnected from the degasser before removing the cover from the input power connector. Failure to disconnect the power cord could result in electrical shock.

1. Make sure the power cord is disconnected from the degasser.
2. Insert the tip of a small pocket screwdriver (or pointed object) into the left side of the power module located on the rear panel of the degasser.



3. Gently lift up until the cover lifts approximately 1/4 inch, then swing the cover to the left; the cover is hinged and cannot be removed.
4. Remove the fuse block (you may have to use needle-nose pliers to grasp the fuse block).



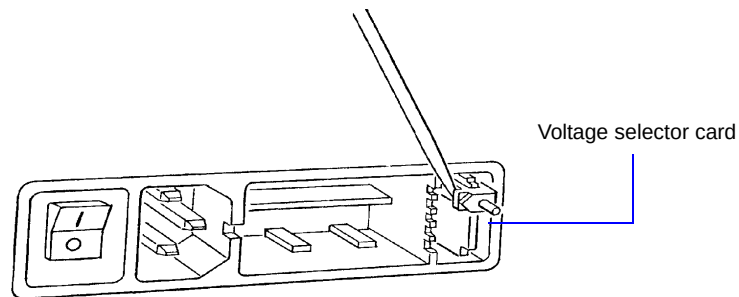
5. The input power connector can be used with either a single-fuse arrangement (100-120 VAC) or a double-fuse arrangement (200-240 VAC). Insert the appropriate fuse(s) for the input power source.



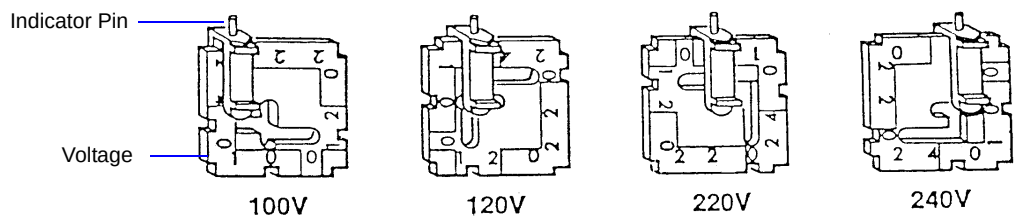
The fuses used in the FlowPrep must be identical in type and rating to that specified. Use of other fuses could result in electrical shock and/or damage to the degasser.

Power Source	Fuse
100-120 VAC	2.5 Amp, slow blow (requires one)
200-240 VAC	1.25 Amp, slow-blow, Type T Time lag, (requires two)

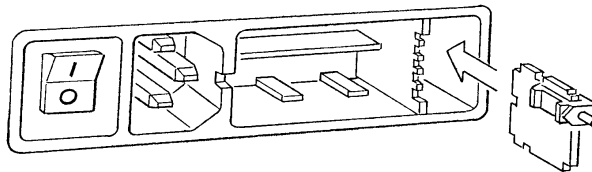
- Position the fuse block so that the side containing the fuse(s) is facing the power module and insert it into the connector. Do not close the cover.
- Pull the voltage selector card straight out of the power connector housing.



- Orient the voltage selector card so that the desired voltage is indicated at the bottom. Orient the indicator pin so that it points upward as shown in the following illustration.



- Insert the voltage selector card into the power connector housing with the edge containing the desired voltage first and with the printed side facing the POWER ON/OFF switch.



- Close the cover to the power entry module; ensure that the indicator pin is in the correct position.

Rear Panel Connections

1. Insert one end of the power cord into the input power connector at the rear of the degasser and the other end into the appropriate power source.



When the FlowPrep leaves the factory, stabilizing tubes are placed in heating stations 1 and 6 to prevent the heater block from shifting during shipment. Be sure to remove these tubes before turning on the FlowPrep.

2. Attach an appropriate regulator to the gas bottle. Leave the gas bottle shut-off valve closed until instructed otherwise.
3. If the regulator has a 1/8 in. outlet, proceed to Step 4. If the regulator has a 1/4 in. outlet, attach the reducer fitting to the outlet of the regulator shut-off valve.



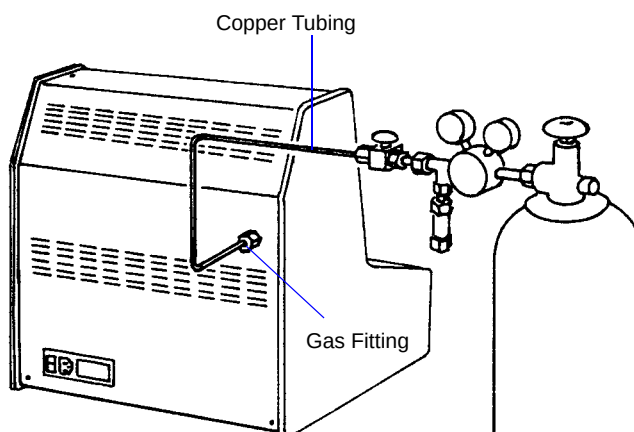
4. Tighten the regulator shut-off valve nut.



Do not overtighten the fittings. Doing so can collapse the brass ferrule and cause a leak.

5. Attach the copper tubing to the brass reducer fitting.

6. Attach the other end of the copper tubing to the fitting on the back of the degasser.



7. Open the gas bottle shut-off valve.
8. Use the regulator pressure control knob to adjust the pressure. The following table shows pressures and their resulting flow rates (tested with helium and nitrogen). If you do not know the flow rate you want to use, start with about 10 cm³/min. Experience with your samples will help you determine whether a change is required.

Table 2-2. Gas Flow Rate

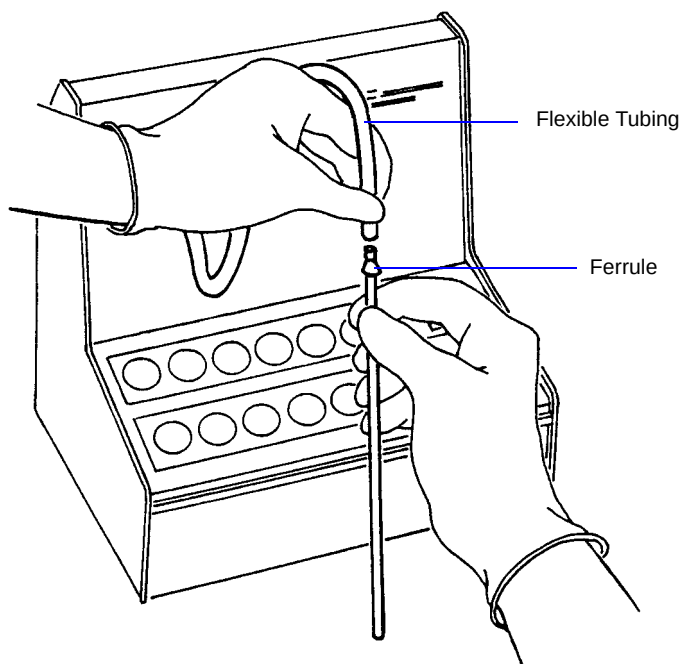
Flow	Gauge Pressure	
	psi	kPa
cm ³ /min		
10	4	28
20	6	41
30	8	55
40	10	69
50	13	90

A flow rate of 50 cm³/min is the maximum flow rate that would generally be used in normal operation. However, the degasser is capable of accepting up to 50 psi pressure. A pressure of 50 psi (345 kPa) would produce a flow rate of approximately 250 cm³/min.

9. Close the gas bottle shut-off valve. Check the pressure. If it decreases, gas is probably leaking at the fitting. Tighten the fitting. Then check the pressure again.
10. Open the regulator shut-off valve. The pressure should stabilize after about five minutes. If it does not, gas is probably leaking at the brass reducer fitting or at the gas port on the rear panel of the degasser. Tighten the fittings. Then check the pressure again.
11. Open the gas bottle shut-off valve.

Attaching the Gas Delivery Tubes

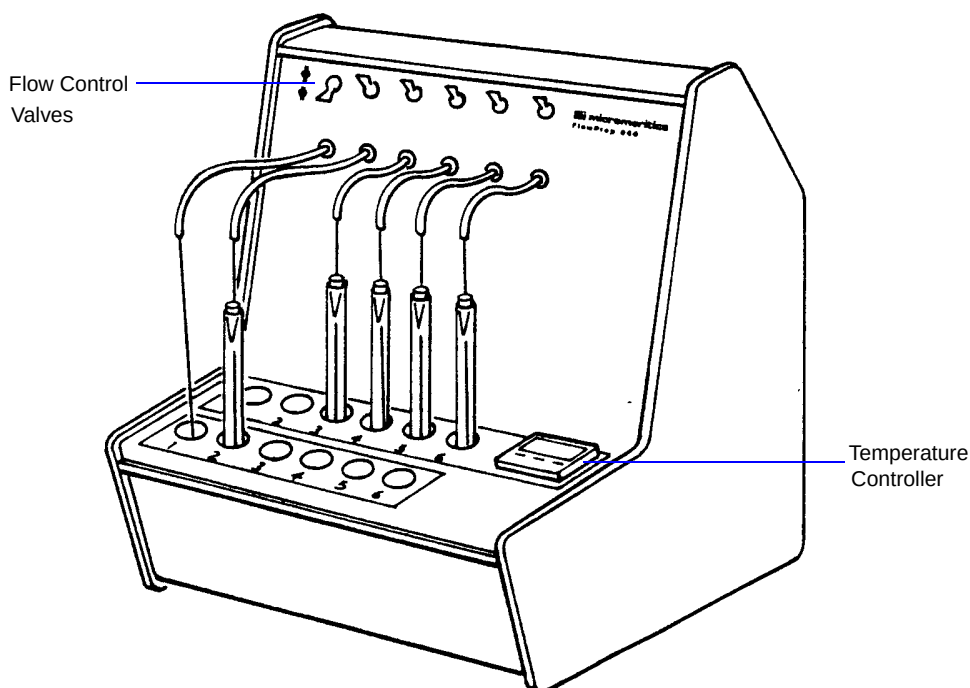
Six gas delivery tubes are included in the accessories kit. Attach one to each flexible tube by pressing the flexible tube over the gas delivery tube. Make sure that the flexible tube completely covers the ferrule at the end of the gas delivery tube.



3. OPERATION AND SAMPLE PREPARATION

Operation

Front Panel Controls



Temperature Controller

The temperature controller displays the current temperature of the heating stations and enables you to change the temperature set point. Refer to [Controlling the Temperature of Heating Stations](#), page 3-3 for instructions.

Flow Control Valves

Each heating station has a valve that controls the flow of gas to the station. Place the valve in the up position to open the valve and the down position to close the valve.

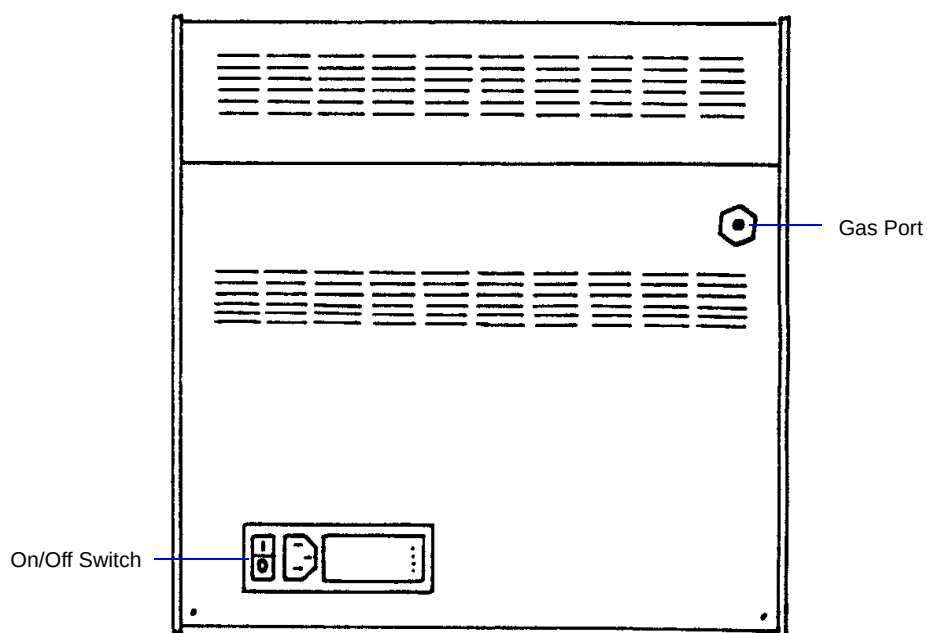


Open



Closed

Rear Panel Controls



On/Off Switch

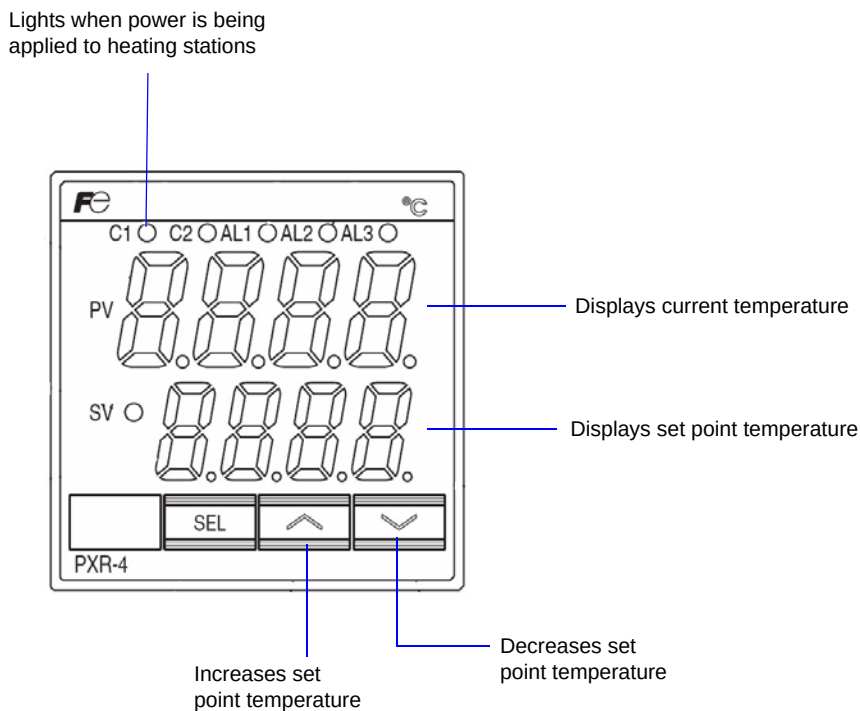
Place the switch in the up position (|) to turn on the degasser, and in the down position (0) to turn off the degasser.

Gas Port

The gas port is used to connect the gas supply to the degasser.

Controlling the Temperature of Heating Stations

The temperature controller, shown below, enables you to specify the temperature of the heating stations and displays the current temperature.



The controller always displays the current temperature (PV = Process Value) and the set point (SV = Set Value).

Press  to increase or  to decrease the value until the desired temperature set point is displayed. The keys may be held down to rapidly increase or decrease the setting.



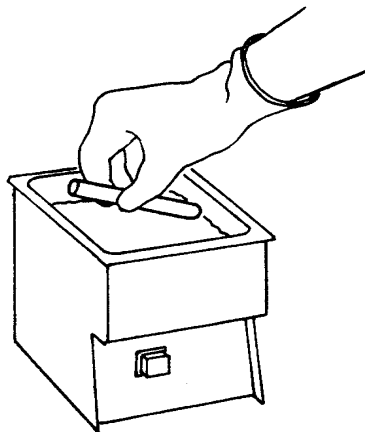
The set point is retained when the degasser is turned off and turned back on.

Sample Preparation

Cleaning Sample Tubes

Sample tubes must be clean in order to obtain accurate analysis results. Clean the tubes in an ultrasonic cleaning unit as follows. The materials required for cleaning and weighing samples are:

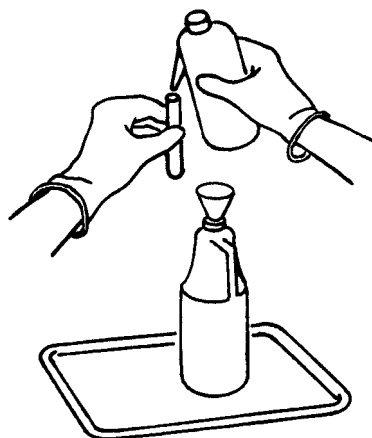
- Ultrasonic cleaning unit
 - Alconox or other suitable detergent
 - Rubber gloves or lint-free cloth
 - Isopropyl alcohol (IPA) (or deionized water if IPA is unavailable)
 - Nitrogen or helium
 - Fume hood
 - Balance for weighing sample
 - Weighing support
 - Sample tube brush
 - Sample tube
 - Sample tube stopper
 - Funnel
1. Check the bowl of the ultrasonic unit to make sure it is clean.
 2. Using a ratio of 5 grams of Alconox (or equivalent detergent) per 500 mL of warm water, fill the bowl of the ultrasonic unit with enough water to cover the entire sample tube.
 3. Ensure that the detergent is dissolved before placing the sample tube into the water. If too much detergent is used, it may be difficult to rinse from the tube.
 4. Fill the sample tube with warm water and place it in the bowl of the ultrasonic cleaning unit. Turn on the unit and clean the sample tube for approximately 15 minutes.



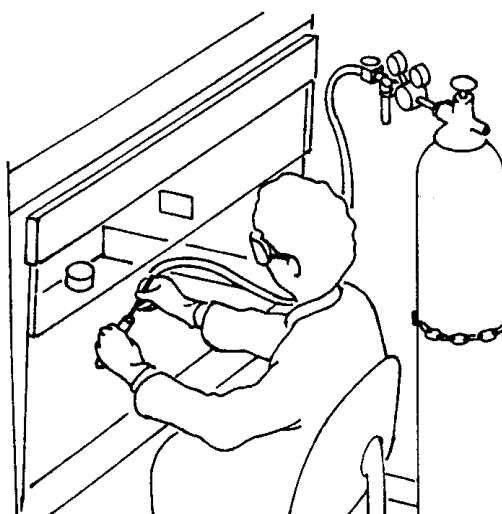
5. Using either rubber gloves or a lint-free cloth (but not bare hands), remove the sample tube from the bowl.
6. Clean the interior of the sample tube with the brush supplied in the accessories kit.
7. Rinse the sample tube thoroughly with hot water. Then rinse it with isopropyl alcohol, using a waste container to collect used isopropyl alcohol.



If isopropyl alcohol is unavailable, deionized water may be used to rinse the sample tube.



8. Dry the interior of the sample tube using nitrogen or helium, under a fume hood, with a tubing extension long enough and small enough in diameter to fit inside the sample tube.



9. Insert a stopper into the sample tube, then degas the sample tube and stopper as described in [Degassing Samples](#), page 3-13.

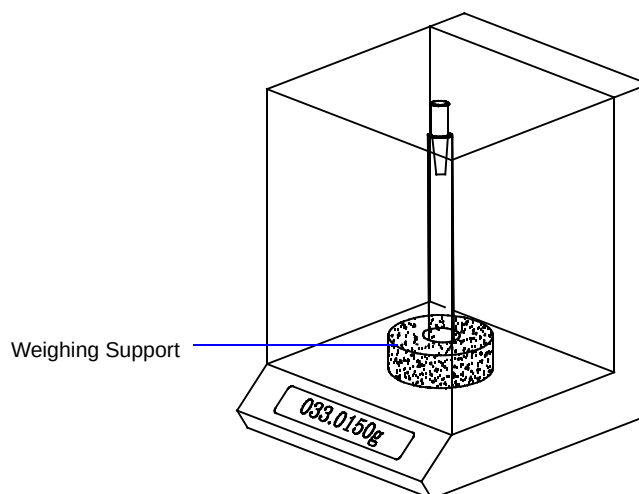
10. After degassing the empty sample tube and stopper, weigh it while it still contains gas.



To get an accurate weight of a degassed sample, the gas in both the empty sample tube and in the tube when it contains the sample must be the same.

Weighing the Sample

1. Place the sample weighing support on the balance. Zero the balance and allow it to stabilize.
2. Place the sample tube with stopper on the sample weighing support. Record the stabilized weight as **empty sample tube weight**.



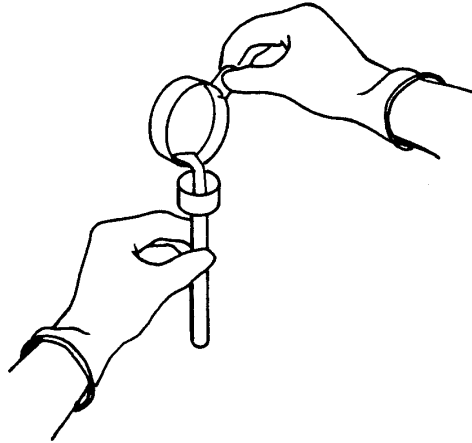
3. Place the sample weighing container on the balance. Zero the balance and allow it to stabilize.



Do not touch the sample with bare hands while completing Step 4. Doing so could affect the accuracy of results.

4. Slowly add the sample to the weighing container. Record the weight as **sample weight**.
5. Remove the rubber stopper from the sample tube.

6. Pour the sample from the sample weighing container into the sample tube using a funnel.



7. Insert the sample tube stopper.
8. Weigh the sample tube, sample, and rubber stopper. Record the weight as **sample plus sample tube weight**.



The weight recorded at this step is prior to degassing. Degassing will reduce the weight. The difference between the *before degas* and *after degas* weights may be useful when estimating effectiveness of degree or how much contaminant is contained in fresh sample.

Inserting and Removing Heating Station Adapters

Heating station adapters are included in the FlowPrep accessories kit for use with sample tubes. There are three models of heating station adapters. Use the appropriate model as shown in Table 2-1 and follow the instructions in this chapter for removing and inserting adapters.

The adapters used with Gemini sample tubes may remain in the stations until you wish to use a different type of sample tube.

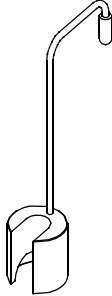
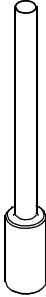
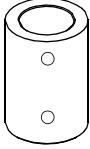
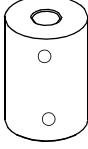
You must remove adapters used with the TriStar and ASAP Series sample tubes when you remove the sample tube. You may store an adapter in the heating station from which it was removed or in a cooling rack.

Adapters constitute an isothermal shield and help to maintain uniform temperature throughout the sample bed. Sample temperature, however, depends on several factors:

- The thermal conductivity of the sample material
- The quantity of sample material
- The rate of gas flow through the sample bed

All materials do not heat identically. The actual sample temperature can be expected to be within ± 10 °C of the current temperature (PV) displayed on the temperature controller. If an exact sample temperature is critical to your application, you should measure the sample bed with a temperature probe and adjust the setpoint temperature accordingly.

Table 3-1. Heating Station Adapters

Analyzer Model	Sample Tubes	Adapter Model
TriStar ASAP Series	 1/4-, 3/8-, or 1/2-in. Stem, 1.2-in. (30-mm) Bulb	 P/N: 065-25815-00
Gemini (Bulb Tube)	 3/8-in. Stem, 3/4-in. (19 mm) Bulb	 P/N: 065-25811-00
Gemini (Straight-Wall Tube)	 3/8-in. Stem	 P/N: 065-25812-00

TriStar and ASAP Series Sample Tubes

Adapters are included as a standard accessory with the FlowPrep. Additional adapters may be ordered if needed (refer to **Ordering Information**, page 5-1.).



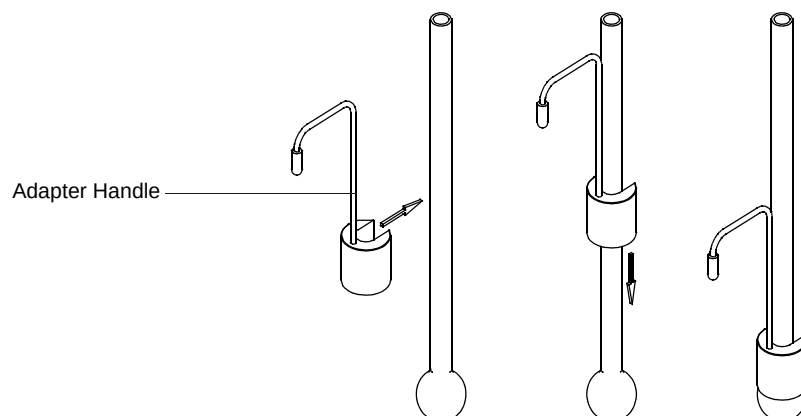
Sample tubes and heating station adapters may be very hot. Wear the proper gloves and hold the sample tube by the upper part of its stem. Hold the isothermal type of adapter by its handle. Failure to observe these precautions may result in severe burns.



Do not place your fingers inside the heating stations; the stations may be hot enough to cause burns.

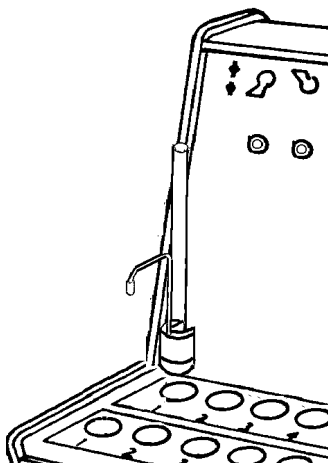
Inserting Adapters

1. Place the adapter over the sample tube.



2. Hold both the adapter handle and sample tube stem when placing the sample tube and adapter in the heating station.

Alternately, you may insert the sample tube in the heating station, then place the adapter over the sample tube in the station.



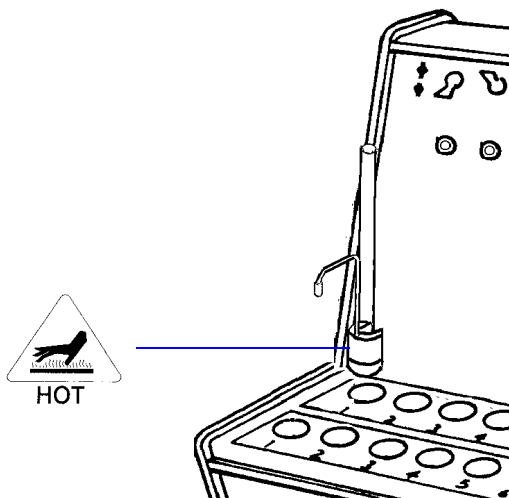
Removing Adapters

Use station when moving sample tubes and heating station adapters to the cooling station.



Sample tubes and heating station adapters may be very hot. Wear the proper gloves and hold the sample tube by the upper part of its stem. Hold the isothermal type of adapter by its handle. Failure to observe these precautions may result in severe burns.

1. Holding both the stem of the sample tube and the adapter handle, remove the adapter and sample tube.



2. Place the adapter and sample tube in a cooling station.

After the sample tube has been installed on the analyzer, you may place the adapter back into the heating station for storage.



Do not place adapters near any combustible material or touch them with your fingers. Do not place a hot adapter on an unprotected surface such as a countertop. The adapter may burn the surface.

Gemini Sample Tubes

Adapters are included as a standard accessory with the FlowPrep. Additional adapters may be ordered if needed (refer to **Ordering Information**, page 5-1).



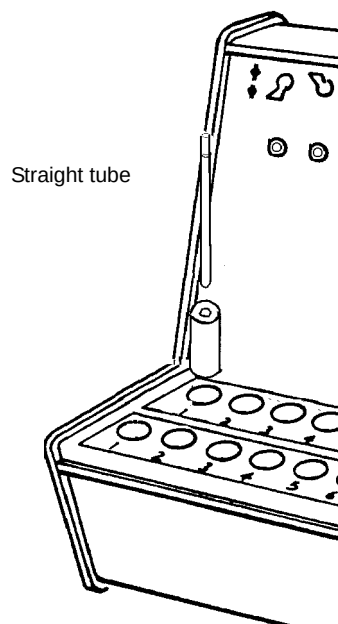
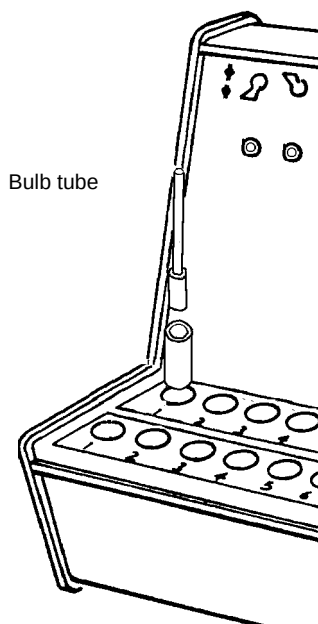
Sample tubes and heating station adapters may be very hot. Wear the proper gloves and hold the sample tube by the upper part of its stem. Failure to observe these precautions may result in severe burns.



Do not place your fingers inside the heating stations; the stations may be hot enough to cause burns.

Inserting Adapters

Insert an adapter into the heating station before you insert the sample tube. An adapter may be inserted into the heating station with either end in the upward position.



Removing Adapters

Adapters for the Gemini may remain in the heating station when not in use if desired.



If it is necessary to remove the adapter from the heating station, wear the proper gloves; the heating station may still be hot. Failure to observe this precaution may result in severe burns.

Degassing Samples

1. Place the degasser power switch in the ON (|) position.



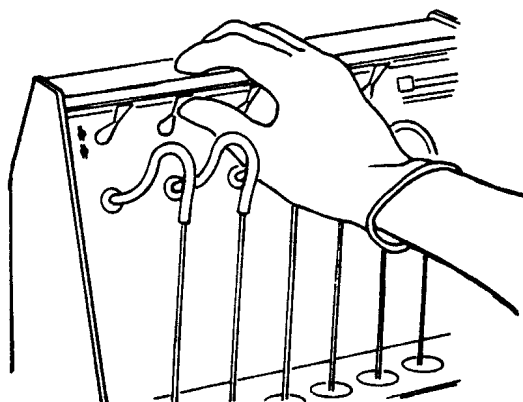
When the FlowPrep leaves the factory, stabilizing tubes are placed in heating stations 1 and 6 to prevent the heater block from shifting during shipment. Be sure to remove these tubes before turning on the FlowPrep.

2. Set the temperature controller to the desired temperature.



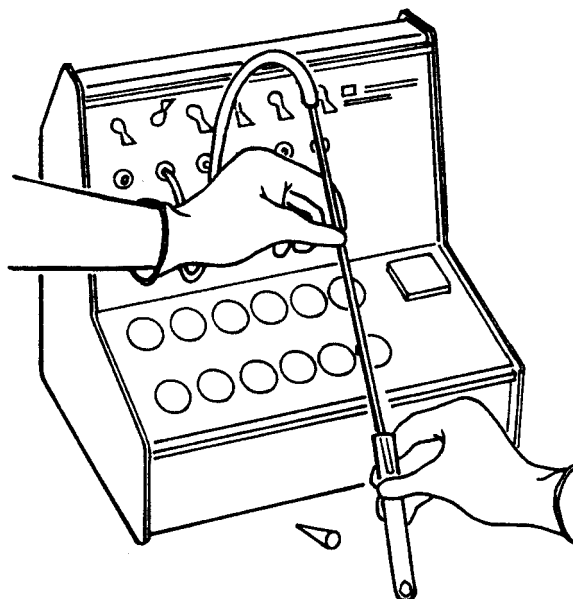
Heat is delivered to all six heating stations; therefore, to prevent burns keep your hands away from the interior of the heating stations.

3. Place the flow control valve on the desired heating station in the open position.



4. Wipe the gas delivery tube with a clean cloth to remove any residue left from the previous sample.

5. Remove the stopper from the sample tube and insert the gas delivery tube into the sample tube.



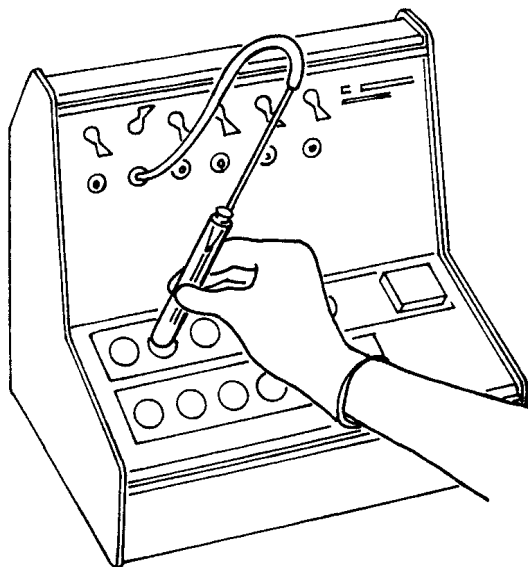
The end of the gas delivery tube may be hot enough to cause burns if it was stored in a heating station instead of a cooling station. Handle the gas delivery tube carefully to avoid burns.

6. Insert the stopper loosely into the sample tube. The stopper helps prevent cool moist air and dust from entering the tube, but it must be inserted loosely to allow a path for the escaping gas.



It is not necessary to use a stopper with sample tubes having an inside diameter of only 5 mm (0.2 in.).

7. Using the appropriate adapter, place the sample tube in a vacant heating station.



8. Allow the sample to degas for the desired length of time. One to two hours is typical for many samples at temperatures above 200 °C. To determine the optimum time, select the highest safe temperature for your sample, then degas it at intervals, determining the surface area after each interval.

For example, degas the sample for 15 minutes, then observe the surface area. Repeat this process until the surface area becomes stable. The length of time required to reach this point is the minimum amount of time required to degas the sample.

9. After the sample is sufficiently degassed, remove the sample tube from the heating station. Follow the instructions for removing adapters provided earlier in this chapter. **DO NOT CLOSE THE GAS FLOW VALVE.**

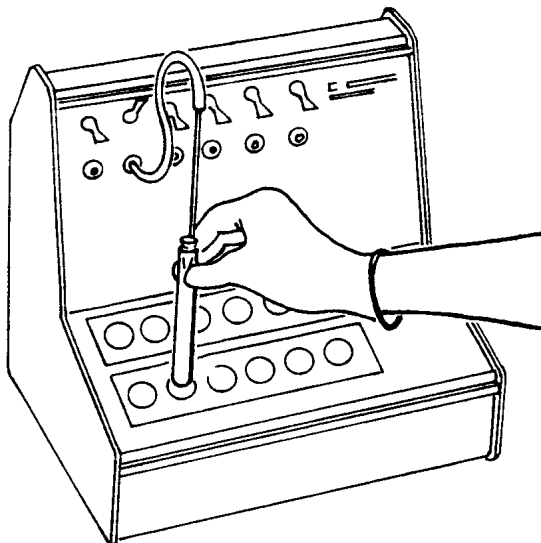


Sample tubes and heating station adapters may be very hot. Wear the proper gloves and hold the sample tube by the upper part of its stem. Failure to observe these precautions may result in severe burns.

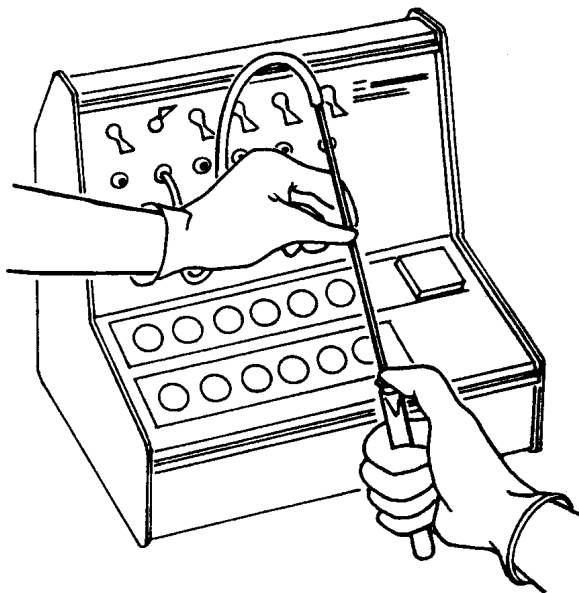


Keep the gas delivery tube and stopper in the sample tube while cooling to prevent contamination from the ambient atmosphere.

10. Place the sample tube, with stopper and gas delivery tube still in place, in a cooling station.

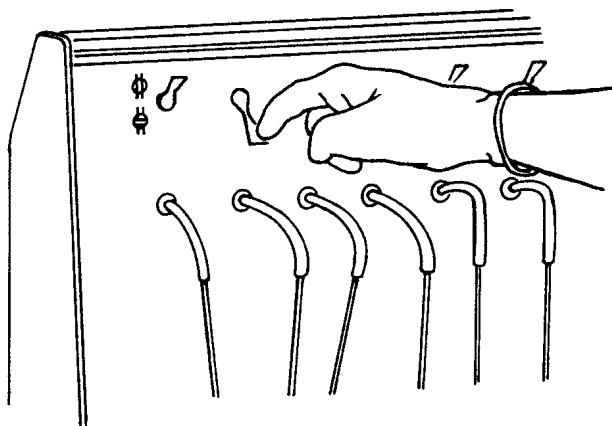


11. The sample tube should be cool enough to handle after several minutes. Remove the tube from the cooling station. Hold the stopper loosely in the tube and slowly pull out the gas delivery tube.



12. As the gas delivery tube clears the stopper, press the stopper into the sample tube to seal the tube against contamination.

13. Place the flow control valve in the off position.



14. Wipe the gas delivery tube with a clean cloth to remove any particles of sample that may have adhered to it. Then, place the gas delivery tube in a cooling station until needed again.
15. Reweigh the sample tube with stopper and sample to ensure that the correct sample weight is recorded.



The weight recorded at this step may be compared to the weight recorded before degassing to determine if adequate degassing has occurred.

4. TROUBLESHOOTING AND MAINTENANCE

The FlowPrep 060 requires very little maintenance to remain in top operating condition. The gas flow tubes should be wiped clean after each use and inspected weekly to ensure that they do not become clogged. This chapter contains instructions for inspecting and replacing gas flow tubes, as well as a troubleshooting chart and other maintenance procedures.

Troubleshooting

Operating problems encountered with the degasser are usually easily corrected. Typical problems and the steps required to correct them are described in the following table.

Table 4-1. Common Operational Problems

What Happened	Why	What To Do
Either no heat or insufficient heat is being supplied to the heating stations.	Blown fuse.	Replace fuse (see page 2-3).
	A mistake was made in entering the temperature set point.	Enter the correct temperature set point on the temperature controller.
	The thermocouple or other internal component is damaged or disconnected.	Call the appropriate service personnel.
Too much heat is being supplied to the heating stations.	A mistake was made in entering the temperature set point.	Enter the correct temperature set point on the temperature controller.
	The thermocouple or other internal component is damaged or disconnected.	Call the appropriate service personnel.
A newly installed fuse is blown.	Line voltage is too high.	Check the line voltage, refer to Selecting the Input Power , page 2-2 .
	A fuse with the wrong rating was installed.	Install the appropriate fuses for the input power source: 100-120 VAC - 2.5 A slow-blow; 220-240 VAC - 1.25 A slow-blow.

What Happened	Why	What To Do
Gas seems to be leaking from gas bottle.	The flow control valves were left in the open position when stations were not in use.	Keep the flow control valve closed on all stations that are not being used for degassing.
	The gas flow rate is set too high.	Decrease the flow rate by turning the regulator pressure control knob clockwise.
	A flow control valve is leaking.	Call the appropriate service personnel.
No gas flow when the flow control valve is opened.	Sample material in the gas delivery tube is blocking gas flow.	Clean the gas delivery tube; replace if necessary. Refer to Cleaning and Replacing Gas Delivery Tubes , page 4-5
	The flexible tubing is twisted.	Remove twist, replace the flexible tubing if necessary. Refer to Replacing Flexible Tubing , page 4-6.
	Gas pressure is set too low.	Increase the flow rate by turning the regulator pressure control knob clockwise.
	Gas bottle is empty.	Replace the gas bottle.
	Valve inlet tubing is detached.	Check the valve inlet tubing connections. Refer to Connecting or Replacing Valve Inlet Tubing , page 4-7.
	Flow control valve is damaged.	Call the appropriate service personnel.

Temperature Controller

Error Messages

The temperature controller performs self-diagnostics when the degasser is turned on and while operating. If an error occurs during self-diagnostics, one of the following error messages will be displayed.

uuuu

Cause: Temperature has risen substantially above temperature scale range or the temperature sensor has burned out (open circuit).

Action: Observe the display. The temperature will be displayed if it is decreasing. If the temperature does not decrease, the message will remain displayed. Turn off power to the instrument and call the appropriate service personnel.

LLLL

Cause: Temperature has fallen substantially below temperature scale range or the temperature sensor has failed (short circuit).

Action: Observe the display. The temperature will be displayed if it is increasing. If the temperature does not increase, the message will remain displayed. Turn off power to the instrument and call the appropriate service personnel.

Maintenance

Checking Gas Flow

The gas flow through the flexible tubing and gas delivery tubes should be checked once a week to ensure that there are no obstructions or leaks in the tubing. To check the flow, place the flow control valve in the open position. Insert the gas delivery tube in a beaker of water. Bubbles should appear. Approximately the same number of bubbles should appear in the beaker of water when moved to each station.

If bubbles do not appear for a particular station, detach the suspect gas delivery tube (refer to [Attaching the Gas Delivery Tubes](#), page 2-6) from the flexible tubing and insert the flexible tubing in the beaker of water. If bubbles appear, the problem is a clogged gas delivery tube. If the tube cannot be unclogged, replace it with a new one. If bubbles do not appear, check the valve inlet tubing (see [Connecting or Replacing Valve Inlet Tubing](#), page 4-7).



Gas delivery tubes and flexible tubing may be ordered in sets of six from Micromeritics. Refer to Ordering Information, page 5-1.

If gas flow is not present in other stations, refer to the following table.

Table 4-2. Gas Flow Problems

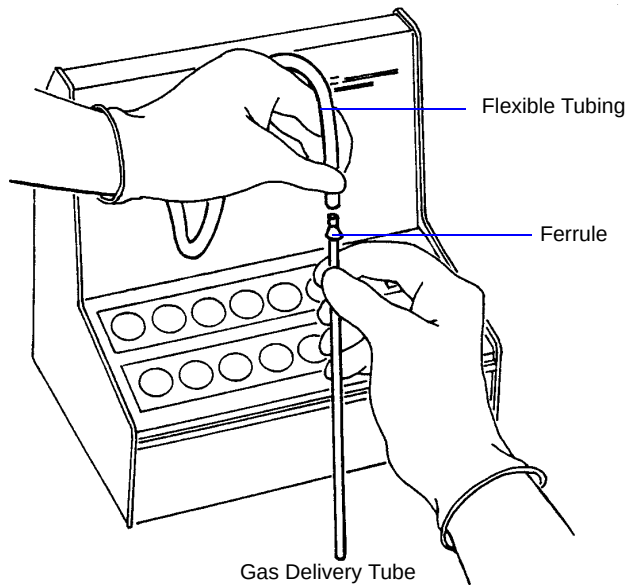
Why	What To Do
Gas pressure is set too low.	Increase the flow rate by turning the regulator pressure control knob clockwise until the correct pressure gauge reading is shown. (Refer to Table 2-2. Gas Flow Rate , page 2-5.)
Gas bottle is empty.	Replace the gas bottle.
Valve inlet tubing is disconnected.	Check valve inlet tube connections, refer to Connecting or Replacing Valve Inlet Tubing , page 4-7.
Flow control valve is damaged.	Call the appropriate service personnel.

Cleaning and Replacing Gas Delivery Tubes

Gas delivery tubes should be wiped with a lint-free cloth after each use to remove any particles of sample that may have adhered to the tube.

If a gas delivery tube becomes clogged or damaged, it should be replaced as follows:

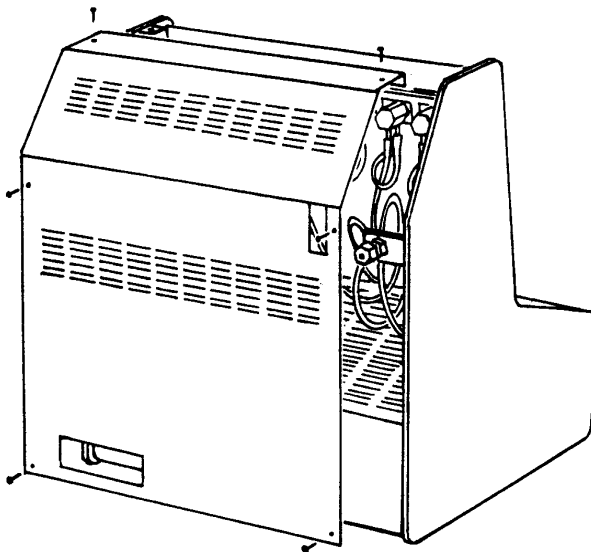
1. Remove the gas delivery tube from the flexible tubing.
2. Attach a new gas delivery tube by pressing the flexible tubing over the gas delivery tube. Make sure that the flexible tubing completely covers the ferrule at the end of the gas delivery tube.



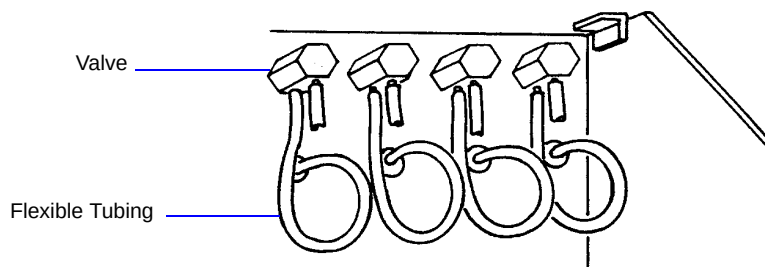
Replacing Flexible Tubing

If the flexible tubing becomes damaged, replace it as follows.

1. Close the appropriate gas flow valve if it is open.
2. Remove the flexible tubing from the gas delivery tube.
3. Remove the top rear panel by removing the six screws that secure it.



4. Remove the flexible tubing from the valve.

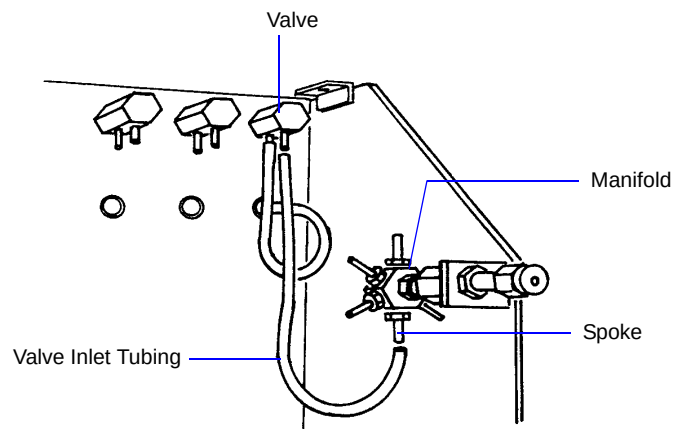


5. Attach new flexible tubing to the valve by pressing it firmly onto the port.
6. Thread the tubing through the hole under the valve. Loop it as shown above to allow flexibility.
7. Replace the top rear panel.
8. Attach the gas delivery hose to the flexible tubing by pressing the flexible tubing over the gas delivery tube. Make sure the flexible tubing completely covers the ferrule at the end of the gas delivery tube (see [Connecting or Replacing Valve Inlet Tubing](#), page 4-7).

Connecting or Replacing Valve Inlet Tubing

Flexible tubing connects the valves to the gas manifold inside the degasser. If there is no gas flow to a particular valve, the tubing could be disconnected. To check the tubing:

1. Remove the top rear panel (refer to previous page).
2. The tubing should be connected to the valve and to one of the spokes on the manifold. If it is disconnected at either end, connect it by pressing firmly into place. If a spoke on the manifold is loose, tighten it finger-tight plus 1/2 turn with a wrench. Do not overtighten because the gasket may become forced out of place. The fitting would then leak.



3. Replace the top rear panel.

5. Ordering Information

The FlowPrep 060 System components and accessories can be ordered using one of the following methods:

- Call our Customer Service Department at (770) 662-3636
- Access our web site at www.micromeritics.com
- Contact your local sales representative

When ordering, please use the information provided below to place your order

Table 5-1. FlowPrep Components and Accessories

Part Number	Item and Description
236-33005-00	PrepSeal Kit, used to degas and transfer air-sensitive samples to an analysis port without contamination.
061-33001-00	Flow Control Valve Kit; allows you to regulate the flow rate to the sample tube
060-25809-00	Gas Delivery Tube, stainless steel, set of 6
060-25804-00	Flexible Tubing, internal (valve inlet), set of 6
060-25805-00	Flexible Tubing, external, set of 6
003-51147-00	Slow-Blow Fuse, 2.5 A, 100-200 VAC
003-51148-00	Slow-Blow Fuse, 1.25 A, 220-240 VAC
003-51197-00	Slow-Blow Fuse, 1.25 A, 220-240 VAC (Type T, time lag)
230-02001-00	Gas inlet line, 1/8 in. x 6 ft. long, copper
004-32004-00	Sample Tube Stopper, rubber
004-62230-58	Gas Regulator, for use with helium or nitrogen, 30 psig
004-25549-00	Reducer Fitting, 1/4-in. for 1/8-in. copper tubing
065-25815-00	Heating Station Adapter, TriStar and ASAP Series analyzers
065-25811-00	Heating Station Adapter, Gemini bulb sample tube, 3/4 in
065-25812-00	Heating Station Adapter, Gemini straight-wall sample tube, 3/8 in.
003-22006-01	Temperature Controller
060-42803-00	Operator's Manual

INDEX

A

Accessories, ordering, [5-1](#)
Adapter
 See Heating Station Adapters

C

Cautions, defined, [1-2](#)
Conventions, operator's manual, [1-2](#)

E

Equipment, returning, [2-1](#)
Error messages, [4-3](#)

F

Flow control valve, [3-1](#)
FlowPrep
 description, [1-1](#)
 front panel controls, [3-1](#)
 ordering components and accessories, [5-1](#)
 rear panel controls, [3-2](#)
 specifications, [1-3](#)
 troubleshooting and maintenance, [4-1](#)
 unpacking and inspecting, [2-1](#)
Front panel controls, [3-1](#)

G

Gas delivery tube
 attaching, [2-6](#)
 cleaning and replacing, [4-5](#)
 inserting into sample tube, [3-14](#)
Gas flow rate, [2-5](#)
Gas flow, checking, [4-4](#)
Gas regulator connections, [2-4](#)

H

Heating station
 controlling temperature, [3-3](#)
 inserting sample tube, [3-15](#)
Heating station adapters, [3-8](#)
 Gemini Series, [3-12](#)
 inserting and removing, [3-8](#)
 TriStar and ASAP Series, [3-10](#)
 types of, [3-9](#)

M

Maintenance, [4-4](#)

N

Notes, defined, [1-2](#)

O

Operator's manual, conventions, [1-2](#)
Ordering information, [5-1](#)

P

Parts, ordering, [5-1](#)

R

Rear panel
 connections, [2-4](#)
 controls, [3-2](#)

S

Sample
 degassing, [3-13](#)
 weighing, [3-6](#)
Sample tube
 cleaning, [3-4](#)
 inserting into heating station, [3-15](#)
Specifications, [1-3](#)

T

Temperature
 accuracy, [1-3](#)
 heating station, [3-3](#)
Temperature controller, [3-1](#), [3-3](#)
 error messages, [4-3](#)
Troubleshooting, [4-1](#)
Tubing
 flexible, [4-6](#)
 valve inlet, [4-7](#)

V

Valve inlet tubing, replacing, [4-7](#)

Voltage

selecting, [2-2](#)

W

Warnings, defined, [1-2](#)