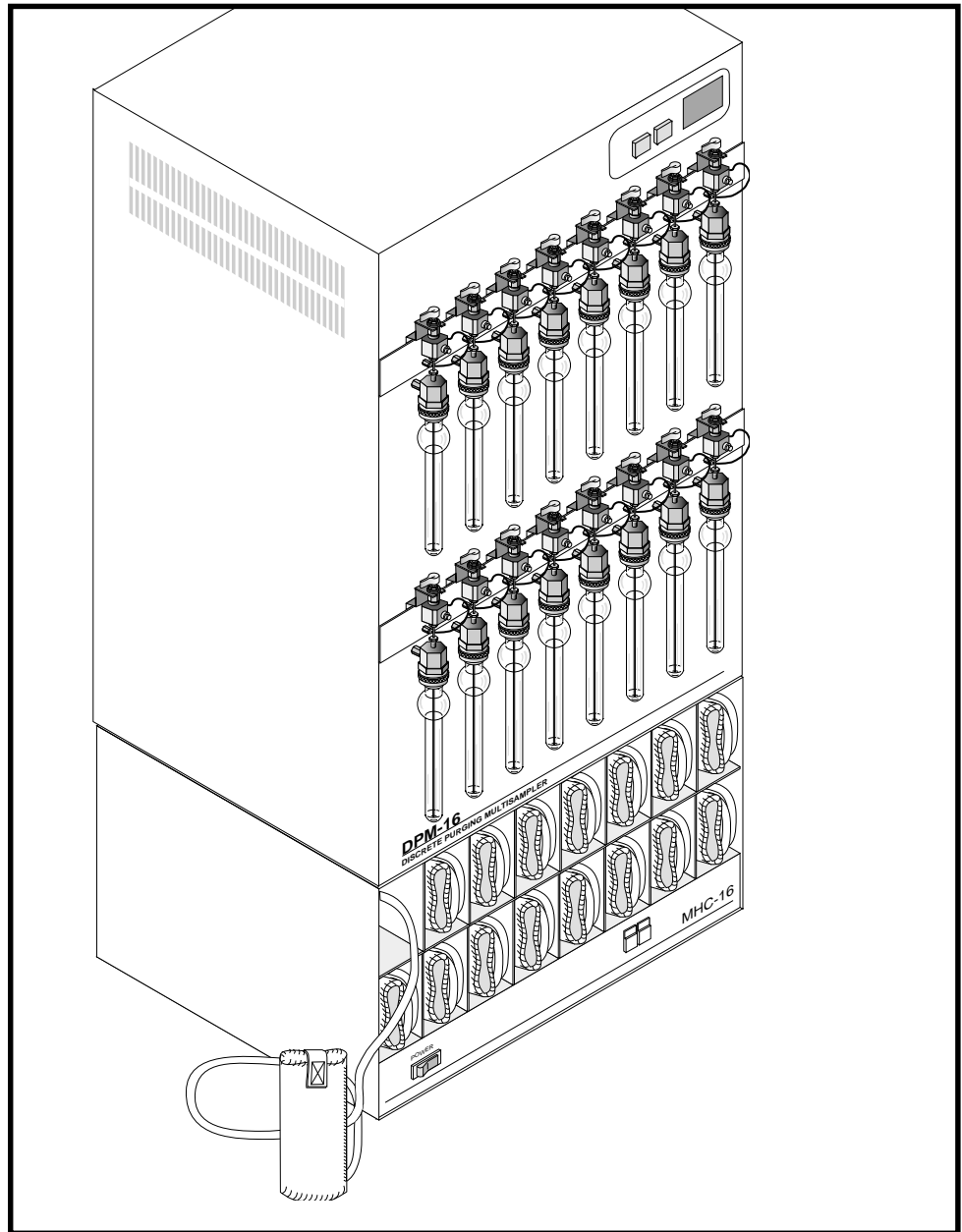




# DPM-16/MHC-16 Operator's Manual



O·Analytical

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OI Analytical Part #248393



## Limited Warranty

OI Analytical warrants each DPM-16 and MHC-16 against defects in materials and workmanship under normal use and service for a period of one (1) year. Equipment installed by OI Analytical is warranted from the installation date; all other equipment is warranted from the ship date. If purchaser schedules or delays installation more than 90 days after delivery, then warranty period starts on the 91st day from date of shipment. This warranty extends only to the original purchaser. OI Analytical will, at its option, repair or replace equipment that proves to be defective during the warranty period, provided the equipment is returned to OI Analytical at the expense of the purchaser. Parts, labor, and return shipment to the customer shall be at the expense of OI Analytical. Parts used and labor performed during on-site warranty service requested by the purchaser shall be at the expense of OI Analytical. Parts used and labor performed during on-site warranty service requested by the purchaser shall be at the expense of OI Analytical. Travel costs shall be at the cost of the purchaser.

Software and firmware designed by OI Analytical for use with a CPU will execute its programming instructions when properly installed on that CPU. OI Analytical does not warrant that the operation of the CPU, software, or firmware will be uninterrupted or error-free.

Consumables, columns, lamps, and high temperature furnaces are warranted for 30 days (parts only) and are not available for coverage under extended warranties or service contracts.

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- Purchaser-supplied accessories or consumable.
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# Chapter 1

## Introduction

The OI Analytical Discrete Purging Multisampler (DPM-16) is a 16-station automatic purging multisampler designed for use with any OI Analytical purge-and-trap sample concentrator. The DPM-16 can be equipped with a variety of sparge vessels, including needle and frit spargers of either 5-mL or 25-mL capacity, and 18 mm O.D. 10-mL disposable test tubes. (An adapter kit is available for 12 mm glassware.) The DPM-16 is the recommended multisampler for analyzing solids, sludges, soils, and water samples containing large amounts of particulates. It is also suitable for clean water analysis.

The OI Analytical Multiple Heater Controller (MHC-16) is a 16-station automatic heater controller that works in conjunction with the DPM-16. Heater jackets are available for needle spargers and for frit spargers. The MHC-16 should be used with methods that require heated samples (e.g., USEPA 8000 series methods). Heating mantles for the MHC-16 are available for air-tube desorption or Volatile Organic Sampling Train (VOST) analysis.

Applications for a DPM-16/MHC-16 system include:

- USEPA 601, 602, 603, 624
- USEPA 8010, 8015, 8020, 8021, 8030, 8240, 8260
- USEPA TO-1, 5041 (VOST) with optional kits

## DPM-16 Features

- Standard 16-sample capacity with capability of linking two multisamplers for extended sampling positions.
- Standard 18-mm fittings are designed for use with either 5-mL or 25-mL frit and needle nondisposable spargers, or 10-mL disposable glassware direct from the factory.
- Fully automated and controlled by any OI Analytical sample concentrator.
- A HOLD switch allows the unit to be paused at a station for clean-up.
- Adaptable to perform air-tube desorption (USEPA Method TO-1) or VOST analysis (USEPA Method 5041).



## DPM-16 Specifications

### Dimensions

- 28"H x 14.50"W x 16.25"D
- Footprint - 236 in.<sup>2</sup>

### Weight

- 59 lb

### Internal Valve/Line Temperature

- Ambient to 200°C

### Valve

- Electrically actuated, heated 34-port sample valve

### Sample Capacity

- 16 sparge vessels or air-tubes
- 8 VOST tube pairs

### Required Vessel Neck O.D.

- 18 mm (Adaptable for 12 mm with optional kit)

### Control Signals

- Full interface to sample concentrator for automatic control

### Gas Requirements

- 99.999% (UHP) H<sub>2</sub> or He (same as Models 4560 and 4460A )

### Power Requirements

- 110 VAC (±10%)/50/60 Hz
- 220 VAC (±10%) available





## MHC-16 Features

- Individually heats up to 16 samples, sequentially and automatically.
- Heater jackets for different sparge vessels can be used simultaneously.
- Automatic operation is controlled by the sample concentrator.
- Allows low-level soil analysis according to EPA Method 5030 and CLP protocol.

## MHC-16 Specifications

### Dimensions

- 9.74"H x 15.98"W x 14.50"D
- Fits under DPM-16, no additional benchspace required

### Weight

- 31 lbs

### Temperature Ranges

- Soil and water samples: ambient to 100°C
- Air-tube desorption: ambient to 300°C

### Signal Input

- External dry contact closure, 12 volt active

### Electrical Outputs

- Type K thermocouple output for MHC-16 to monitor heater jacket temperature

### Heater Power

- 16 individual ports, rated at 110 VAC or 220 VAC ( $\pm 10\%$ ), 250 watts

### Electrical Requirements

- 110 VAC ( $\pm 10\%$ )/50/60 Hz
- 220 VAC ( $\pm 10\%$ ) available



## Notes



## Chapter 2

# Description of Components

### DPM-16 Front Panel

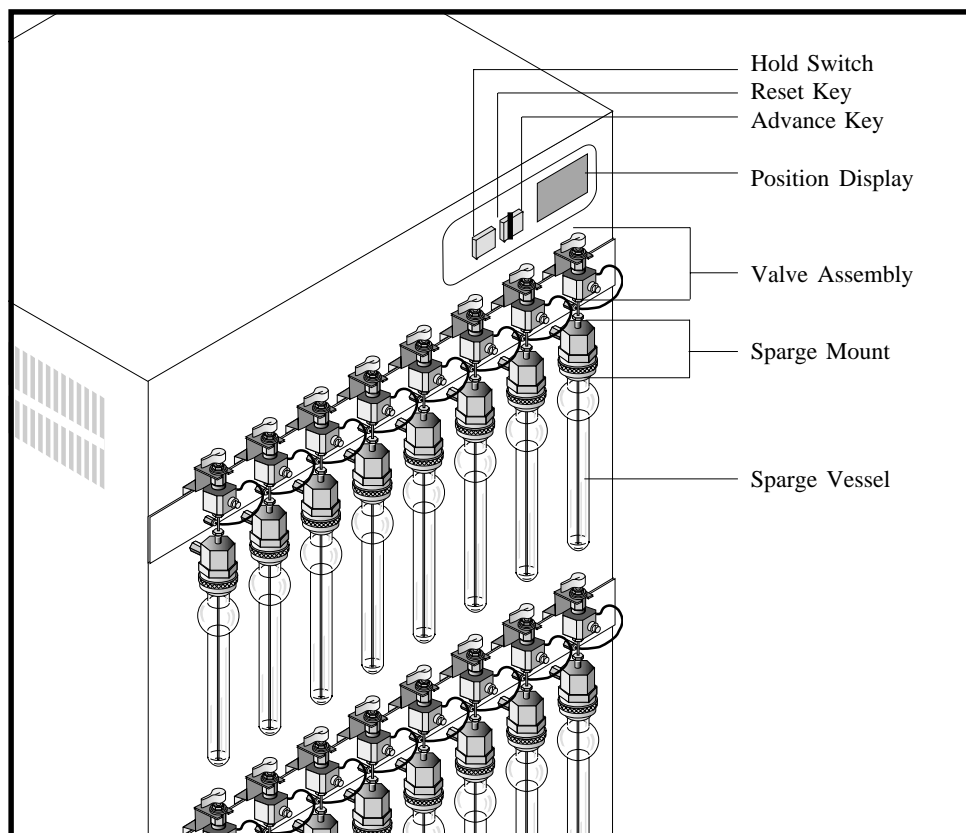


Figure 2.1. DPM-16 Front Panel with Sparge Vessels

**Hold Switch** prevents the DPM-16 from advancing to the next sparge vessel. The HOLD switch can be used to repeatedly purge one sample.

**Reset Key** advances the DPM-16 to the first sparge vessel position.

**Advance Key** rotates the internal switching valve to the next purge station.

**Position Display** shows the number of the current sparge vessel position.

**Valve Assembly** is an inert valve for sample injection and gas flow routing.

**Sparge Mount** holds the sparge vessel during purging.

**Sparge Vessel** contains the sample.



## DPM-16 Back Panel

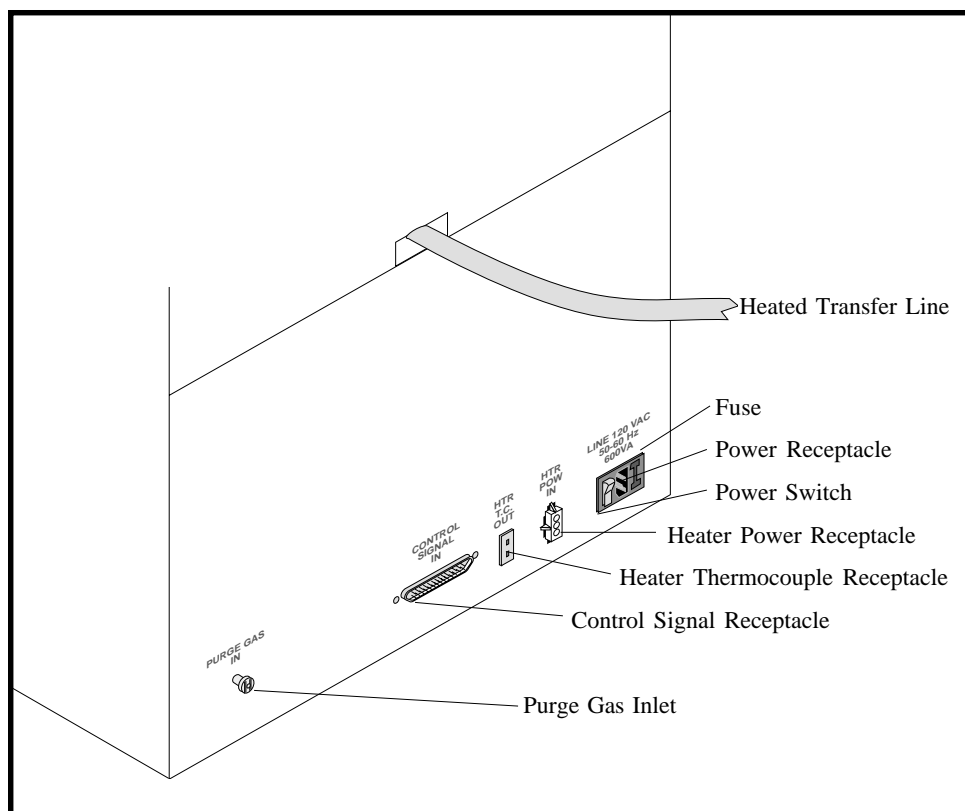


Figure 2.2. DPM-16 Back Panel

**Heated Transfer Line** transfers samples from the DPM-16 to the sample concentrator.

**Fuse** protects against electrical damage from electrical malfunction. (If fuse replacement is necessary, use only a 5 amp AGC-type, 250 volt, fast-blow fuse.)

**Power Receptacle** receives the appropriate grounded power cable, 110 or 220 VAC ( $\pm 10\%$ ).

**Power Switch** is used to turn the power on and off.

**Heater Power Receptacle** receives the 3-pin Molex<sup>®</sup> male connector from the sample concentrator External Heater Interface Cable. (Units manufactured before May 1990 use a 7-pin connector.)

**Heater Thermocouple Receptacle** receives the thermocouple connection from the sample concentrator External Heater Interface Cable.

**Control Signal Receptacle** receives the 25-pin male connector from the sample concentrator Control Signal Interface Cable.

**Purge Gas Inlet** is a 1/16" O.D. bulkhead fitting for accepting the purge gas line from the sample concentrator.



**CAUTION:**

*Failure to provide properly grounded AC power may result in an electrical shock hazard and/or instrument damage.*



## MHC-16 Front Panel

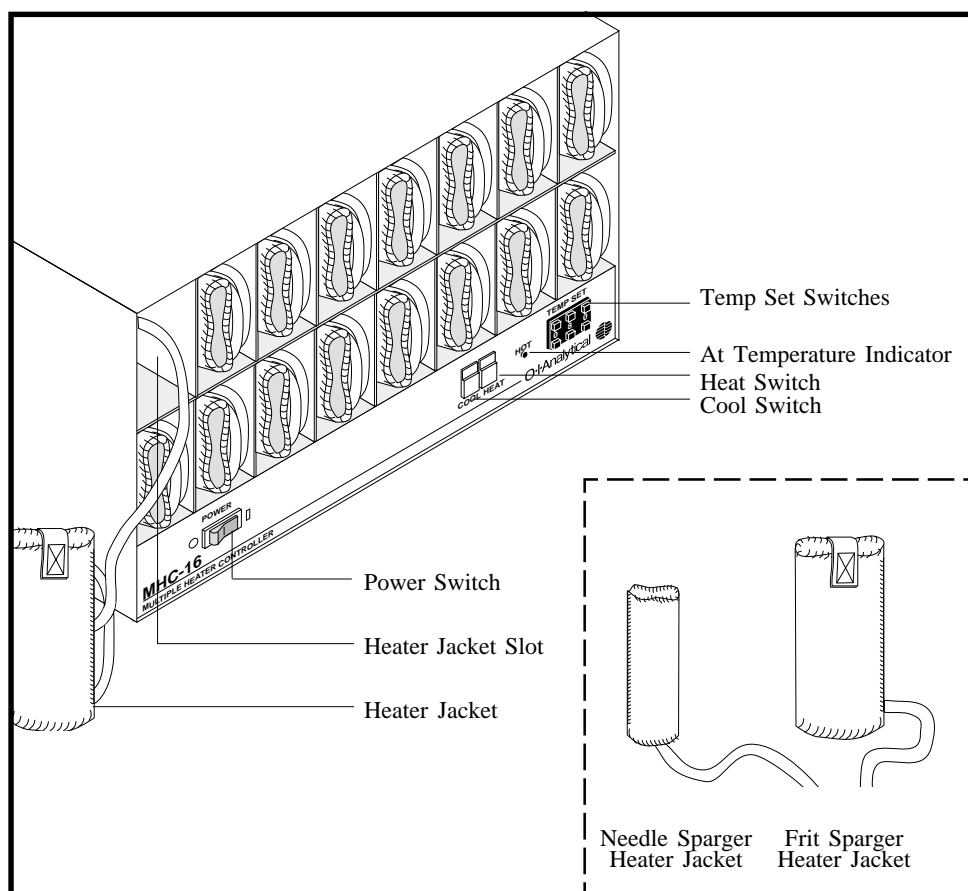


Figure 2.3. MHC-16 Front Panel

**Temp Set Switches** are used to set the temperature of all heater stations. (It can be set up to 999 in increments of 1; however, actual temperatures are limited to 100°C for SOIL/WATER and 300°C for AIR-TUBE.)

**At Temperature Indicator** lights when the MHC-16 heater jacket indicated in the DPM-16 POSITION display has reached set point temperature.

**Heat Switch** indicates that a specific heater station (the number of the station indicated in the DPM-16 POSITION display) is in the HEAT state. This switch is also a manual override used to put the MHC-16 into the HEAT state.

**Cool Switch** indicates that a specific heater station (the number of the station indicated in the DPM-16 POSITION display) is in the COOL state. This switch is also a manual override used to put the MHC-16 into the COOL state.

**Power Switch** is used to turn the power on and off. An internal neon lamp lights when the power is on.

**Heater Jacket Slots** house and segregate the heater jackets.

**Heater Jackets** fit snugly around sparge vessels, providing heat to the sample.



## MHC-16 Back Panel

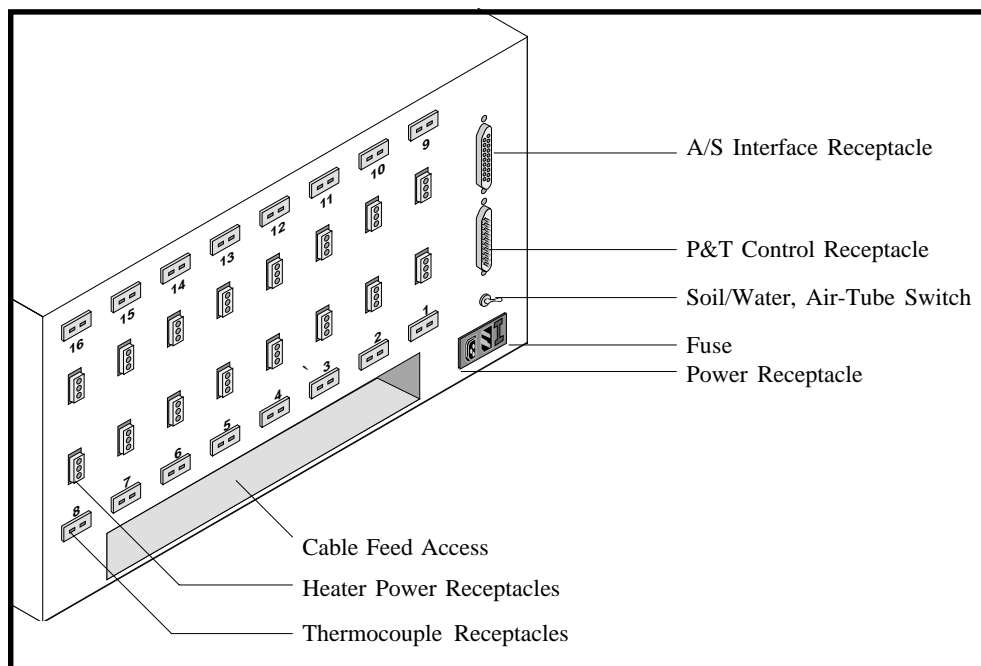


Figure 2.4. MHC-16 Back Panel

**A/S Interface Receptacle** receives the 25-pin male connector from the MHC-16/DPM-16 Interface Cable. The other end of the cable plugs into the Control Signal Receptacle on the rear panel of the DPM-16, to provide control signals.

**P&T Control Receptacle** receives the 25-pin female connector from the Control Signal Interface Cable. The other end of the cable plugs into the Autosampler/Multisampler Receptacle on the SC back panel, providing control signals to both the MHC-16 and DPM-16.

**Soil/Water, Air-Tube Switch** puts the MHC-16 in the selected mode. (It limits the temperature that the heater jacket can reach to prevent accidental overheating of aqueous samples.)


**Fuse** protects against electrical damage from electrical malfunction. (If fuse replacement is necessary, use only a 5 amp AGC-type, 250 volt, fast-blow fuse.)

**Power Receptacle** receives the appropriate grounded power cable, 110 or 220 VAC ( $\pm 10\%$ ). The duplex plug accepts power for the MHC-16 and provides fused power to the DPM-16.

**Cable Feed Access** facilitates connections and routing of the heater jacket power cables to the MHC-16 back panel.

**Heater Power Receptacles** receive the 3-pin male connector from the Heater Cables to provide AC power to heat the jackets or air-tube heaters.

**Thermocouple Receptacles** receive the thermocouple connections from the Heater Cables, allowing the MHC-16 to monitor the temperature of the heater jackets or air-tube heaters.

  
**CAUTION:**  
*Failure to provide properly grounded AC power may result in an electrical shock hazard and/or instrument damage.*



## Chapter 3 Installation

This chapter lists procedures for the installation of the DPM-16 and MHC-16 with the OI Analytical Model 4560 and Model 4460A Purge-and-Trap Sample Concentrators. For information on installation of the DPM-16 and MHC-16 with the Model 4551 Vial Autosampler, see the instructions in the Model 4551 to DPM-16 Interface Kit (Part #237495).

### Connecting the DPM-16 or DPM-16/MHC-16 and the Model 4560

#### Tubing Connections (see Figures. 3.1 and 3.2)

1. Position the DPM-16 on the left side of the Model 4560; or, for the DPM-16 and MHC-16, position the MHC-16 on the left side of the Model 4560 and the DPM-16 on top of the MHC-16.
2. Remove the plug from the PURGE GAS IN receptacle on the DPM-16 back panel with a flathead screwdriver. Connect the preswaged end of the purge gas line (Part #188623) to the PURGE GAS IN receptacle.
3. Remove the purge gas line from the bottom left of the Model 4560 front panel. Remove the frit sparger assembly (by unscrewing the 18-mm nut) and sparger.

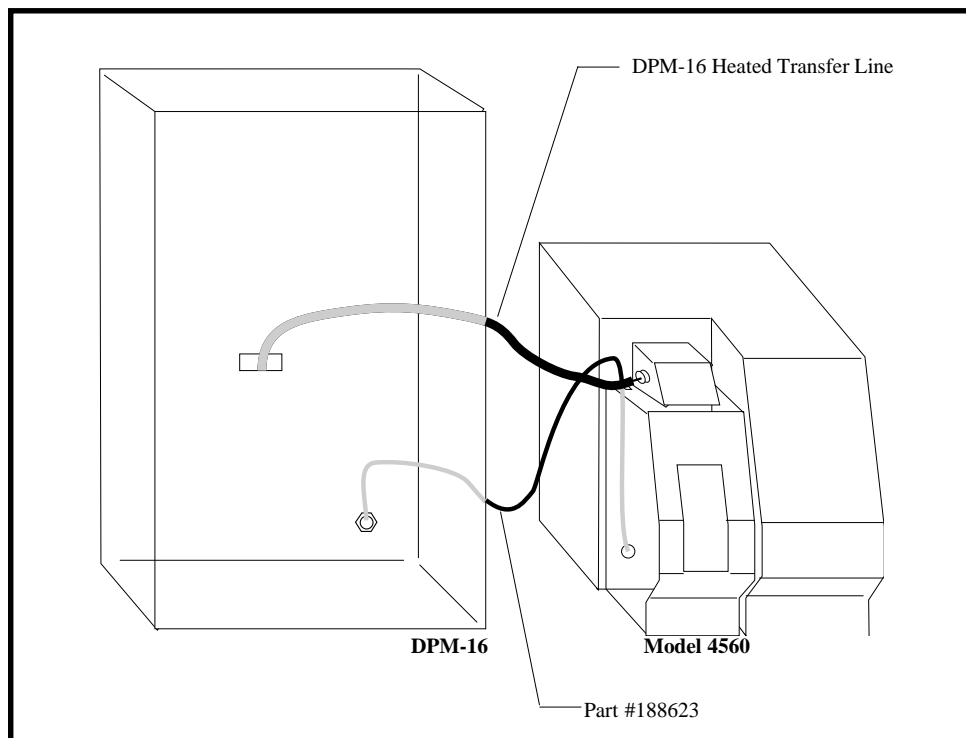


Figure 3.1. DPM-16 to Model 4560 Tubing Connections



4. Connect the other end of the purge gas line to the stainless steel 1/16" x 1" purge gas line inlet on the bottom left of the of the Model 4560 front panel using the 1" nut (Part #225557) and the brass 1/16" tube ferrule (Part #226456).
5. Remove the sparge filter from the left of the sparge mount cover with a 3/8" wrench. Replace the filter with the transfer line adapter fitting (Part #209536).
6. Attach the stainless steel 1/16" nut (Part #169640) and the 1/16" Teflon® tube ferrule (Part #177626) to the end of the heated transfer line extending from from the DPM-16 back panel. Screw the connections into the transfer line inlet on the sparge mount cover (where the adapter fitting (Part #209536) was installed).
7. Remove the sparge mount cover to leak-check the connection of the adapter fitting to the sparge mount. Tighten the adapter until the connection is leak-free.
8. Leak-check all other connections as described in Chapter 5, "Maintenance."

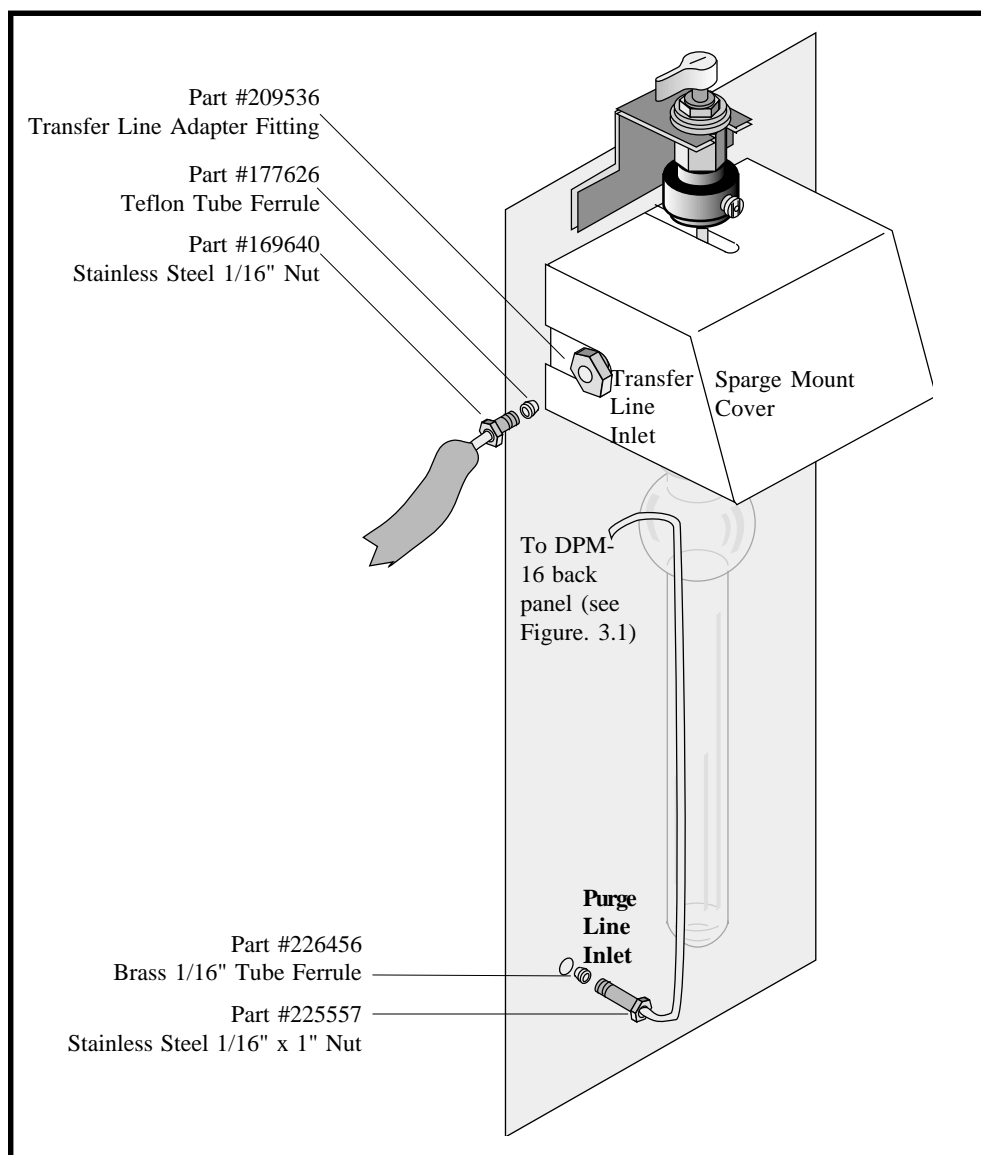


Figure 3.2. 4560 Gas Line Connections





**CAUTION:**  
Turn the power  
off to the Model  
4560 and DPM-  
16 before making  
electrical  
connections.

## Electrical Connections for the DPM-16 (see Figure 3.3)

1. Plug the 25-pin female connector of the control signal interface cable (Part #226605) into the CONTROL SIGNAL IN receptacle on the DPM-16 back panel. Plug the 25-pin male connector of the cable into the MULTISAMPLER receptacle on the Model 4560 back panel.
2. Plug the 7-pin female connector of the external heater interface cable (Part #195321) into the HTR POWER IN receptacle on the DPM-16 back panel. Plug the 3-pin Molex male connector of the cable into the EXTERNAL HEATER POWER receptacle on the Model 4560 back panel.
3. Plug the thermocouple (TC) connector of the external heater interface cable into the HTR T.C. OUT receptacle on the DPM-16 back panel. Plug the other TC end of the cable into the EXTERNAL HEATER T.C. receptacle on the Model 4560 back panel. Jumper the oven TC (AUX T.C.) outlet on the back of the Model 4560 if it will not be used. (See the Model 4560 Operator's Manual if more information is required.)
4. Plug the power cord (Part #116038) into the LINE power receptacle on the DPM-16 back panel and connect it to an appropriate grounded outlet (110 or 220 VAC ( $\pm 10\%$ )).
5. Test the connections by turning the power on to both the DPM-16 and the Model 4560 to verify that the Model 4560 passes the self-test.

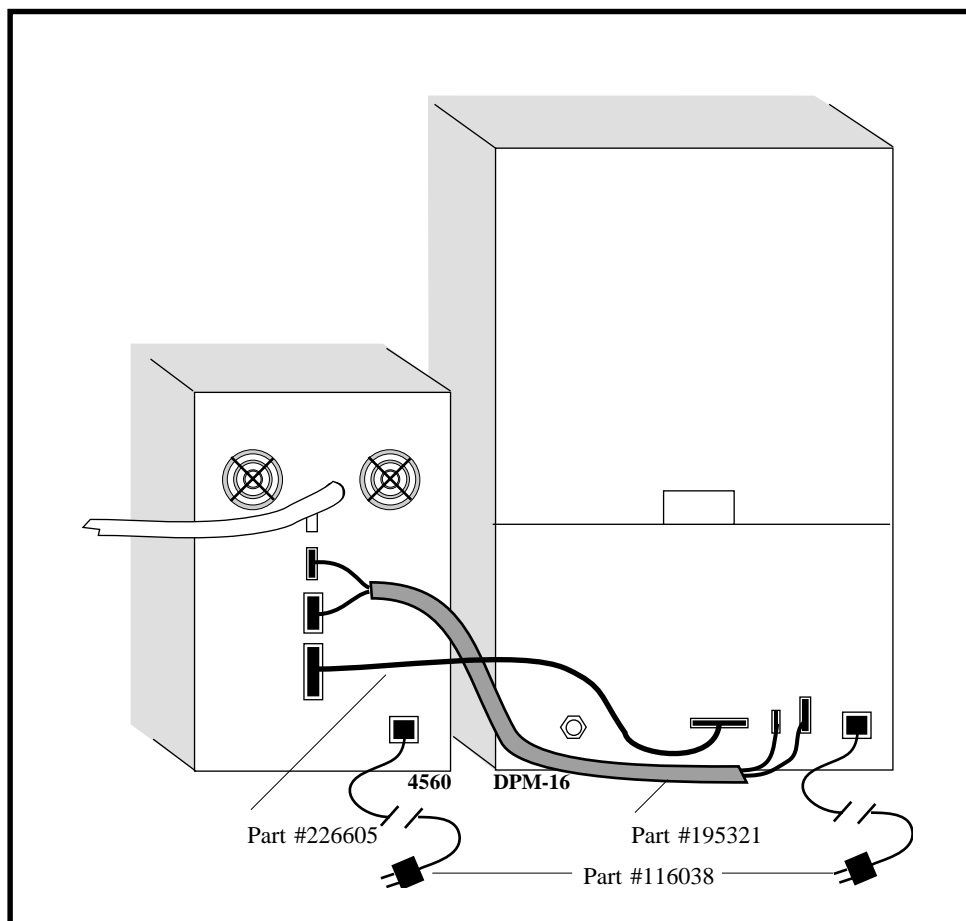


Figure 3.3. DPM-16 to Model 4560 Electrical Connections



**CAUTION:**  
Turn the power  
off to the 4560,  
DPM-16, and  
MHC-16 before  
making electrical  
connections.

## Electrical Connections for the DPM-16/MHC-16 (see Figure 3.4)

1. Plug the 25-pin male connector of the control signal interface cable (Part #226605) into the MULTISAMPLER receptacle on the Model 4560 back panel. Plug the other end of the control signal interface cable into the purge and trap CONTROL receptacle on the MHC-16 back panel.
2. Plug the 25-pin male connector of the DPM-16/MHC-16 interface cable (Part #229450 for MHC-16 Rev. B or later, Part #192443 for MHC-16 Rev. A) into the A/S INTERFACE receptacle on the back panel of the MHC-16. Plug the other end of the cable into the CONTROL SIGNAL IN receptacle on the DPM-16 back panel.
3. Plug the 7-pin female connector of the external heater interface cable (Part #195321) into the HTR POWER IN receptacle on the DPM-16 back panel. Plug the 3-pin Molex male connector of the cable into the EXTERNAL HEATER POWER receptacle on the Model 4560 back panel.
4. Plug the thermocouple (TC) connector of the external heater interface cable into the HTR T.C. OUT receptacle on the DPM-16 back panel. Plug the other TC end of the cable into the EXTERNAL HEATER T.C. receptacle on the Model 4560 back panel. Jumper the oven TC (AUX T.C.) outlet on the back of the Model 4560 if it will not be used. (See the Model 4560 Operator's Manual if more information is required.)

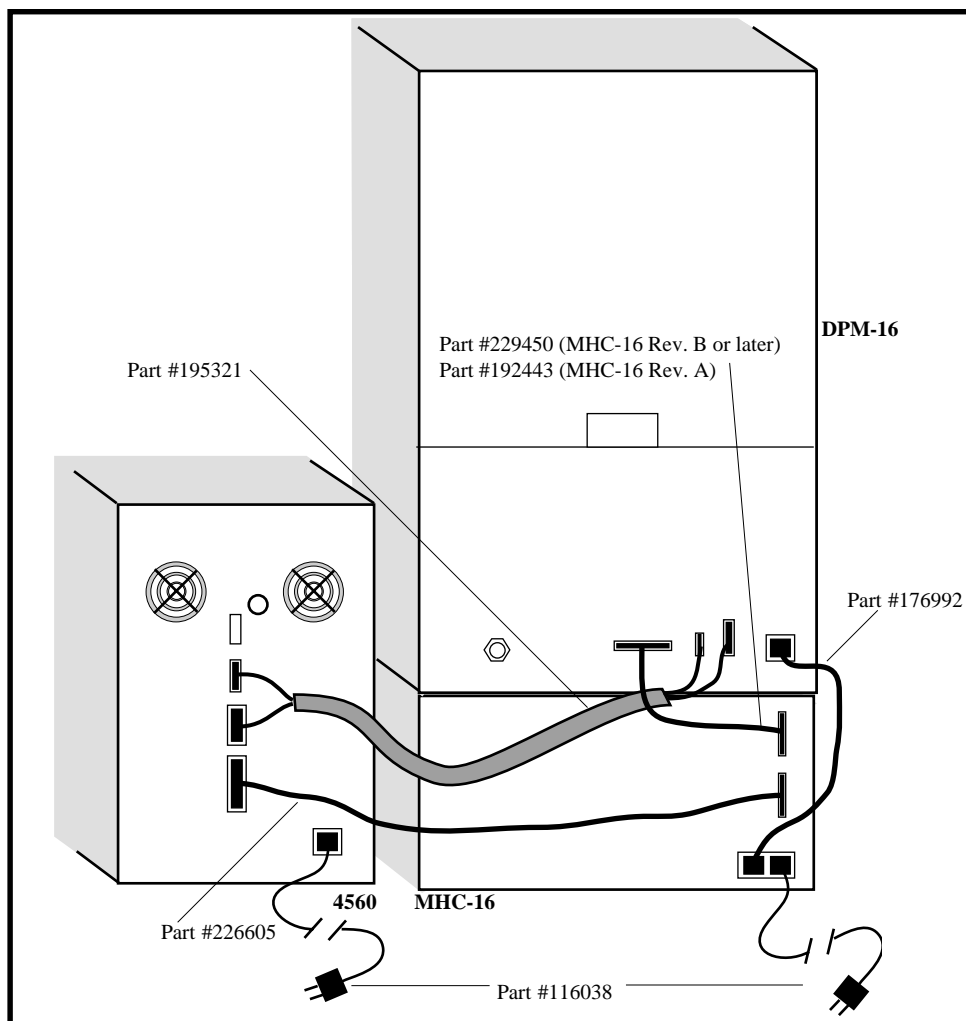


Figure 3.4. DPM-16/MHC-16 to 4560 Electrical Connections



5. Plug the power cord (Part #116038) into the LINE POWER receptacle on the MHC-16 back panel and into an appropriate grounded outlet (110 or 220 VAC ( $\pm 10\%$ )). Plug the power cord (Part #176992) into the MHC LINE POWER receptacle and the DPM-16 LINE power receptacle.
6. Test the connections by turning the power on to the DPM-16, MHC-16, and Model 4560 and verify that the Model 4560 passes the self-test.

## Configuring the Model 4560

To configure the Model 4560 for single or tandem DPM-16 operation:

1. Select CONFIG on the Model 4560 by pressing the 2nd function key (the gold key) and the [TIME] key.
2. Select OPTIONS in the Model 4560 display by pressing the [ON] key until the moving underline is under OPTIONS. Press [ENTER].
3. For Model 4560 Rev. 2.0 or later: **Scroll through the options by pressing the [ON] key. Select DPM1, for single DPM-16 operation, or DPM2, for tandem DPM-16 operation, by pressing [ENTER], then [ON].**  
For Model 4560 Rev. 1.07: **Scroll through the options by pressing [ENTER]. Select MPM-16 in the display, for single DPM-16 operation, or TANDEM, for tandem DPM-16 operation, by pressing [ON].**  
For Model 4560 Rev. 1.06 or earlier: **Scroll through the options by pressing [ENTER]. Select MPM-16 by pressing [ON]. (A firmware upgrade is required for tandem DPM-16 operation).**
4. Press [CLEAR] repeatedly to return to the main menu.

## Connecting the DPM-16 or DPM-16/MHC-16 and the Model 4460A

### Tubing Connections

1. Position the DPM-16 on the left side of the Model 4460A; or position the MHC-16 on the left side of the Model 4460A and the DPM-16 on top of the MHC-16.
2. Remove the plug from the PURGE GAS IN receptacle on the DPM-16 back panel with a flathead screwdriver.
3. Connect the preswaged end of the purge gas line (Part #188623) to the PURGE GAS IN receptacle. Remove the gold tee fitting and sample valve assembly (if attached) from the front panel of the Model 4460A. Connect the other end of the purge gas line to the purge line inlet extending from the front panel of the Model 4460A using the stainless steel 1/16" tube union (Part #165747) and 1/16" Teflon ring ferrules (Part #175952).
4. Connect the heated transfer line from the DPM-16 back panel to the male fitting extending from the Model 4460A front panel using the stainless steel 1/16" union (Part #218081), stainless steel nut (Part #169640), and 1/16" gold tube ferrule (Part #217810).
5. Leak-check the connections as described in Chapter 5, "Maintenance."



**CAUTION:**  
Turn the power  
off to the 4460A  
and DPM-16  
before making  
electrical  
connections.



**CAUTION:**  
Turn the power  
off to the 4460A,  
DPM-16, and  
MHC-16 before  
making electrical  
connections.

## Electrical Connections for the DPM-16

1. Plug the 25-pin female connector of the control signal interface cable (Part #230656) into the CONTROL SIGNAL IN receptacle on the DPM-16 back panel. Plug the 25-pin male connector of the cable into the AUTOSAMPLER receptacle on the Model 4460A back panel.
2. Plug the 7-pin female connector of the external heater interface cable (Part #195321) into the HTR POWER IN receptacle on the DPM-16 back panel. Plug the 7-pin male connector of the cable into the EXT HTR receptacle on the Model 4460A back panel. (Units produced after May 1990 use a 3-pin Molex connector in place of the 7-pin D-sub connector on both the Model 4460A and the multisampler. An adapter cable (Part #198259) is available for conversion.) Plug the thermocouple (TC) connector of the external heater interface cable into the HTR T.C. OUT receptacle on the DPM-16 back panel. Plug the other end of the cable into the EXT HTR receptacle on the Model 4460A back panel. The oven thermocouple (COL.) receptacle on the back of the Model 4460A should be jumpered if not used. (See the *Model 4560 Operator's Manual* if more information is required.)
3. Plug the power cord into the LINE power receptacle on the back panel of the DPM-16 and connect to an appropriate grounded outlet (110 or 220 VAC ( $\pm 10\%$ )).
4. Test the connections by turning the power on to both the DPM-16 and the Model 4460A and monitor external temperature to verify that the valve and transfer line temperature set points are reached.

## Electrical Connections for the DPM-16/MHC-16

1. Plug the 25-pin male connector of the control signal interface cable (Part #230656 for MHC-16 Rev. B, Part #192435 for MHC-14 Rev. A) into the AUTOSAMPLER receptacle on the 4460A back panel. Plug the other end of the control signal interface cable into the P&T CONTROL receptacle on the MHC-16 back panel.
2. Plug the 25-pin male connector of the DPM-16/MHC-16 interface cable (Part #229450 for MHC-16 Rev. B or later, Part #192443 for MHC-16 Rev. A) into the A/S INTERFACE receptacle on the MHC-16 back panel. Plug the other end of the cable into the CONTROL SIGNAL IN receptacle on the DPM-16 back panel.
3. Plug the 7-pin female connector of the external heater interface cable (Part #195321) into the HTR POWER IN receptacle on the DPM-16 back panel. Plug the 7-pin male connector of the cable into the EXT HTR receptacle on the Model 4460A back panel. (Units produced after May 1990 use a 3-pin Molex connector in place of the 7-pin D-sub connector on both the Model 4460A and the multisampler. An adapter cable (Part #198259) is available for conversion.) Plug the thermocouple (TC) connector of the external heater interface cable into the HTR T.C. OUT receptacle on the DPM-16 back panel. Plug the other end of the cable into the EXT HTR receptacle on the Model 4460A back panel. The oven thermocouple (COL.) receptacle on the back of the Model 4460A should be jumpered if not used. (See the *Model 4560 Operator's Manual* if more information is required.)
4. Plug the power cord (Part #116038) into the LINE POWER receptacle on the MHC-16 back panel and into an appropriate grounded outlet (110 or 220 VAC ( $\pm 10\%$ )). Plug the power cord (Part #176992) into the MHC LINE POWER receptacle and the DPM-16 LINE power receptacle.



5. Test the connections by turning the power on to both the DPM-16 and the Model 4460A and monitor external temperature to verify that the valve and transfer line temperature set points are reached.

## Configuring the Model 4460A

The Model 4460A is configured with DIP switches in the right bay of the instrument or numeric settings on the front panel. See “Model 4460A Configuration Settings” in the Appendix of this manual, or the *Model 4460A Operator’s Manual*.

## Needle Sparging Connections

The DPM-16 is shipped in needle sparging configuration.

**Note:** Wash all glassware thoroughly before using.

To attach needle spargers:

1. Loosen the 18-mm nut at the bottom of the sparge mount. Slide the needle sparger over the needle and into the 18-mm nut (see Figure 3.5). Finger-tighten the nut, or use the 18-mm wrench provided, for a secure fit.
2. Leak-check the connections as described in Chapter 5, "Maintenance."

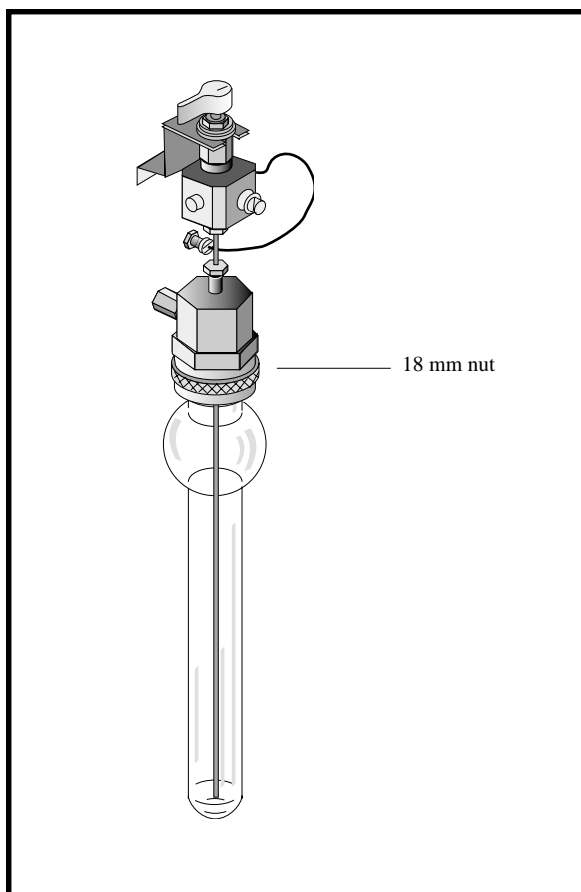


Figure 3.5. Needle Sparger Assembly



## Frit Sparging Connections

The DPM-16 is shipped in needle sparging configuration. To set up the DPM-16 for frit sparging (see Figure 3.6):

1. Unscrew the needle sparging purge gas line from the DPM-16 front panel with a flathead screwdriver. Unscrew the needle sparging purge gas line from the needle assembly (being careful not to lose the ferrule).
2. Loosen the 1/4" nut at the top of the sparge mount. Pull the needle assembly up so that the needle comes out of the sparge mount.
3. Remove the needle from the needle assembly by unscrewing the clear needle bushing. Screw in the frit needle (Part #203042) finger-tight plus 1/4 turn.
4. Replace the needle assembly: Slide the needle through the sparge mount and the sample valve mounting bracket into its slot of the DPM-16 front panel so that the needle end is at the desired level in the sparger.

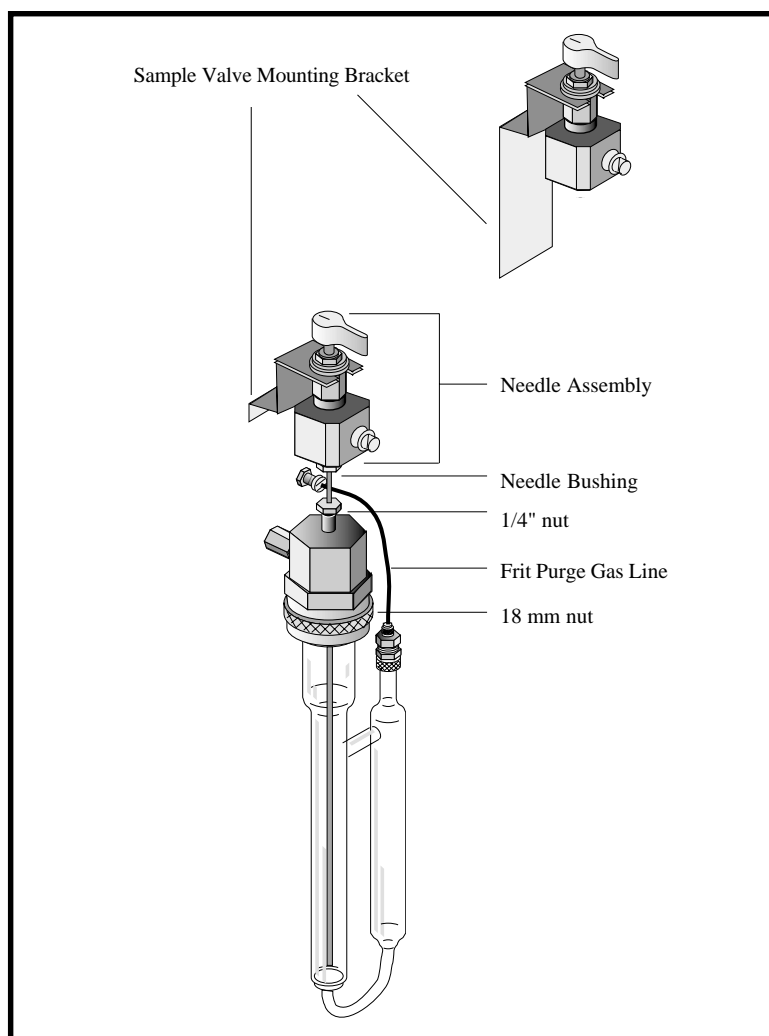


Figure 3.6. Frit Sparger Assembly



5. Tighten the 1/4" nut at the top of the sparge mount.

**Note:** Wash all glassware thoroughly before using.

6. Attach and tighten (finger-tight plus 1/4 turn) the brass 1/4"-1/16" male union (Part #197251) on the inlet arm of the frit sparger. (The union comes with a two-piece, 6-mm ferrule that can be replaced with the one-piece, 6-mm tube ferrule (Part #224337) provided.)
7. Attach the preswaged end of the frit gas line (Part #247924) into the purge gas outlet on the DPM-16 front panel.
8. Slide the frit sparger into the 18-mm nut, allowing the frit purge gas line to slide into the inlet arm. Finger-tighten the nut, or use the 18-mm wrench provided, for a secure fit.

9. Leak-check the connections as described in Chapter 5, "Maintenance."



## Notes





## Chapter 4

# Operation

**Note:** The instructions for installation and operation given in this manual are believed to be a thorough account for proper and safe operation. However, it is the responsibility of each laboratory to maintain the instrument in a condition suitable for safe use. All chemicals and samples used should be treated as potential health risks, and exposure to these materials should be minimized. Each laboratory is responsible for enforcing OSHA regulations regarding safe handling of chemicals and associated equipment.

## Overview of Operation

### DPM-16 Principle of Operation

The DPM-16 is capable of consecutively purging up to 16 samples automatically. The DPM-16 can accommodate both frit and needle sparge vessels and is particularly suited for analyzing solid samples and heavily particulated water samples. The sparge vessels are filled manually by syringe or by removing the sparge vessel to load the sample. Once the sample is loaded, the sample concentrator is programmed and the sequence is started. Purge gas flows from the sample concentrator to the DPM-16, through a heated valve, and into the sparge vessel. The purged compounds then return through a heated transfer line, back through the heated valve, into the sample concentrator's internal valve, and onto the trap. When the sample concentrator completes the DESORB and BAKE states, it moves into a STANDBY state. A two-second closure at the end of the BAKE cycle signals the DPM-16 valve to rotate to the next position. This process repeats until all samples are purged.

### MHC-16 Principle of Operation

The MHC-16 is capable of consecutively heating up to 16 samples automatically. It provides heat for frit and/or needle sparge vessels, or air-tubes with the optional air-tube heating accessory. The temperature of the heater jackets or mantles is set by controls on the MHC-16 front panel. The sample concentrator automatically controls all other operations. The HEAT and COOL keys on the MHC-16 front panel provide manual override of heating and cooling. Heater jackets are attached to the prepared sparge vessels and temperatures are set. The sample concentrator is programmed and the cycle begins. The MHC-16 heats the jacket of the active sample position during the PURGE state of the cycle. The samples may be preheated before the start of PURGE, to allow the sample temperature to stabilize before purging begins, by entering a PRE-HEAT time through the sample concentrator.



## Mud-Dawgs™

The Mud-Dawgs (Part #215061) supplied with the DPM-16 provide an inert barrier designed to prevent contamination of the transfer lines and valve of the DPM-16. For soil (clay) samples, the Mud-Dawg will stop or break apart a plug if it develops and moves up the sparger. For water samples, the Mud-Dawg will reduce deposits on the side of the sparge vessels caused by foaming samples for improved reproducibility.

To attach a Mud-Dawg to a needle, bend the Mud-Dawg slightly and slide it on the needle, with the needle going through both holes, as in Figure 4.5. It should be placed 1-2" above the sample level.

Mud-Dawgs can be cleaned following the normal laboratory procedures for glassware, or replaced as an expendable item.

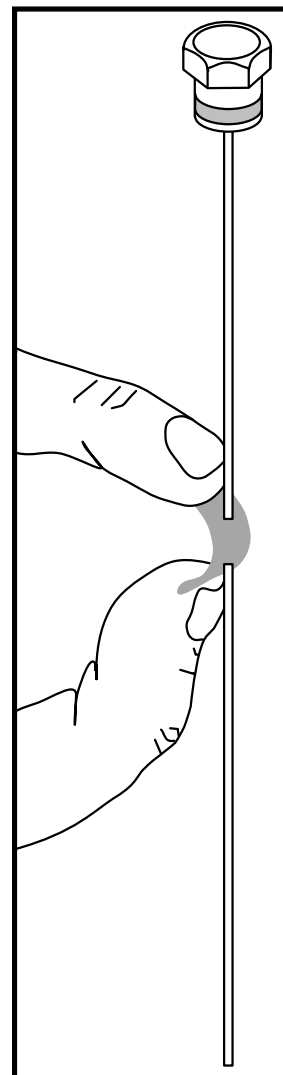


Figure 4.1. Mud-Dawg

## Loading and Unloading Samples

For both needle and frit sparging, samples can be loaded by removing the sparge vessel, putting the sample into the sparge vessel, and reinstalling the sparge vessel on the DPM-16.

Solid samples must be weighed into the needle sparge vessel before loading them onto the DPM-16. Once the sparge vessel is installed, reagent water (necessary for aiding purging) is added by syringe injection.

Liquid samples for both needle and frit sparging can be loaded by syringe injection.

Refer to EPA Method 502, 524, 5030, or other specific purge-and-trap methods for more detailed information on sample preparation and loading procedures.



## Loading Samples by Removing the Sparge Vessel

1. Loosen the 18-mm nut and remove the glassware.
2. Clean the outside of the needle with Kimwipes® or similar material.
3. Clean the inside of the needle by first advancing the DPM-16 to the position to be evacuated (press [RESET] or [ADV]). Do not advance past a position containing a sample to be analyzed as it could violate the integrity of the sample. Advance the sample concentrator to the PURGE state. Any sample remaining in the needle should be ejected.
4. Allow the position to purge for a second or more, until it is clear.
5. After cleaning all of the positions, return the sample concentrator to STANDBY (for Model 4560, press [HOLD], the gold 2nd function key, and [ON]; for Model 4460A, press the RUN/STOP/STEP switch and [CLEAR]).
6. Clean the glassware. (See "Glassware Maintenance" in Chapter 5.)
7. Put the sample in the sparge vessel, slide the sparge vessel over the needle and into the sparge mount, and re-tighten the 18-mm nut.

**Note:** As ferrules age, a finger-tight connection may not be leak-free. In this case, replace the ferrules or use a 1 1/8" open-end wrench to tighten the fitting up to 1/3 turn past finger-tight.

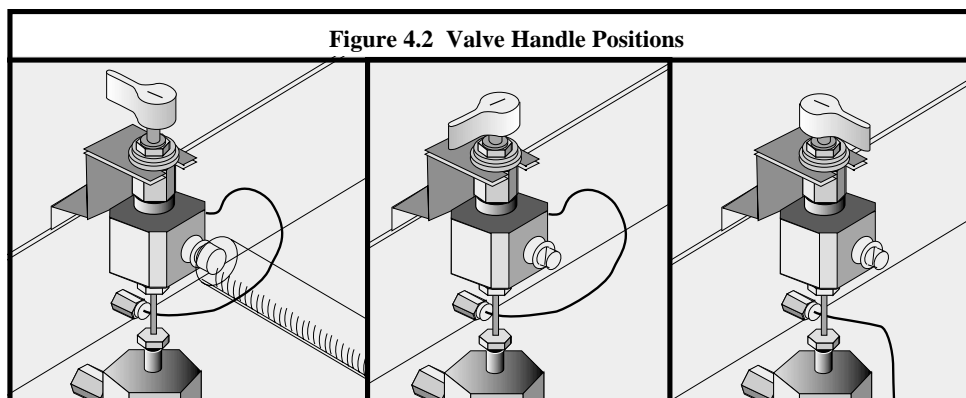
## Loading Samples by Syringe Injection

1. Screw the syringe into the front Luer-lock port of the sample valve.
2. Turn the valve handle so that it points toward the DPM-16 (see Figure 4.2.A).
3. Depress the plunger to inject the sample and leave the syringe in place until after the valve handle position is set as follows:

**For needle sparging,** turn the valve handle so that it is parallel to the DPM-16 front panel, pointing left (see Figure 4.2.B).

**For frit sparging,** turn the valve handle so that it points away from the DPM-16 (see Figure 4.2.C).

4. Remove the syringe.



A. For Injection and Extraction

B. For Needle Sparging

C. For Frit Sparging



## Unloading Samples by Syringe Extraction

Samples can not be completely unloaded from needle spargers by syringe extraction.

For syringe extraction of frit spargers, the frit needle must be resting on the frit. To extract a sample from a frit sparger by syringe injection:

1. Screw the syringe into the front Luer-lock port of the sample valve.
2. Turn the valve handle to the injection position (see Figure 4.2.A.).
3. Pull the plunger to evacuate the sample. (It is easier to pull the plunger when the sample concentrator is in the BAKE state.)
4. Return the valve handle to the frit sparging position (see Figure 4.2.C.).

**Note:** At least two rinses with organic-free water are required to prevent carryover.

## Operation of the DPM-16 and MHC-16 with the Model 4560

### Operation of the DPM-16

The DPM-16 is primarily controlled through the sample concentrator. Verify that the Model 4560 is configured for single DPM-16 or tandem DPM-16 operation. (See the configuration instructions in Chapter 3, "Installation.") Set time and temperature parameters on the Model 4560. (See the *Model 4560 Operator's Manual*, if necessary.) For instructions on attaching sparge vessels, see "Loading and Unloading Samples" in this chapter. (When operating with a DPM-16, the Model 4560 will display the current sample position when the [SPL] key is pressed.)

The HOLD switch, when on, prevents the DPM-16 from advancing to the next vessel position. It can be used to repeatedly purge one sample. Press the HOLD switch to activate or deactivate the HOLD function.

The [ADV] key is used to set the DPM-16 vessel position, indicated in the POSITION display.

The [RESET] key is used to set the DPM-16 to the first vessel position, indicated in the POSITION display. (The DPM-16 will cycle through all positions after the current position.)

**Note:** Do not advance past a position containing a sample to be analyzed as it could violate the integrity of the sample. ([RESET] will advance past all remaining positions.)



## Operation of the MHC-16

Once the Model 4560 is programmed and started, the MHC-16 is controlled automatically. Manual override of the MHC-16 is possible by using the HEAT and COOL switches on the MHC-16 front panel.

**Note:** The heater jacket slots, as indicated on the MHC-16 back panel, should correspond numerically to the sparge vessel positions, as indicated on the DPM-16 front panel.

1. Place the heater jackets over the loaded sparge vessels. For frit sparge vessels, slide the jacket on the vessel from the bottom and secure the retaining strap. For needle sparge vessels, slide the jackets on the vessels from the bottom. For air-tubes, slide the heating mantles over the tubes and secure with the thumbscrews or clips provided.
2. Set the temperature for the heater jackets or mantles with the TEMP SET switches on the MHC-16 front panel. (The required temperature for most 8000 series methods is 40°C. It may be necessary to set the heater jacket temperature slightly higher to get the sample to 40°C.)
3. Set the SOIL/WATER, AIR-TUBE switch on the MHC-16 back panel. (For safety, the heating circuit temperature is limited to 100°C for soil/water.)
4. Set the PRE-PURGE time on the Model 4560. (PRE-PURGE is usually used only for air-tube analysis to remove unwanted oxygen and moisture from the tube prior to heating.)
5. Set the PRE-HEAT time on the Model 4560. The PRE-HEAT time should be long enough for the jacket to reach the temperature set point before purge begins.

## To Start a Run

- **Rev. 2.0 or later:** Press the [SPL] key on the Model 4560 and enter the START and END positions that correspond to the actual vessel positions on the DPM-16 to be purged. (For continuous cycling of the DPM-16, enter a final sample number of 0.)

**Rev. 1.07 or earlier:** Press the [SPL] key on the Model 4560 and enter a start position, THIS SAMPLE, and an end position, FINAL. The DPM-16 will begin the run from the current DPM-16 position indicated in the POSITION display, regardless of the position input in THIS SAMPLE. (For continuous cycling of the DPM-16, enter a final sample number of 0.)

- Press [START] on the Model 4560. (If the Model 4560 was recently run, it will wait until the trap has cooled, then advance through PURGE READY, automatically start, and illuminate the START light.)

## To Stop a Run

- Press [HOLD], the 2nd function key (the gold key), and [ON] on the Model 4560. The sample run is aborted and the Model 4560 goes into the STANDBY state (all heated zones cool and gas flows stop).



# Operation of the DPM-16 and MHC-16 with the Model 4460A



**CAUTION:**  
For 4460A  
firmware prior to  
Rev. G: Vessels  
may pressurize  
during and  
following purging.  
Always stand clear  
of the syringe and  
sample injection  
valve.

## Operation of the DPM-16

The DPM-16 is primarily controlled through the sample concentrator. Verify the Model 4460A configuration. (See "Model 4460A Configuration Settings" in the Appendix.) Set time and temperature parameters on the Model 4460A. (See the Model 4460A Operator's Manual, if necessary.) For instructions on attaching sparge vessels, see "Loading and Unloading Samples" in this chapter.

The HOLD switch, when on, prevents the DPM-16 from advancing to the next sparge vessel. It can be used to repeatedly purge one sample. Press the HOLD switch to activate or deactivate the HOLD function.

The [ADV] key is used to set the DPM-16 sample position, indicated in the POSITION display.

The [RESET] key is used to set the DPM-16 to the first sample position, indicated in the POSITION display.

**Note:** Do not advance past a position containing a sample to be analyzed as it could violate the integrity of the sample. ([RESET] will advance past all remaining positions.)

1. Set the AUTO DRAIN switch on the Model 4460A back panel to OFF .

**Note:** Failure to set the AUTO DRAIN switch to OFF will pressurize the station being analyzed during the DESORB state.

2. Turn the Model 4460A power on (**I**) and verify that the selected method designator is displayed in the TEMPERATURE display screen.

**Note:** Always clear the Model 4460A after registering any program changes, such as DIP switch or AUTO DRAIN settings.

## Operation of the MHC-16

Once the Model 4460A is programmed and started in the AUTO RUN process, the MHC-16 is controlled automatically. Manual override of the MHC-16 is possible by using the HEAT and COOL switches on the MHC-16 front panel.

**Note:** The heater jacket slots, as indicated on the MHC-16 back panel, should correspond numerically to the sparge vessel positions, as indicated on the DPM-16 front panel.

1. Verify that DIP switch #1 in the Model 4460A right bay is in the on position when using the MHC-16, to enable the PRE-PURGE and PRE-HEAT function. (See "Model 4460A Configuration Settings" in the Appendix.)



2. Place the heater jackets over the loaded sparge vessels. For frit sparge vessels, slide the jacket on the vessel from the bottom and secure the retaining strap. For needle sparge vessels, slide the jackets on the vessels from the bottom. For air-tubes, slide the heating mantles over the tubes and secure with the thumbscrews or clips provided.
3. Set the temperature for the heater jackets or mantles with the TEMP SET switches on the MHC-16 front panel. (The required temperature for most 8000 series methods is 40°C. It may be necessary to set the heater jacket temperature slightly higher to get the sample to 40°C.)
4. Set the SOIL/WATER, AIR-TUBE switch on the MHC-16 back panel. (For safety, the heating circuit temperature is limited to 100°C for soil/water.)
5. Set the PRE-PURGE time with the [PUMP] key (2nd FUNCT.) on the Model 4460A. (PRE-PURGE is usually used only for air-tube analysis to remove unwanted oxygen and moisture from the tube prior to heating.)
6. Set the PRE-HEAT time with the [INJ] key (2nd FUNCT.) on the Model 4460A. The PRE-HEAT time should be long enough for the jacket to reach the temperature set point before purge begins.

## To Start a Run

1. Set the number of consecutive samples to be purged with the [SPL NO] key on the Model 4460A front panel.
2. Press the AUTO ON/OFF switch on the Model 4560 (the green LED will illuminate). Press the RUN STOP/START switch (the red LED will illuminate).

## To Stop a Run

1. Press the RUN/STOP/STEP switch on the Model 4460A front panel.
2. Press CLEAR (2nd FUNCT.) on the Model 4460A front panel. The sample run is aborted and the Model 4460A goes to the STANDBY state (all heated zones cool and gas flows stop).



## Notes





**CAUTION:**  
*Proper laboratory practices should be followed when using the solvents and cleaning agents described in this section. Many of the samples analyzed with this equipment are known hazardous materials. Wastes and residues should be handled accordingly.*

## Chapter 5 Maintenance

### Glassware Maintenance

The following information is from the United States Environmental Protection Agency's Test Methods for Evaluating Solid Waste (November 1986), Volume 1B, section 4.1.4.

#### Cleaning the Glassware

In the analysis of samples containing components in the parts per billion range, the preparation of scrupulously clean glassware is mandatory. Failure to do so can lead to a myriad of problems in the interpretation of the final chromatograms due to the presence of extraneous peaks resulting from contamination. Particular care must be taken with glassware such as Soxhlet extractors, Kuderna-Danish evaporative concentrators, sampling-train components, or any other glassware coming in contact with an extract that will be evaporated to a lesser volume. The process of concentrating the compounds of interest in this operation may similarly concentrate the contamination substance, which may seriously distort the results. To clean the glassware:

1. Remove the surface residuals immediately after use. As soon as possible after glassware (i.e., beakers, pipets, flasks, or bottles) has come in contact with sample or standards, the glassware should be methanol-flushed before it is placed in the hot detergent soak. If this is not done, the soak bath may serve to contaminate all other glassware placed therein.
2. Hot soak to loosen and flotate most particulate material. The hot soak consists of a bath of a suitable detergent in water of 50°C or higher. The detergent — powder or liquid — should be entirely synthetic and not a fatty acid base. There are very few areas of the country where the water hardness is sufficiently low to avoid the formation of some hard-water scum resulting from the reaction between calcium and magnesium salts with a fatty acid soap. This hard-water scum or curd would have an affinity particularly for many chlorinated compounds and, being almost wholly water-insoluble, would deposit on all glassware in the bath in a thin film.

There are many suitable detergents on the wholesale and retail markets. Most of the common liquid dishwashing detergents sold at retail are satisfactory but are more expensive than other comparable products sold industrially. Alconox, in powder or tablet form, is manufactured by Alconox, Inc., New York, and is marketed by a number of laboratory supply firms. Sparkleen, another powdered product, is distributed by Fisher Scientific Company.



3. Hot-water rinse to flush away floated particulates.
4. Soak with an oxidizing agent to destroy traces of organic compounds. The most common and highly effective oxidizing agent for removal of traces of organic compounds is the traditional chromic acid solution made up of  $H_2SO_4$  and potassium or sodium dichromate. For maximum efficiency, the soak solution should be hot (40-50°C). Safety precautions must be rigidly observed in the handling of this solution. Prescribed safety gear should include safety goggles, rubber gloves, and apron. The bench area where this operation is conducted should be covered with fluorocarbon sheeting because spattering will disintegrate any unprotected surfaces.

The potential hazards of using chromic sulfuric acid mixture are great and have been well publicized. There are now commercially available substitutes that possess the advantage of safety in handling. These are biodegradable concentrates with a claimed cleaning strength equal to the chromic acid solution. They are alkaline, equivalent to ca. 0.1 N<sub>2</sub>NaOH upon dilution, and are claimed to remove dried blood, silicone greases, distillation residues, insoluble organic residues, etc. They are further claimed to remove radioactive traces and will not attack glass or exert a corrosive effect on skin or clothing. One such product is "Chem Solv 2157," manufactured by Mallinckrodt and available through laboratory supply firms. Another comparable product is "Detex," a product of Borer-Chemie, Solothurn, Switzerland.

5. Hot-water rinse to flush away materials loosened by the deep penetrant soak.
6. Distilled-water rinse to remove metallic deposits from the tap water.
7. Methanol rinse to flush off any final traces of organic materials and remove the water.
8. Flush the item immediately before use with some of the same solvent that will be used in the analysis. There is always a possibility that between the time of washing and the next use, the glassware could pick up some contamination from either the air or direct contact. To ensure against this, it is good practice to flush the item immediately before use with some of the same solvent that will be used in the analysis.

The drying and storage of the cleaned glassware is of critical importance to prevent the beneficial effects of the scrupulous cleaning from being nullified. Pegboard drying is not recommended because contaminants can be introduced to the interior of the cleaned vessels. Neoprene-coated metal racks are suitable for such items as beakers, flasks, chromatographic tubes, and any glassware that can be inverted and suspended to dry. Small articles such as stirring rods, glass stoppers, and bottle caps can be wrapped in aluminum foil and oven-dried a short time if oven space is available. Under no circumstances should such small items be left in the open without protective covering. The dust cloud raised by the daily sweeping of the laboratory floor can most effectively recontaminate the clean glassware.

As an alternative to air drying, the glassware can be heated to a minimum of 300°C to vaporize any organics.



## Purge/Sample Line Maintenance

The purge gas lines and the sample lines should be periodically baked-out to minimize carryover. Carryover can occur whenever high-level and low-level samples are analyzed sequentially. The valve, gas lines, and sample lines are all subject to contamination; therefore, bake-out and purging of the entire unit may be required. Lines may also be flushed with organic-free water if baking alone is not sufficient.

## Other Maintenance

- Inspect the sparge ferrules and replace them when they become worn or badly distorted.
- To clean the heater jackets, unplug them and wipe them with a damp rag. Dry them thoroughly before using.

## Leak-Check

When the DPM-16 glassware is converted from one sparger style to another, or if a loss of standard or sample recovery is noted, leak-check the purge gas system. (Refer to the appropriate sample concentrator operator's manual, if necessary, for details on sample concentrator instructions listed below.)

1. Inject a standard volume of reagent water into the sparger positions to be tested.
2. Verify that the sample concentrator purge gas back pressure is at 20 psi in STANDBY or PURGE READY.
3. Verify that the flow rate in PURGE is approximately 40 mL/min.
4. Advance the DPM-16 valve to the position to be tested by pressing the [ADV] key.
5. Firmly plug the VENT outlet on the 4560.
6. Observe the purge flow rate through the sparger and purge gas back pressure gauge of the sample concentrator. There should be a decrease in purge velocity (bubble rate) and an increase in system back pressure.
7. The purge flow should decrease to zero over 1–2 minutes as the system comes to full 20 psi pressure. Continued flow or less than full back pressure indicates a leak. Use a helium leak detector to isolate and correct the problem.
8. Reduce the system pressure by removing the purge flow outlet plug. Advance the DPM-16 valve to the next position to be tested. Repeat this procedure until all suspect positions have been tested.
9. Reset the system pressure to 20 psi in STANDBY or PURGE READY.



**CAUTION:**  
*Verify that the fittings are snug. Pressure build-up in the sparge vessel may cause the vessel to come out of its fitting.*



## Notes



# Chapter 6

## Troubleshooting

This chapter lists problems that might occur during normal operation of the DPM-16 and MHC-16 along with possible solutions. Any maintenance that involves the interior components of the DPM-16 should be performed by OI Analytical trained technical support personnel only. If a problem still exists after reviewing the following chart, or if it is not addressed, contact OI Analytical's Technical Support Department for assistance at (800) 336-1911 or (979) 690-1711.

### DPM-16 Troubleshooting Chart

Symptom	Probable Cause	Corrective Action
No power	Power cord not plugged in  Fuse blown	Plug in power cord  Check fuse and replace if necessary
Foaming sample	High salt content or surfactants present    Purge flow too high	Dilute sample if feasible  Add antifoam agent such as DOW Antifoam B®  Use Mud Dawgs™  Use needle sparger  Use larger volume sparger  Decrease flow rate
Sample concentrator does not advance to purge	Interface cable not connected  DPM-16 in HOLD  Sample concentrator not configured properly    <i>[Continued on next page.]</i>	Plug in interface cable    Press the HOLD switch to deactivate HOLD  Configure the sample concentrator to automatically advance to Purge (contact closure)



Symptom	Probable Cause	Corrective Action
Sample concentrator does not advance to purge	Run not initiated  Trap temperature too hot in STANDBY	Press START/RUN on sample concentrator  Check FINAL/END sample number on sample concentrator and reset, if necessary  Check trap temperature and verify that the air flow is not impeded around the bottom of the sample concentrator
Contamination/carryover	Sample foaming  Dirty glassware  High boiling-point compounds in sample pathway	Clean glassware and sample path  Use Mud Dawgs™  Clean glassware and sample path  Periodically bake out DPM-16 lines at elevated (> default) temperature up to 150°C  See sample concentrator troubleshooting (contamination)  Connect heater power cable
Heated lines not functioning	Heater interface not connected  External heater setting not correct on sample concentrator  DPM-16 not plugged in or fuse blown  Sample concentrator A/C control board fuse blown (external heater)  Thermocouple not connected  Open heater cartridge  Shorted heater cartridge	Set proper temperature  Plug DPM-16 in or replace fuse  Replace fuse  Plug thermocouple in  Replace heater cartridge  Repair heater cartridge  Connect thermocouple
External heater temperature display erratic	Thermocouple not plugged in  Open thermocouple	Check thermocouple continuity with voltmeter; replace heated transfer line if necessary



Symptom	Probable Cause	Corrective Action
No gas flow during PRE-PURGE or PURGE	Purge gas line not connected	Connect purge gas line
	Leak in connections	Leak-check as described in Chapter 5, "Maintenance"
	Flow is blocked by sample valve	Make sure valve is in proper position to allow flow
	Flow is blocked by plugged needle	Remove needle and clean
	Misaligned 34-port valve	Replace 34-port valve and actuator (consult OI Analytical Service Department for valve replacement instructions)
Low or no recovery	Leak in transfer line connections	Check DPM-16 transfer line connections to the sample concentrator
	Faulty trap	Replace trap
	Low sample temperature	Allow samples to come to room temperature before analysis
Switching valve advance is erratic or sluggish	Valve actuator overheating	Check fan for blocked air intake; move DPM-16 to free intake; clean grill if necessary
	Poor interface connection	Reconnect multisampler communication cable
No PRE-PURGE or PRE-HEAT states	If 4460A: DIP switch #1 not on	Set DIP Switch #1 to ON position
	Times set to 0	Program times for these functions
Sample transfer from one station to another; purging of two channels simultaneously	Valve rotor scored by particulate matter	Consult the OI Analytical Service Department



## MHC-16 Troubleshooting Chart

Symptom	Probable Cause	Corrective Action
No power	Not plugged in	Plug in power cord
	Fuse blown	Replace fuse
HOT lamp comes on immediately when unit is put into HOT state	Temperature set at or below room temperature	Increase temperature
	Thermocouple not plugged into correct receptacle	Plug thermocouple into correct receptacle (see Chapter 3, "Installation")
Unit does not start HEAT state when purging sample	Communication cable not connected properly	Make sure cable is connected to proper receptacle (see Chapter 3, "Installation")
	If 4460A: DIP switch #1 not on	Set DIP switch #1 to ON
	Wrong cable used between sample concentrator and MHC-16	Install correct cable (see the Cable Matrix in the Appendix)
	Faulty cable	Replace cable
	Faulty heater jacket	Replace heater jacket
	Faulty thermocouple	Replace heater jacket
Wrong jacket heats	Wrong cable connected between DPM-16/MHC-16	Install correct cable (see the Cable Matrix in the Appendix)
	Faulty cable	Replace cable
	Faulty jacket	Replace heater jacket
No jacket heats	Jacket not plugged in	Check connections on back panel of MHC-16
	Wrong cable connected between DPM-16/MHC-16	Replace with correct cable
	Temperature set too low	Raise temperature to correct setting
	Faulty jacket	Replace heater jacket





# Chapter 7

## Replacement Parts

Replacement parts considered expendable are marked with an asterisk under "XPND." (Expendable components should be replaced regularly or are easily broken or deformed.) If the part is shown in a drawing, the figure number is listed under "Fig."

<u>Part Name</u>	<u>Part #</u>	<u>U/M</u>	<u>XPND</u>	<u>Fig.</u>
<b>Cables</b>				
4560/DPM or MHC Control .....	226605	ea		3.3, 3.4
4460A/DPM or MHC Control .....	230656	ea		-
4460A/MHC (Rev. A) Interface .....	192435	ea		-
Sample Concentrator/DPM Heater .....	195321	ea		3.3
Power Cable.....	116038	ea		3.3, 3.4
MHC-16 to DPM-16 Power Cable .....	176992	ea		3.4
MHC (Rev. A)/DPM Interface .....	192443	ea		3.4
MHC (Rev. B)/DPM Interface .....	229450	ea		3.4
<b>Boards</b>				
PCA - DPM Control .....	247759	ea		-
PCA - MHC/4560 Interface.....	229435	ea		-
PCA - MHC Controller .....	250134	ea		-
PCA - MHC Back Panel .....	192823	ea		-
<b>Ferrules</b>				
KEL-F 1/4-28 1/16 x 0.8 mm .....	187203	ea	*	7.2
Teflon 1/16 Tube (5/pk) .....	196220	pk	*	7.1
Teflon 18 mm Tube (10/pk) .....	224352	pk	*	7.1
Brass 1/16 Tube Reverse .....	228049	ea	*	7.2, 7.3
Teflon 1/16 Ring (10/pk) .....	208355	pk	*	-
SS 1/16 Tube (5/pk) .....	196246	pk	*	-
Graphite/Vespel 1/16 Tube (10/pk) .....	216366	pk	*	7.4
SS/Au 1/16 Tube (5/pk) .....	217828	pk	*	7.4
Teflon 6 mm Tube .....	224337	ea		7.3
<b>Fittings</b>				
Brass Plug 10-32 .....	167652	ea		-
KEL-F Female Luer 1/4-28 .....	169468	ea	*	7.1
Brass/Ni Coupling 10-32 .....	176033	ea		-
Nut SS 1/16 M (5/pk).....	196311	pk		7.4, 7.1
Nut SS 18 mm Female Knurled .....	224675	ea		7.1
Union SS/Au 18 mm .....	271809	ea		7.1
Nut Al 1/4-28 1/16 Silver (5/pk) .....	196287	pk		7.2
Union SS 1/16 Tube Male.....	165747	ea		-
Adapter Transfer/4560 .....	209536	ea		7.4
Union SS 1/16 FBODY .....	218081	ea		-
Nut SS 1/16 x 1 Male .....	225557	ea		7.4
Nut SS 1/16 Male Knurled.....	217240	ea		7.2, 7.3
Union - Brass 1/4-1/16 Male .....	197251	ea		7.3



<u>Part Name</u>	<u>Part #</u>	<u>U/M</u>	<u>XPND</u>	<u>Fig.</u>
<b>Glassware (Sparge Vessels) -Kits</b>				
5 mL Frit (18 mm) (16/kit) .....	247916	ea	*	-
25 mL Frit (18 mm) (16/kit) .....	247932	ea	*	-
5 mL Needle (18 mm) (16/kit) .....	232207	ea	*	-
25 mL Needle (18 mm) (16/kit) .....	232223	ea	*	-
10 mL Disposable Test Tubes (18 mm) (125/box) ...	199521	bx	*	-
<b>Glassware (Sparge Vessels) -Single Piece</b>				
5 mL Frit Sparger (18 mm) .....	209015	ea	*	-
25 mL Frit Sparger (18 mm) .....	209031	ea	*	-
5 mL Needle Sparger (18 mm) .....	225623	ea	*	-
25 mL Needle Sparger (18 mm) .....	225631	ea	*	-
<b>Heater Jackets</b>				
5 mL Needle Sparger (16/kit) 110 VAC .....	198689	ea	*	2.3
10/25 mL Needle Sparger (16/kit) 110 VAC .....	198697	ea	*	2.3
5/25 mL Frit Sparger (16/kit) .....	218651	ea	*	2.3
<b>Miscellaneous</b>				
DPM-16/MHC-16 Operator's Manual .....	248393	ea		-
DPM-16 Start-up Kit .....	248328	ea		-
Fuse- 5A 5 x 20 mm Fast Blow .....	247957	ea		2.2, 2.4
Heater Cartridge Element 50W 120V 1/4 .....	225482	ea		-
Heater Line 48" DPM-16 .....	247783	ea		2.2
MHC Start-up Kit .....	192468	ea		-
Mud-Dawgs (50/pack) .....	215061	pk	*	4.1
Relay - 240 VAC .....	192526	ea		-
Sample Valve Mounting Bracket .....	252049	ea		7.1
<b>Needles</b>				
5 mL/25 mL Frit (18 mm) .....	203042	ea	*	7.1
5 mL/25 mL Side-Hole Needle (18 mm) .....	232348	ea	*	7.1
<b>Spargers</b> <i>see Glassware above</i>				
<b>Syringes</b>				
10 mL Sample w/Luer .....	182006	ea	*	-
10 ul x 2 in Needle .....	167545	ea	*	-
25 mL Sample w/Luer .....	172461	ea	*	-
5 mL Sample w/Luer .....	177659	ea	*	-



## **Part Name**

## **Part #**

## **U/M**

## **XPND**

## **Fig.**

### **Tubes and Tubing**

DPM-16 Frit Sparging Purge Tube Assembly .....	247924	ea	7.3
DPM-16 Needle Sparging Purge Tube Assy .....	258483	ea	7.2
PEEK Purge Line Kit (16/kit) .....	222729	pk	-
SS 4560/DPM-16 Purge Gas Tube Assembly .....	188623	ea	3.1

### **Valves**

KEL-F 3-Port Sample 1/4-28 .....	169484	ea	7.1
34-port Valve Assembly with Actuator .....	187179	ea	-

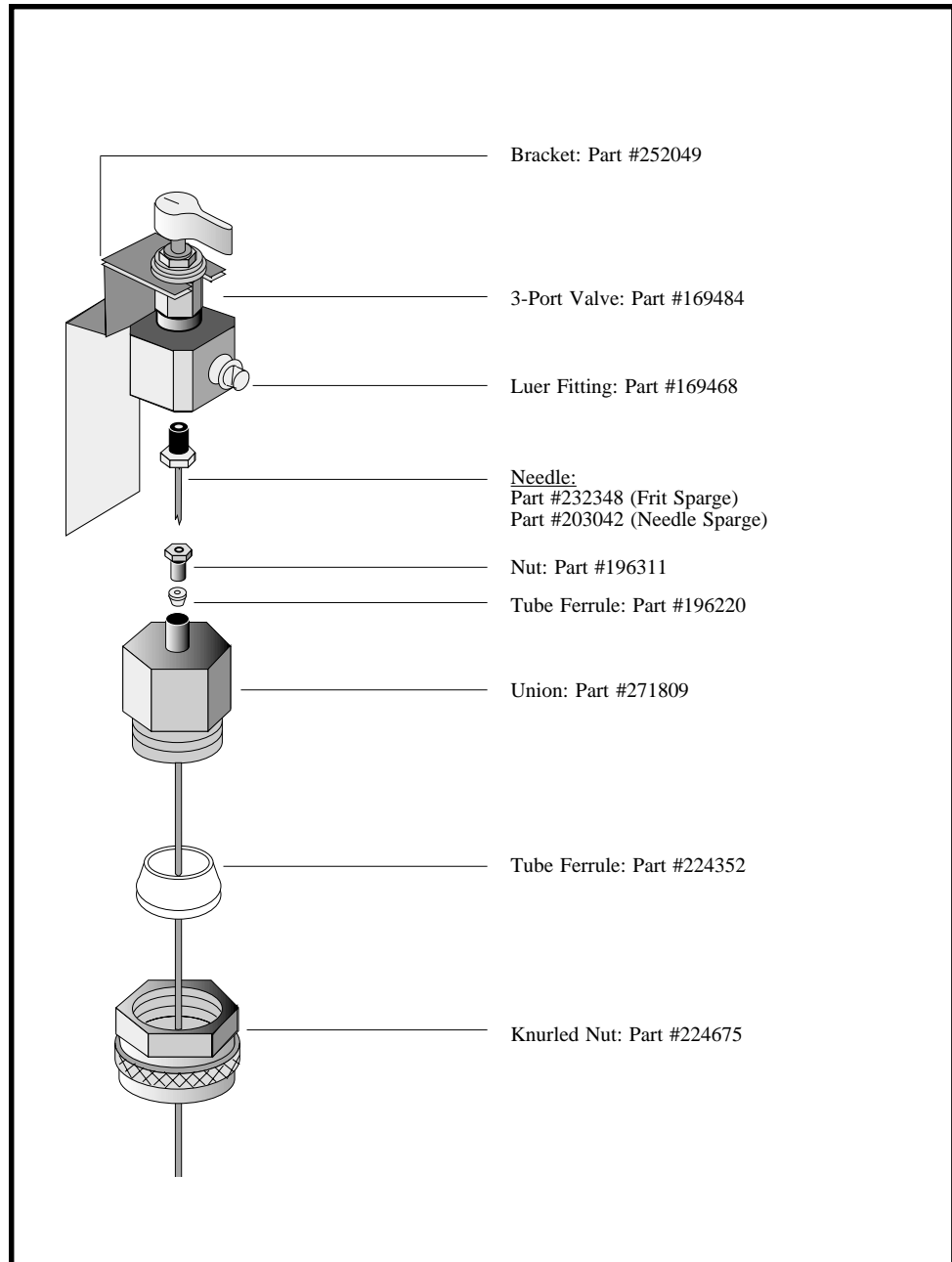


Figure 7.1. Sample Valve and Sparge Mount Assemblies

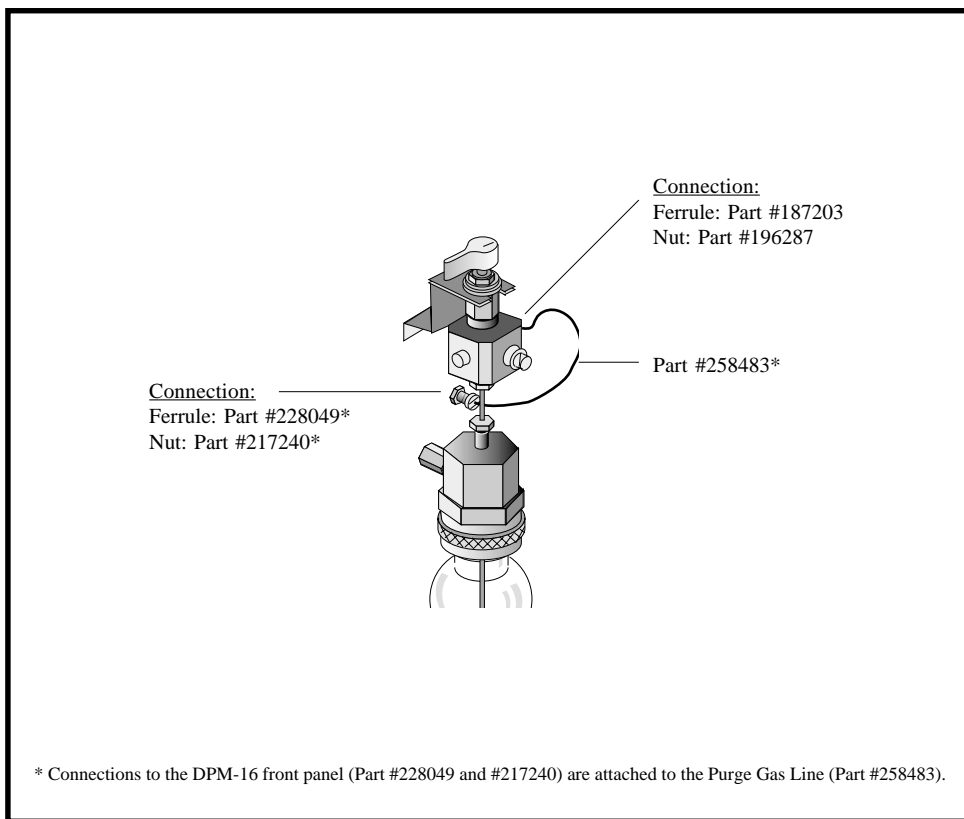


Figure 7.2. Needle Sparging Connections

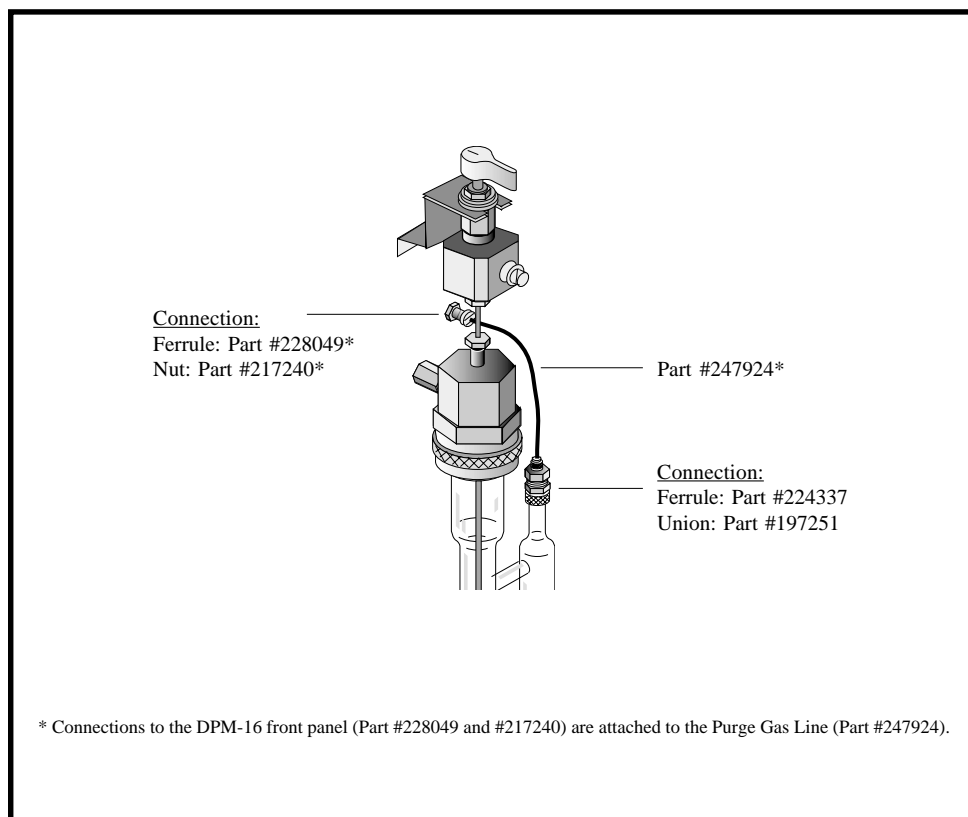


Figure 7.3. Frit Sparging Connections

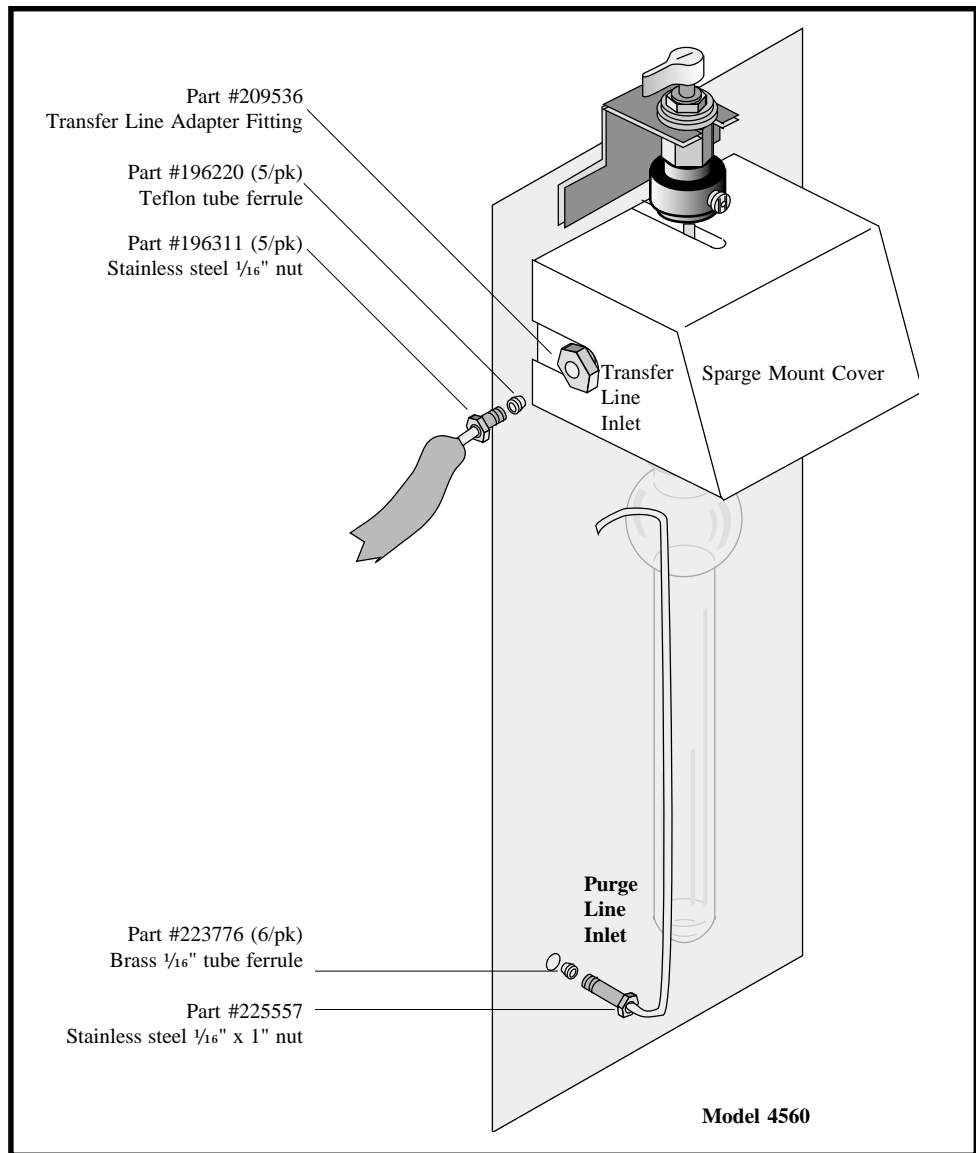


Figure 7.4. Model 4560 Gas Line Connections

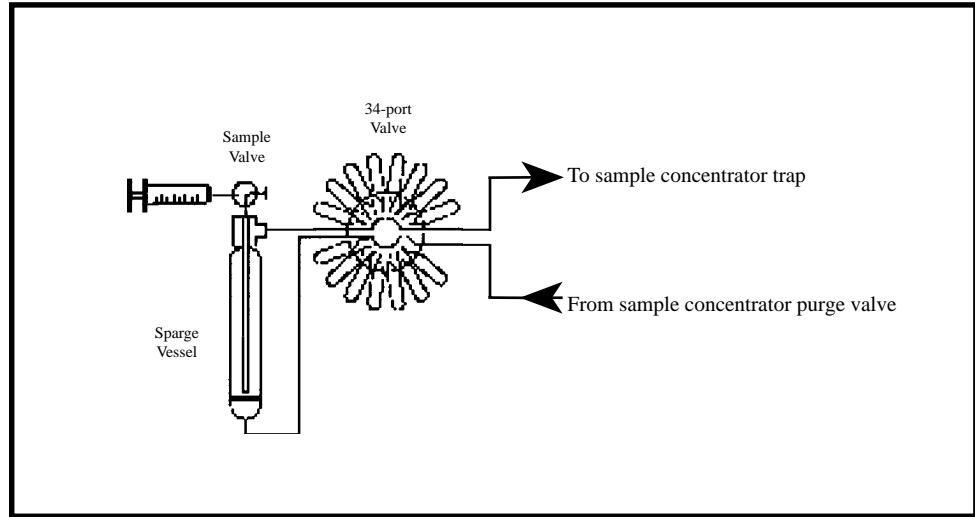


## Notes



# Appendix

## Plumbing Schematic



## Cable Matrix for the DPM-16/MHC-16

	4460A	4560	DPM-16
<b>MHC-16 (Rev. A)</b>	Part #192435 4460A/MHC INTFC	Part #226605 4560/DPM or MHC CNTRL	Part #192443 MHC/DPM INTFC
<b>MHC-16 (Rev. B)</b>	Part #230656 4460A/DPM or MHC CNTRL	Part #226605 4560/DPM or MHC CNTRL	Part #229450 MHC/DPM INTFC
<b>DPM-16</b>	Part #230656 4460A/DPM or MHC CNTRL	Part #226605 4560/DPM or MHC CNTRL	N/A

When using an MHC-16, no cabling is required between the DPM-16 and the sample concentrator; cables connect the sample concentrator to the MHC, and the MHC to the DPM-16.



## Model 4460A Configuration Settings

2nd FUNCT. BAKE	DIP switch #1	DIP switch #6	Result	Application
0	OFF	OFF	Advances past PURGE READY automatically	DPM for water (no MHC-16)
1	ON	OFF	Adds states, advances past PURGE READY automatically	VOA Sampler DPM for soil, air (MHC-16)
2	OFF	ON	Holds at PURGE READY	Manual Injection for water
3	ON	ON	Adds states, holds at PURGE READY	Manual Injection for soil, air





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