micromeritics®

AccuPyc II 1340 for Windows

Operator's Manual

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1. GENERAL INFORMATION

Organization of the Manual

This manual describes how to install, operate, and maintain the AccuPyc II 1340 Pycnometer. The manual is organized as follows:

Chapter 1 **GENERAL INFORMATION**

Provides a general description and specifications of the AccuPyc II 1340 pycnometer.

Chapter 2 **INSTALLATION**

Provides instructions for installing the hardware and software.

Chapter 3 **USER INTERFACE**

Provides basic hardware and software interface.

Chapter 4 **OPERATIONAL PROCEDURES**

Provides step-by-step instructions on the operations for the AccuPyc II 1340 pycnometer.

Chapter 5 **FILE MENU**

Provides a description of the commands on the File menu.

Chapter 6 **UNIT MENU**

Provides a description of the commands on the Unit menu.

Chapter 7 **REPORTS MENU**

Provides a description of the commands on the Reports menu.

Chapter 8 **OPTIONS MENU**

Provides a description of the commands on the Options menu.

Chapter 9 **TROUBLESHOOTING AND MAINTENANCE**

Provides troubleshooting and maintenance information.

Chapter 10 **ORDERING INFORMATION**

Provides part numbers and ordering information for system components.

Appendix A **ERROR MESSAGES**

Lists the error messages that may be displayed by the software; includes cause(s) and action(s) for each.

Appendix B **CALCULATIONS**

Contains the calculations used by the software to produce reports.

Appendix C **THEORY**

Provides information on the theory for the analysis function of the AccuPyc.

Appendix D **ETHERNET PORT CONFIGURATION**

Provides information on configuring an ethernet port, and disabling the fire-wall setting.

Appendix E **MULTIPLE ANALYSIS MODULES**

Provides instructions for attaching multiple analysis modules.

Appendix F **TEMPERATURE-CONTROLLED ACCUPYC**

Provides instructions for attaching a bath circulator to the temperature-controlled AccuPyc.

Appendix G **MULTIVOLUME INSERTS**

Provides instructions for using multivolume inserts.

Appendix H **MULTIGAS OPTION**

Provides instructions for attaching and using the Multigas option.

Index **INDEX**

Provides quick access to a subject matter

Conventions

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

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.

Internet Access

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About Micromeritics	A brief history of Micromeritics, office locations, awards/certifications, career opportunities, and a virtual tour of its headquarters
Products	Product information and printable brochures
Applications	Application Notes, Product Bulletins, Tech Tips, Technical Articles/papers, and important application links
Online Catalog	Catalog of instruments and accessories, allowing you to place your order online
News and Press	Press releases, Events calendar, microReports, and latest Micromeritics news updates
Lab Service	Provides laboratory tips and access to the Micromeritics Analytical Services web site
Customer Support	Customer support contacts, product registration, instrument training information, Material Safety Data Sheets, and account registration
Grant Program	Details of the Grant Program established for non-profit organizations and universities
Contact Us	Contact information, office locations, maps and driving directions to the Micromeritics facility, and registration for the microReport newsletter

Be sure to browse our site to see the many ways in which we can assist you.

Equipment Description

The AccuPyc II 1340 Pycnometer is an easy-to-use, fully automatic gas displacement pycnometer. The AccuPyc 1340 determines density and volume by measuring the pressure change of helium within calibrated volumes. It also reports the chamber temperature at the end of the requested cycles.

The AccuPyc II 1340 Pycnometer consists of a control module and an analysis module. When ordering a single unit, the control module is built into the same unit as the analysis module for convenience. The Analysis modules are also available in a standalone configuration, allowing you to attach multiple analysis modules to a single controlling unit. You can have up to five analysis modules of the same size or of different sizes installed to one controller (six total). Each module has its own gas connection. The pycnometer is controlled by a friendly Windows interface. The operational status of the pycnometer(s) can be continually monitored in a Status window shown on the computer screen.

Software

The AccuPyc II 1340 Pycnometer's unique *run precision* feature increases the precision of analysis results by reporting data from five consecutive runs that are within a user-specified tolerance. This feature allows early termination of analyses, thereby decreasing the number of runs needed for accurate results.

Analysis enables you to measure sample volume, from which density can be derived automatically if you have entered the sample mass. Default files are included in the software, however, may not be appropriate for your sample. Using these files as a starting point or creating new ones is accomplished easily and quickly.

When the software is not running, the AccuPyc can be operated in keypad mode; an operator's manual for keypad operation is included. For example; if your computer is inoperative for some reason, you can still perform analyses using the keypad.

A *purge* is used strictly for sample clean-up and for removing air and moisture from the inside of the chamber. It is accomplished by closing off the pycnometer block and filling the cell chamber to the designated purge fill pressure. The chambers are then vented to atmosphere, resulting in elimination of water vapor or other contaminants. A *cycle* is used for collecting the precise, accurate data used in report calculations.

Calibration is used to determine the size of the cell and expansion chambers within the instrument. After calibration, the cell and expansion chamber volumes are stored automatically.

A new zero pressure offset can be calculated easily and automatically simply by using a command on the Unit menu. The zero pressure offset is measured when the system is at atmospheric pressure and thermal equilibrium, and is subtracted from all subsequent pressure readings in order to obtain a true gauge pressure.

Configurations

To ensure best fit with your sample, the AccuPyc is available in multiple configurations:

- 1-cm^3 sample chamber
- 10-cm^3 sample chamber
- 100-cm^3 sample chamber
- 350-cm^3 sample chamber

Best fit means your sample nearly fills the sample chamber and, therefore, optimizes the precision of your results.

Temperature Control

A temperature-controlled unit to which an external bath is connected is available in the following configurations:

- 10-cm^3 sample chamber
- 100-cm^3 sample chamber

The temperature-controlled unit is specifically designed for temperature-sensitive materials. This unit is ideally suited for laboratories in which ambient temperature varies during normal work hours, or in which subambient cooling is required.

Glove Box

A glove box unit for analysis of samples in which a controlled environment is required is available in the following configurations:

- 1-cm^3 sample chamber
- 10-cm^3 sample chamber
- 100-cm^3 sample chamber
- 350-cm^3 sample chamber

This unit consists of two separate modules. The controller is placed outside the glove box, while the analysis module is placed inside the glove box.

If you have an existing AccuPyc, you can order the glove box analysis unit containing the desired sample chamber and simply connect it to the connector provided on the rear panel of the existing AccuPyc.

Options

FoamPyc

A **FoamPyc** option for measuring open- and closed-cell foam materials is available in the following configurations for the standard and temperature-controlled pycnometers:

- 100-cm^3 nominal cell volume (recommended)
- 10-cm^3 nominal cell volume

This unit can be ordered initially with the FoamPyc application installed, or if you have a standard AccuPyc, you can upgrade with a software enhancement. The FoamPyc option also includes the capability of performing analyses using the standard method, making it easy and convenient to perform analyses on standard samples and foam samples.

MultiVolume Inserts

A MultiVolume option allowing you to analyze smaller-sized samples with your current AccuPyc model is available for the following configurations:

- 1-cm^3 nominal cell volume, contains a 0.1 cm^3 cup
- 10-cm^3 nominal cell volume, contains 1- and a 3.5-cm^3 cups
- 100-cm^3 nominal cell volume, contains 10- and 35-cm^3 cups

Each kit includes appropriate insert(s), reference standard(s), and sample cup(s) (refer to **Ordering Information**, page **10-2** for additional information).

Multigas Option

The Multigas Option enablesyou to connect up to four gases to one analyzer. Installation and operation instructions are provided in Appendix H, beginning on page **H-1**. Refer to Ordering Information on page **10-1** for details on placing an order.

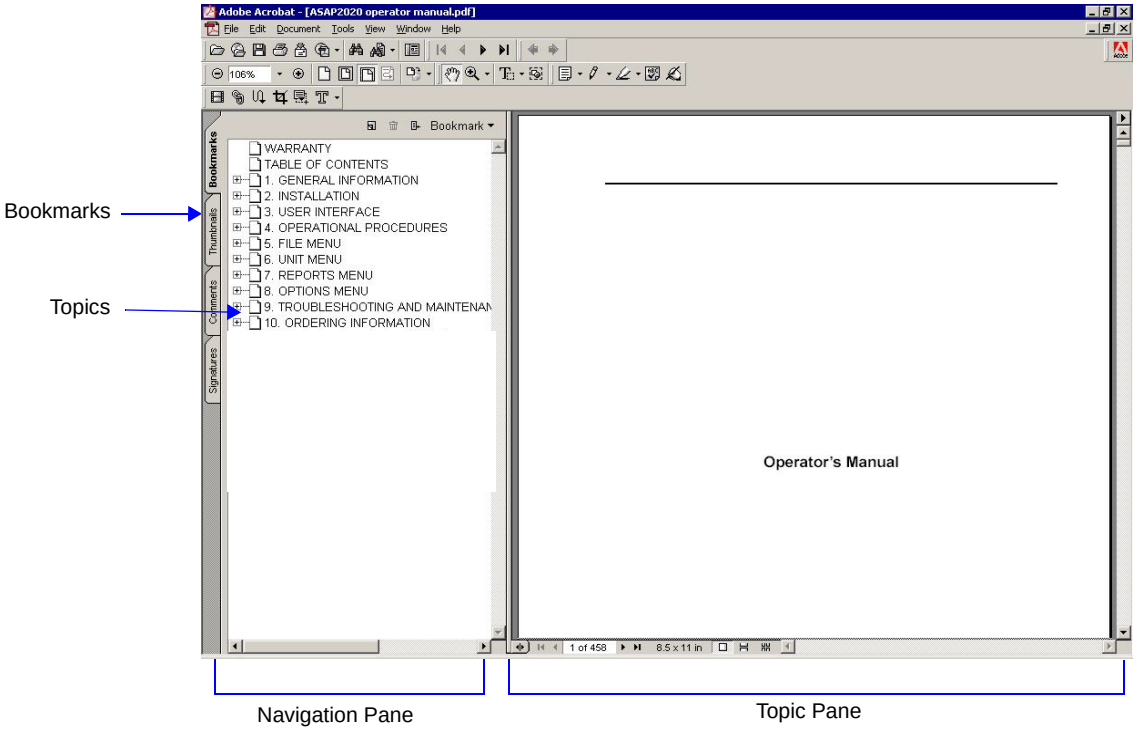
Online Manual

For your convenience, the Operator's Manual is available online. You can access the manual by selecting **Help**, then **Operator's Manual** from the analysis program main menu. The manual appears in an Adobe® Acrobat® Reader®.

Following are some tips to help you quickly locate the information you need in the manual. Refer to the Adobe Acrobat Help system (click the **Help** button on the Acrobat menu) for more information on the Acrobat features you can use while viewing the manual.

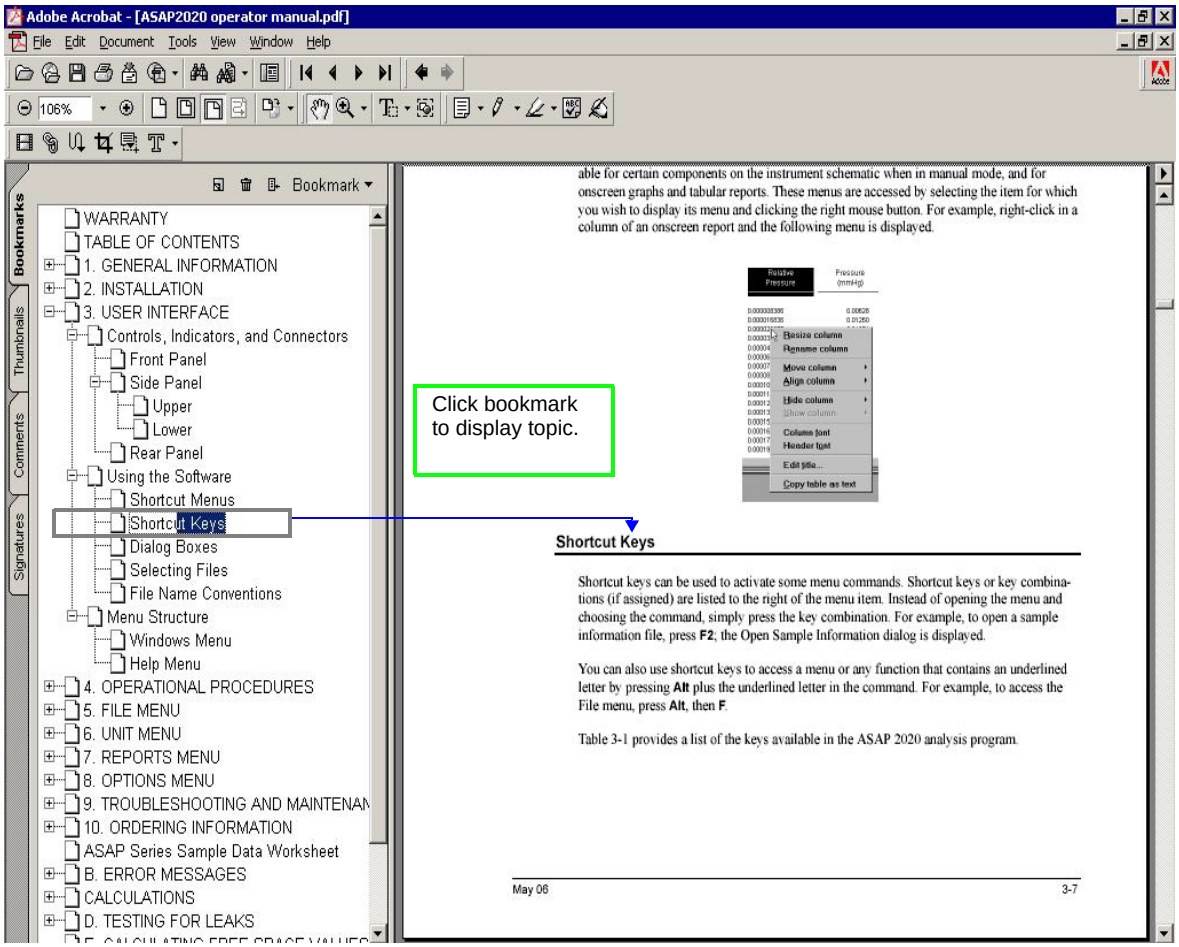
Using Bookmarks

Click the **Bookmarks** tab to list and access the topics included in the manual.



You can use the + and − buttons next to topics as they are used in Windows Explorer to expand or collapse the topic list.

To display a topic, click the topic name in the Bookmarks section. The related information appears in the topic pane of the window as shown in the following example.



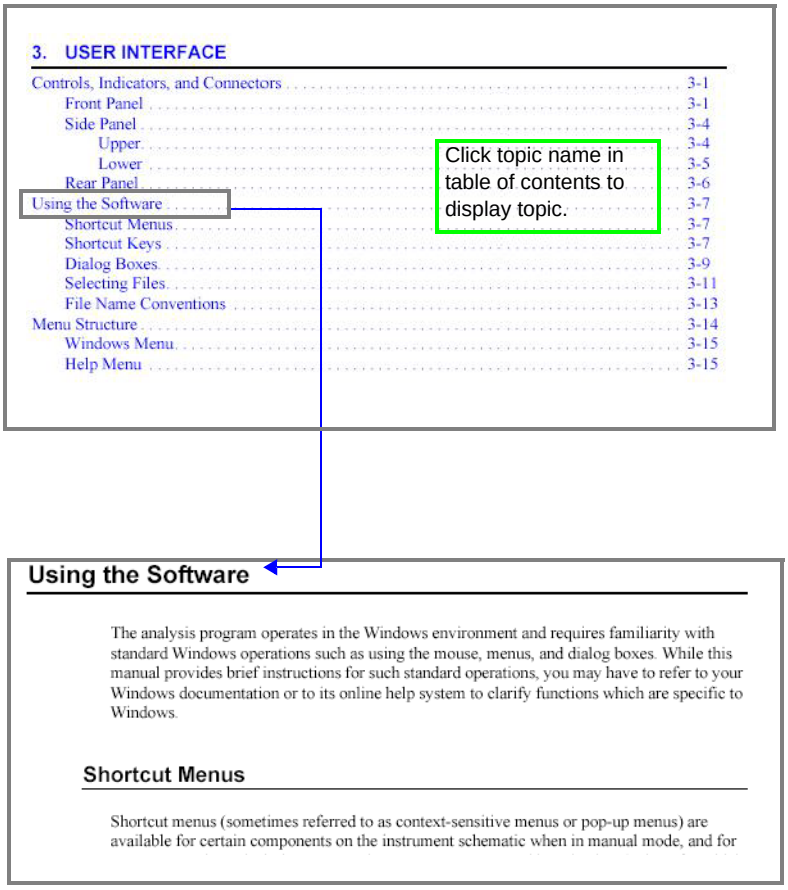
Using the Table of Contents, Index, and other Links

Links provide direct access to selected information. All links appear in blue type. Links are contained in:

- the table of contents
- index entries
- cross-references within the manual

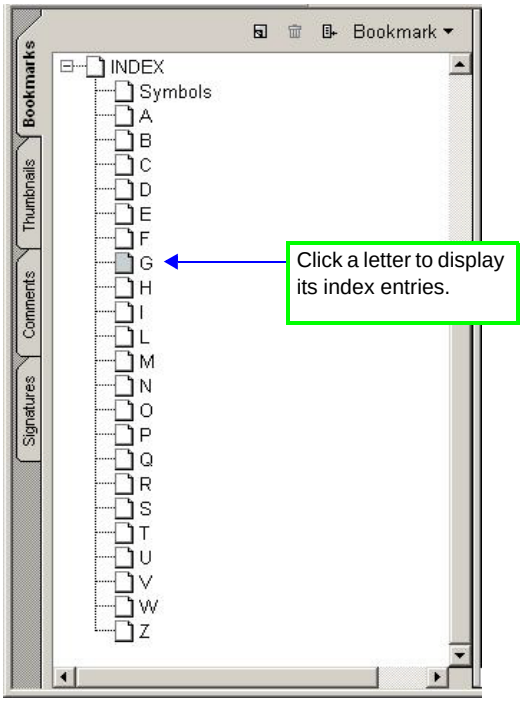
Table of Contents

To display the table of contents, click **Table of Contents** in the **Bookmarks** section. When the table of contents is displayed, you can click an entry to display its associated page. For example, clicking **Using the Software** in the table of contents, displays the page containing information about the software.



Index

To use the index in the online manual, click the **Bookmarks** tab, scroll down to **INDEX** (the last topic in Bookmarks), then click the + button to expand the index. The letters A through Z are displayed. Click a letter to display its corresponding index entries as shown in the following example.



After you display the entries, locate the item of interest and click on the page reference to access the information.

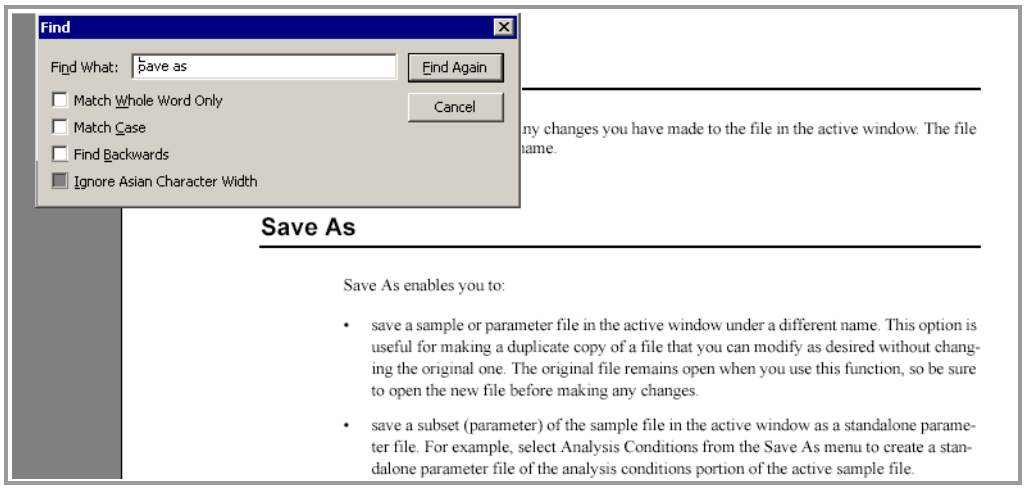
Cross References

Cross-references work in the same manner. In the example below, clicking on the cross-reference, **FILE MENU** (shown on the screen in blue type) will display the first page of the chapter describing the commands found on the File menu.

> **FILE MENU**
>
> Provides a description of the commands available on the File menu.

Using the Find Command

The Adobe Acrobat **Find** command provides another method of easily accessing specific information. For example, suppose you want to know how the **Save as** command works. You could select **Edit > Find** from the Adobe Acrobat menu, then enter **Save as** in the Find dialog. The following example shows the results.

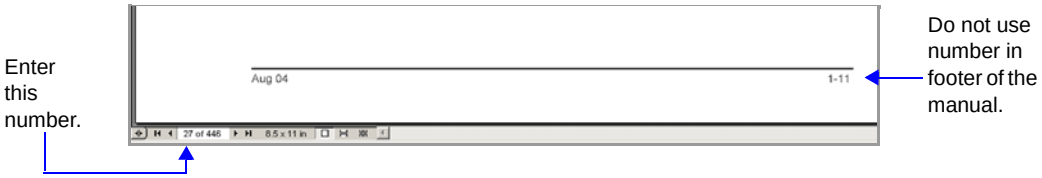


Printing

You can print the entire manual, a selected page, or range of pages. There are several options for printing. You can:

- Select the printer icon ( ) on the Adobe Acrobat toolbar.

  A standard Print dialog is displayed. Select the page(s) to print, then click **OK**. When using this option (or the next one), be sure to enter the page number(s) displayed in Adobe Acrobat; do not use the page number(s) listed in the footer(s) of the manual.



- Select **File** > **Print**.

  A standard Print dialog is displayed. Select the page(s) to print, then click **OK**.

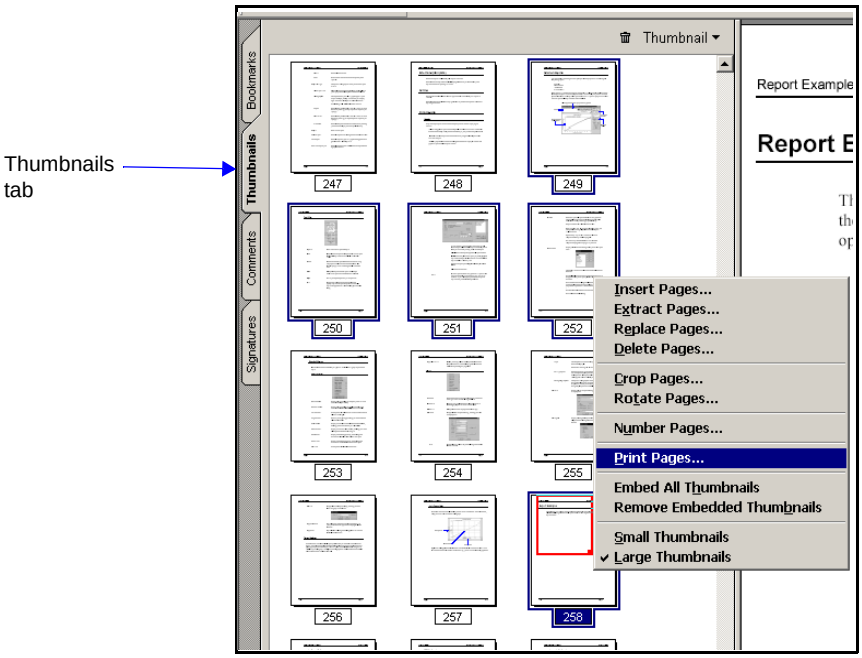
- Click the **Thumbnails** tab.

  Thumbnails of manual pages are displayed.

  a. Click the pages you want to print.

  b. Right-click to display a shortcut menu, then select **Print Pages**.

  c. A standard Print dialog is displayed; click **OK**.



Specifications

The AccuPyc II 1340 Pycnometer has been tested to meet the specifications in the following table.

Characteristic	Specification
Environment	
Temperature:	Stable between 15 and 35 ºC (59 to 96 ºF) Temperature-controlled AccuPyc: temperature stability is dependent upon specifications of the installed circulator. Recommended range: 15 to 50 ºC (59 to 122 ºF)
Humidity:	20 to 80% relative, non-condensing
Physical	
Height:	17.9 cm (7.0 in.); analysis modules for 1-, 10-, and 100-cm^3 units, and control module 25.9 cm (10.2 in.), 350 cm^3 analysis module
Width:	27.3 cm (10.7 in.), control module 22.2 cm (8.7 in.), analysis module
Depth:	36.2 cm (14.3 in.)
Weight:	9.3 kg (20.5 lbs), control/analysis unit (1-, 10-, and 100-cm^3 units) 7.9 kg (17.4 lbs), analysis module (1-, 10-, and 100-cm^3 units) 10.5 kg (23.2 lbs), analysis module (350-cm^3 unit) 3.6 kg (8.0 lbs), control module
Electrical	
Voltage:	90 to 264 VAC
Power:	30 VA
Frequency:	50 to 60 Hz
Gases	
Research grade helium is recommended. If unavailable, use helium with a dew point of -67 ºC (-88 ºF) or lower. Carbon dioxide, dry air, or nitrogen can also be used for different applications. A multigas option is available for connection of multiple gases.	
Sample Chamber	
1 cm^3 chamber:	1.15 cm ID x 1.1 cm D (0.45 in. ID x 0.44 in. D)
10 cm^3 chamber:	1.8 cm ID x 3.93 cm D (0.72 in. ID x 1.55 in. D)
100 cm^3 chamber:	4.62 cm ID x 6.17 cm D (1.82 in. ID x 2.43 in. D)
350 cm^3 chamber:	5.84 cm ID x 13.94 cm (2.30 in. ID x 5.49 in. D)

Characteristic	Specification
Analysis	
Precision	Reproducibility typically to within ± 0.01% of the nominal full-scale cell chamber volume. Reproducibility guaranteed to within ± 0.02% of the nominal full-scale volume on clean, dry, thermally equilibrated samples using helium in the 15 to 35 ºC range (15 to 50 ºC for temperature-controlled models).
Accuracy	Accurate to within 0.03% of reading, plus 0.03% of sample capacity.
Computer	
Minimum requirements:	Pentium 333 MHz or equivalent Ethernet port (capable of communicating with a 10 base-T ethernet card) One CD ROM drive 128 megabytes of RAM 1-gigabyte hard drive 1024 x 768 video display capability Windows® XP Professional or Windows Vista® operating system

2. INSTALLATION

This chapter describes how to:

- setup and install the analyzer, beginning on this page
- install the software, page **2-8**
- calibrate the pycnometer, page **2-13**
- verify operation, page **2-17**
- use the Setup program for other functions, page **2-19**

An installation video is also included with your AccuPyc if you prefer to use online instructions.

If you are upgrading from a keypad AccuPyc, skip to page 2-5 for rear panel connections to a computer, then to page 2-8 for installing the software.

Installing the Analyzer

These instructions assume that the shipping cartons have been opened and their contents checked and verified as instructed in the Preinstallation Instructions.

Location

When selecting the location of the pycnometer, keep the following in mind:

- The pycnometer performs best in a constant temperature environment.
- It should be installed on a workbench approximately 36 in. (91.44 cm) high in a location free of drafts from either a forced-air heating or cooling system.
- The pycnometer should not be placed near a window; exposure to sunlight may cause the temperature to vary.

Gas Requirements

The pycnometer uses helium (99.995% pure or better) to provide rapid, accurate analyses. The cylinder containing helium must be fitted with a gas regulator set for 19-23 psig (131-159 kPag). The pressure input to the pycnometer should never be greater than 25 psig (172 kPag). Excessive pressures waste gas due to a protection device contained in the pycnometer that vents the pycnometer to atmospheric pressure if pressure exceeds 35 psig (241 kPag).

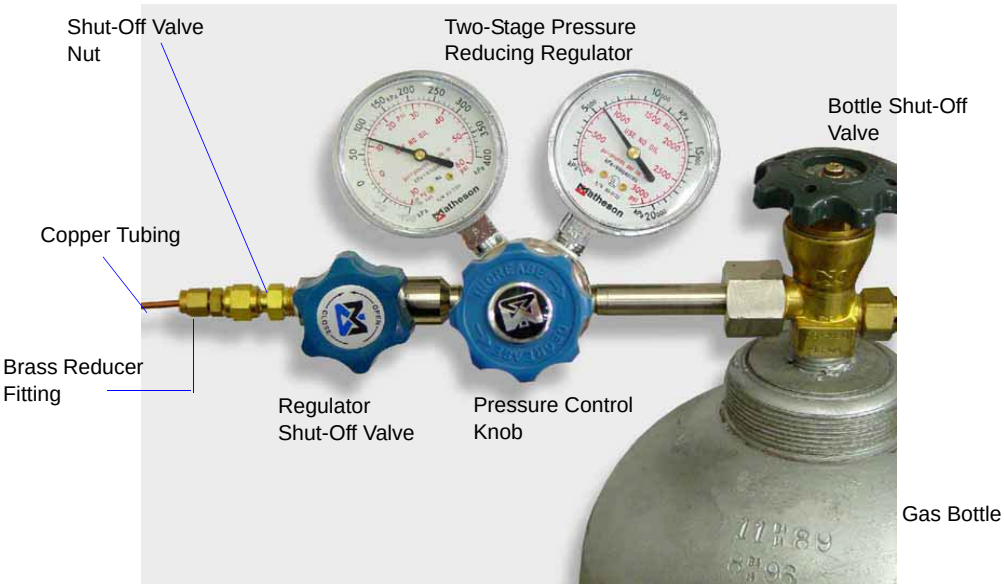
Minimum recommended helium tank pressure is 200 psig (1379 kPag).

Other inert, dry gases can also be used and may be more applicable for some applications.

Rear Panel Connections

These instructions are for connecting inert gases only. Follow the safety procedures used by your laboratory for connecting hazardous gases.

1. Attach an appropriate regulator to the gas supply bottle or gas line, then tighten with a wrench. Leave the gas bottle shut-off valve closed until instructed otherwise.



A Multigas option is available for attaching multiple gases to the analysis module. Refer to Ordering Information, page 10-1 for ordering information.

2. Attach the gas inlet line to the regulator, reducer fitting, or regulator expansion:

It is very important to use the inlet tubing supplied with the analyzer. Gas lines made of materials other than copper or stainless steel can cause operational problems as well as inaccurate data.

If regulator has	Then .....
1/4-in outlet	Attach the reducer fitting to the outlet of the regulator shut-off/ isolation valve
	Tighten the nut finger-tight, then 1-1/4 turns with a wrench.
	Continue with the steps given for the 1/8-in outlet
1/8-in outlet	Insert the gas tubing into the fitting.
	Make sure the tubing is seated fully inside the fitting.
	Tighten the nut finger-tight.
	While holding the fitting body steady, tighten the nut with a wrench 3/4 turn.

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

3. Purge the regulator and inlet tubing; this is important to prevent contamination of the analysis gas.

   a. Close the regulator shut-off valve; turn it fully clockwise.

   b. Turn the pressure regulator control knob fully counterclockwise.

   c. Slowly open the gas bottle shut-off valve; turn counterclockwise, then quickly close it.

   d. Observe the high-pressure gauge.

      If the pressure decreases, tighten the nut connecting the regulator to the gas bottle. If the pressure is stable, proceed to step e.

Make sure the gas supply equipment is adequately vented before performing the next step.

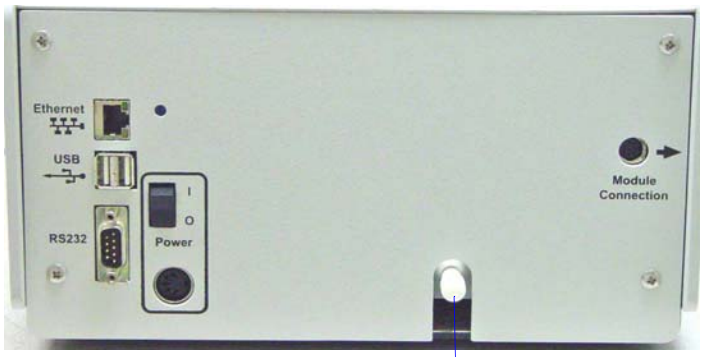
   e. Turn the pressure regulator control knob clockwise until the low-pressure gauge indicates 19.500 psig (134.445 kPag).

   f. Open the regulator shut-off valve; turn it counterclockwise.

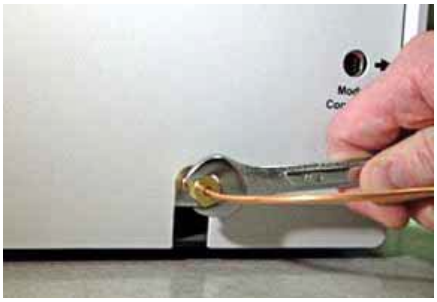
   g. Open the gas bottle shut-off valve; turn it counterclockwise. Flow gas for 10 to 30 seconds, then close the valve.

   h. Close the regulator shut-off valve; turn it clockwise.

4. Attach the other end of the copper tubing to the gas inlet located on the rear panel of the pycnometer. The pycnometer is shipped with a plug in the inlet; remove and discard the plug, or store in a safe location for future use.



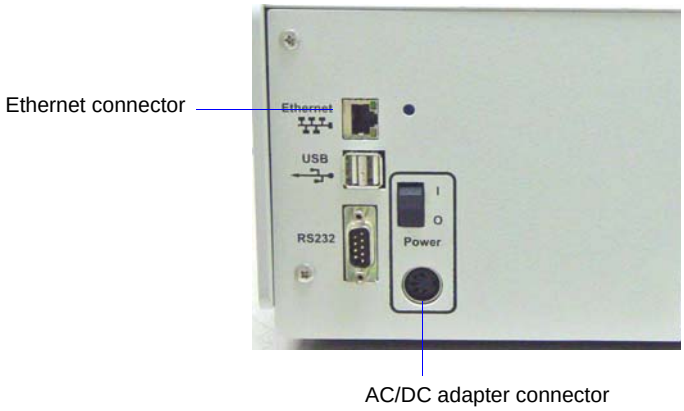
5. Turn the nut on the tubing clockwise until it is finger-tight. Then use a 7/16-in. open-ended wrench (or an adjustable wrench) to tighten the nut an additional 1/4 turn.



6. Open the shut-off valves for the gas bottle and the regulator.

7. If you have a temperature-controlled AccuPyc, attach the circulating bath (refer to Appendix F, page **F-1**) before proceeding with the next step.

8. Connect the AC/DC adapter cord to the connector provided on the rear panel of the instrument, then plug the pycnometer power cord into the adapter.



9. Connect one end of the ethernet cable to the connector labeled **Ethernet** on the back of the analyzer. Connect the other end of the cable to an ethernet slot on the computer.

   These instructions assume your computer has been installed with peripheral components, such as a keypad and mouse, and is ready for operation.

10. Plug in the pycnometer power cord (from the AD/DC adapter) to an appropriate power source.

Connecting an Analytical Balance

An analytical balance can be connected to a serial port on the computer and used to transfer the sample's mass via a third-party software directly to the AccuPyc II 1340 application. Refer to the balance manufacturer's operator's manual for transmission instructions.

Turning On and Off the Pycnometer

Place the power ON/OFF switch on the rear panel in the ON (|) position. After a few seconds, the system vents automatically and the green indicator light on the front panel illuminates.

Do not turn off the analyzer while initialization is in progress. Doing so may damage the instrument.

Allow approximately 30 minutes for the analyzer to warm before performing analyses. For analyses that require very precise results, allow the analyzer to warm a minimum of two hours.

It is recommended that you leave the analyzer on at all times.

It is important that a constant temperature be maintained inside the unit because a change in temperature could alter analysis results. We recommend that the pycnometer remain turned on at all times to maintain thermal stability. Power consumption is small and the cost of electricity will be minimal.

If it does become necessary to turn off the analyzer, perform the following steps.

1. Allow any analyses in progress to complete.
2. Select **Close** from the **System** menu or **Exit** from the **File** menu.
3. Place the computer, monitor, and printer ON/OFF switches in the OFF position.
4. Place the analyzer ON/OFF switch in the OFF position.

Handling System Components

Listed in this section are guidelines for handling system components.

Calibration Standard(s)

These guidelines are for handling the calibration standard(s):

- Wear latex or nitrile, powder-free gloves to prevent transfer of oil from your hands
- Do not drop the standard(s) into the sample cup; allow the standard(s) to roll gently into the cup to prevent denting the cup
- Always return the standard(s) to their case; standard(s) are unit-specific

Sample Chamber Cap

These guidelines are for handling the sample chamber cap:

- Wear latex or nitrile, powder-free gloves to prevent transfer of oil from your hands
- Keep the cap on the sample chamber except when inserting or removing the sample cup. When left uncapped, the sample chamber temperature may become unstable and/or water vapor will adsorb on the inner surface of the chamber. Either of these conditions can affect analysis results.
- Avoid laying the chamber cap on a work surface; debris may collect on the greased surface of the O-ring which can also affect analysis results
- When multiple analysis modules are connected, never interchange sample chamber caps; caps are unit-specific

Greasing the Chamber Cap O-Ring

Grease the chamber cap O-ring as described below. Wear latex or nitrile gloves to prevent contaminating the grease with oil from your fingertips.

1. Turn the chamber cap counterclockwise and lift it from the chamber.
2. Place the chamber cap on a clean surface, with the O-ring side exposed.
3. Place a small amount of Dow Corning High vacuum grease (or equivalent) on your index finger.

Apply the grease sparingly; too much grease may alter cell volume, while too little grease results in an imperfect seal and leaks.

4. Move your index finger completely around the O-ring groove to distribute the grease.

5. Replace the chamber cap; turn the cap clockwise to tighten.

Installing the Software

The AccuPyc Windows program can also be installed on a computer other than the one controlling the analyzer. This allows you to:

- create or edit sample and parameter files
- generate reports on completed sample files

Review the Micromeritics PROGRAM License Agreement for restrictions on the use of another copy of the AccuPyc Windows program.

The AccuPyc Windows program is supplied on a CD-ROM. After initial installation, the Setup program is used to perform other analyzer functions such as removing an analyzer and uninstalling the software. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

Be sure you have completed the following tasks before installing the software:

- Configure the ethernet port the analyzer will use (refer to **Configuring the Ethernet Port**, page **D-1**)
- Disable the firewall setting for the connection between your computer and analyzer (refer to **Configuring the Firewall Setting**, page **D-7**)

Install the program as follows:

1. Connect the analyzer to the configured ethernet port, turn on the analyzer, then turn on the computer.
2. Use the keypad on the pycnometer and ensure that the analyzer's IP address is as shown below.
   a. Press **Alt + 2** to access **Set Up**, then press **CHOICE** until **Communications** is displayed.

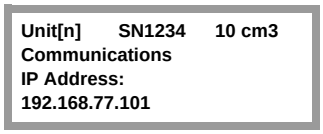
   ```
   Unit[n]     SN1234     10 cm3

   Set-up Type?
   Communications
   ```

   b. Press **ENTER** until the **IP address** prompt is displayed.
   c. Press **CHOICE** until **Specify** is displayed, then press **ENTER**.

   ```
   Unit[n]     SN1234     10 cm3
   Communications
   IP Address?
   Specify
   ```

d. Ensure that **192.168.77.101** is displayed in the fourth line of the display; if it is not, enter it:



e. Press **SAVE** to save the address and return to the **Reload** prompt.

3. Choose one:

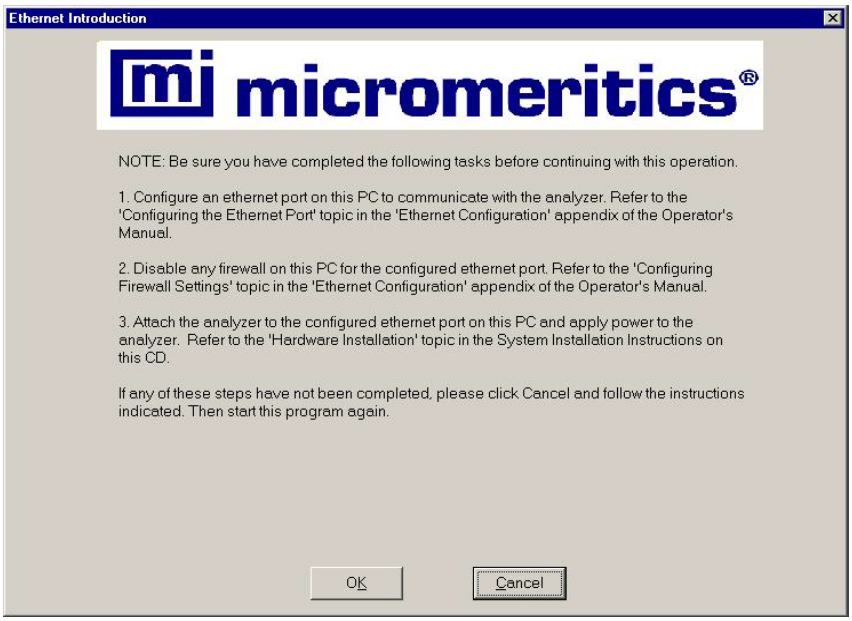
If	Then ....
you are using the video for installation:	minimize the video.
you are using the operator's manual for installation:	insert the program CD into the CD-Rom drive.
	When the installation menu displays, click the **X** in the upper right-hand corner of the menu to close it.

4. Select **Start** > **Run** from the Windows menu bar.

5. Enter the name of the drive designator, followed by **analyzersetup** (for video installation) or **setup** (for manual installation)**.**

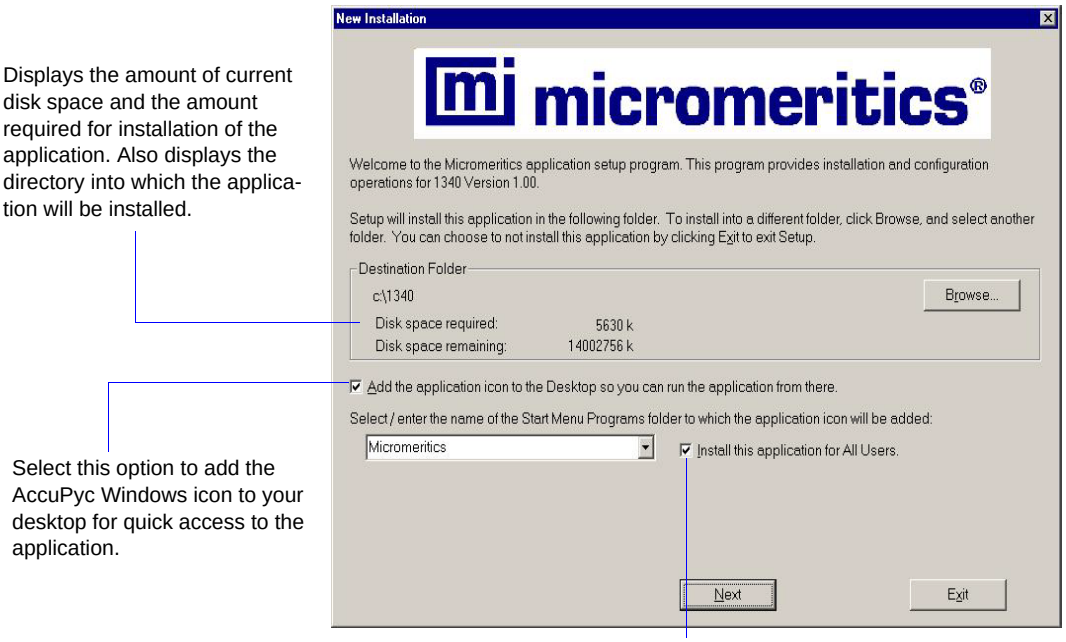
   For example: **e:analyzersetup** or **e:setup**, respectively.

6. Click **OK;** the Ethernet Introduction dialog is displayed. This screen outlines the steps that should be completed before installing the software.



If all of the steps have not been completed, click **Cancel**, perform the steps, then restart the installation program. Do not proceed with installation until these tasks have been completed.

7. Click **OK**; the New Installation dialog is displayed.



The **Destination Folder** group box displays the amount of current disk space, the amount of disk space required for the analysis program, and the directory into which the application will be installed. If you wish to install the application into a different directory, click **Browse** to choose the directory.

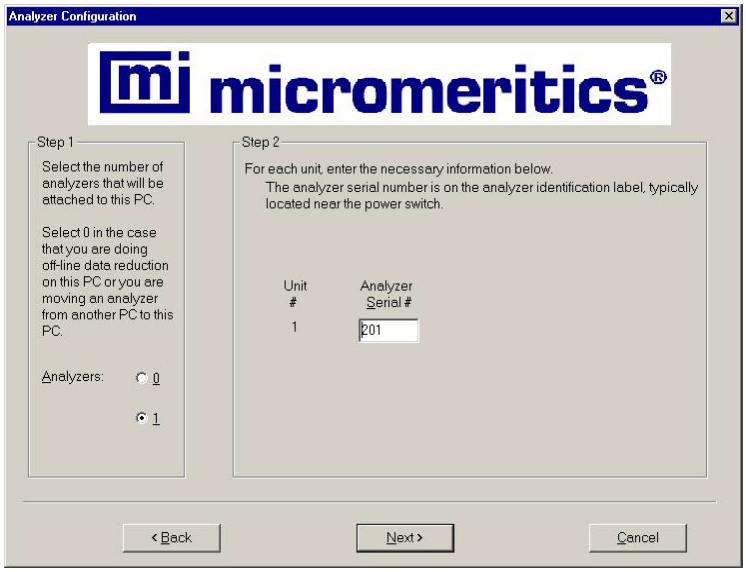
8. Select the check box just below the **Destination Folder** group box to add an icon to your desktop; this enables quick access to the analysis program.

9. The AccuPyc Windows icon is added to the Micromeritics folder by default. If you prefer a different folder, enter or select one from the drop-down list.

10. The **Install this application for All Users** check box enables you to allow or prohibit users other than the installer to access the application.

    - Select the check box to allow access for all users logged onto Windows.
    - Deselect the check box to allow access for only the user installing the application.

11. Click **Next**; the Analyzer Configuration dialog is displayed.



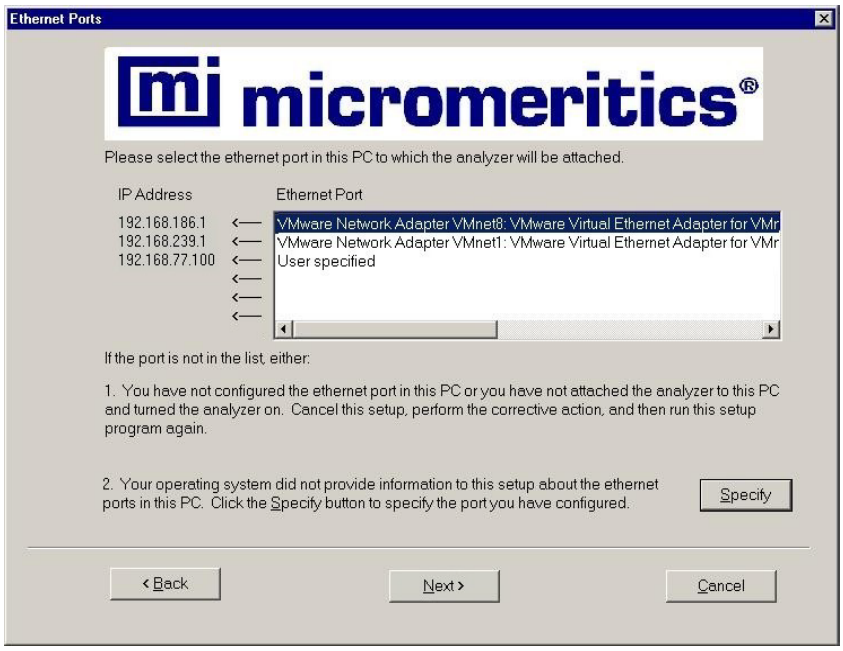
12. In the Step 1 group box, ensure that 1 is selected.

Choose 0 (zero) if you are installing this program for data reduction on a computer other than the one controlling the analyzer.

13. In the Step 2 group box, enter the serial number of the *control module*; in most cases, the control module and the analysis module are a single unit.

    If you are adding multiple analysis modules, refer to **Appendix E**, page **E-1** after you have completed initial installation.

14. Click **Next**; the Ethernet Ports Dialog is displayed.



15. Choose one of the following:

If	Then ....
the port you configured is listed:	select the port and proceed to the next step.
the port you plan to use has been configured but is not listed:	Click **Specify**, the Specify Ethernet Port dialog is displayed.
	Enter the remaining portion of the IP address in the enabled fields, then proceed to the next step.

16. Click **Next**; the Installation Complete dialog containing the **Readme** file will display when installation is complete. This dialog may also contain other important notices. After reading the information contained in this dialog, click **Finish** to close it.

17. Choose one:

If	Then ....
you are installing the analysis program with regard to the installation video:	Return to the Installation Instructions menu and continue with the next procedure.
you are installing the analysis program independent of the installation video and have no other operations to perform:	Remove the program CD and store in a secure location. The original program CD contains calibration files specific to your instrument. Upgrade CDs do not contain calibration files. Therefore, it is important that you maintain your original program CD in a secure location in the event calibration files need to be reinstalled.

Calibrating the Pycnometer

Although calibrated before shipment, the pycnometer should be recalibrated to your laboratory atmospheric and environmental conditions. If upgrading from the keypad version, it is still recommended that you calilbrate the pycnometer.

1. Turn the Pressure Control knob clockwise to set the regulator pressure at 21.500 psig (low-pressure gauge).

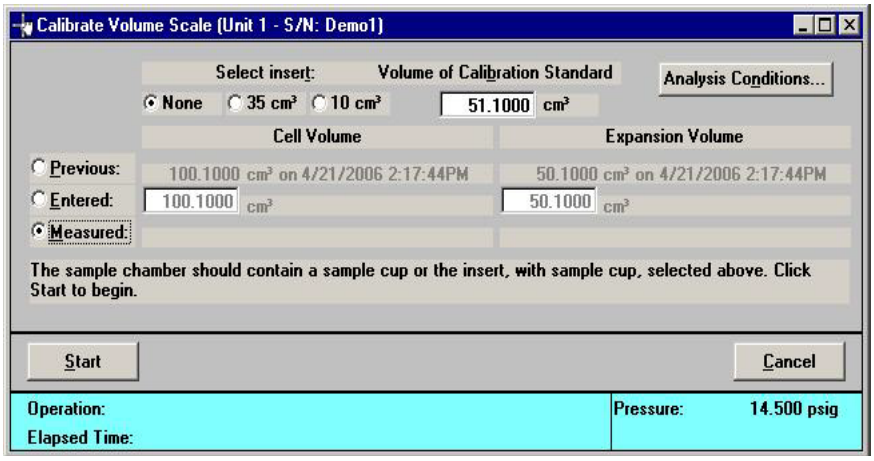
2. Remove the chamber cap and place an empty cup into the sample chamber; replace the cap.

   If an insert is being used, place the insert sample cup into the chamber. An insert is a device that enables you to analyze smaller sample quantities using your current pycnometer.

Wear latex or nitrile, powder-free gloves to prevent transfer of oil from your hands when handling sample cups, calibration standards, and inserts (refer to Handling System Components, page 2-6).

3. Double-click on the application icon (placed on your desktop during software installation) to start the analysis program.

4. Select **Unit > Calibration > Calibrate Volume**; the Calibrate Volume Scale dialog is displayed.

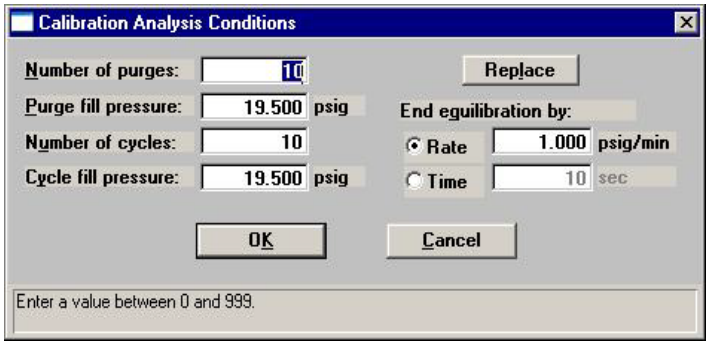


5. Enter the volume of the calibration standard(s) (located on the outside of the calibration standards case shipped with your instrument) in the **Volume of Calibration Standard** field.

   The value recorded on the case for a 10-cm^3 pycnometer is the sum of the two standards, and on a 350-cm^3 pycnometer, the sum of the three standards.

6. Select the **Measured** option.

7. Click **Analysis Conditions** to specify calibration parameters; the Calibration Analysis Conditions dialog is displayed.

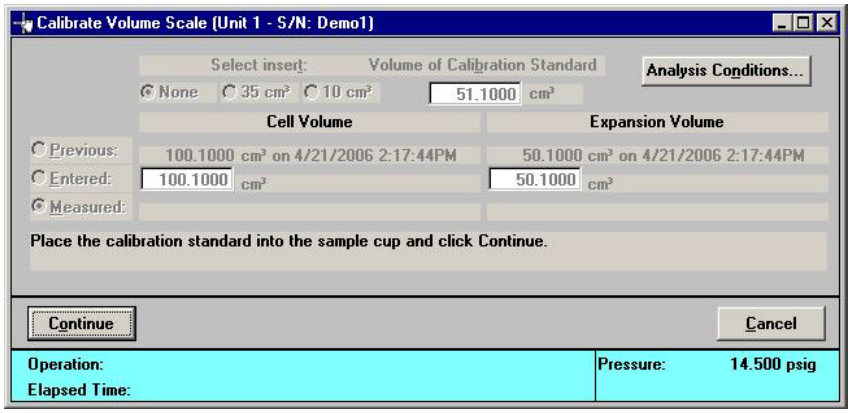


8. Click **Replace**; the Open Analysis Conditions dialog is displayed.

9. Select the file named **calstd.anc**, then click **OK**; the Calibration Analysis Conditions dialog containing appropriate values is displayed.

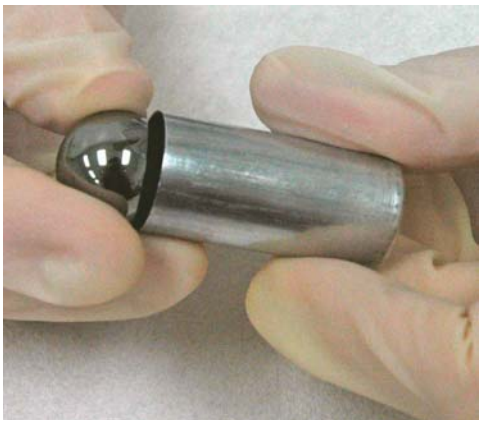
10. Click **OK** to return to the Calibrate Volume Scale dialog.

11. Click **Start** to begin the first phase of the calibration (volume offset). Status messages display until this phase is complete, then a dialog prompting you to insert the calibration standard(s) is displayed.



12. Remove the sample chamber cap, then remove the sample cup from the chamber. Place the cap back onto the chamber while placing the standard(s) into the cup.

13. Tilt the sample cup and allow the standard to roll gently into the cup to prevent denting of the cup.



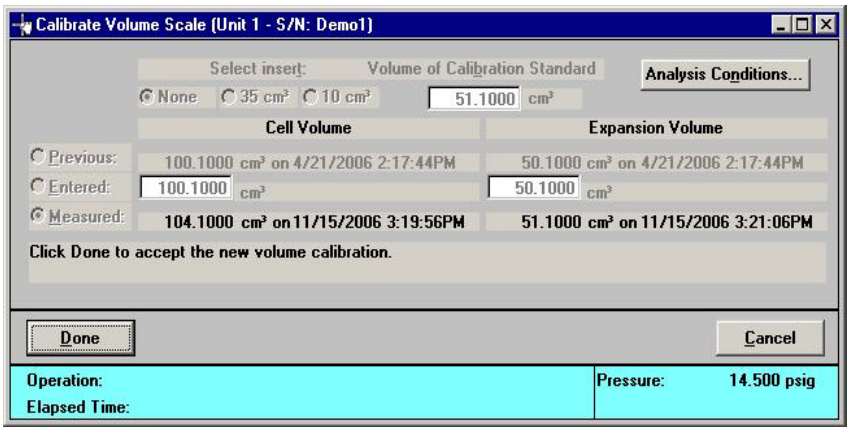
- one standard is shipped with the 1- and 100-cm^3 pycnometers
- two are shipped with the 10-cm^3 pycnometer
- three are shipped with the 350-cm^3 pycnometer

14. Remove the sample chamber cap, place the sample cup back into the chamber, and replace the cap. Turn the cap clockwise to tighten.

15. Allow the standards to reach thermal equilibrium with the pycnometer; approximately:

- 10 minutes for 1- and 10-cm^3 pycnometers
- 15 minutes for the 100-cm^3 pycnometer
- 20 minutes for the 350-cm^3 pycnometer

16. Click **Continue** to complete the second portion of the calibration (volume scale). Status messages display until the calibration is complete; the following dialog is displayed.



17. Click **Done** to accept the new values.

18. Do not remove the standard(s) from the sample chamber until you have verified operation (next section).

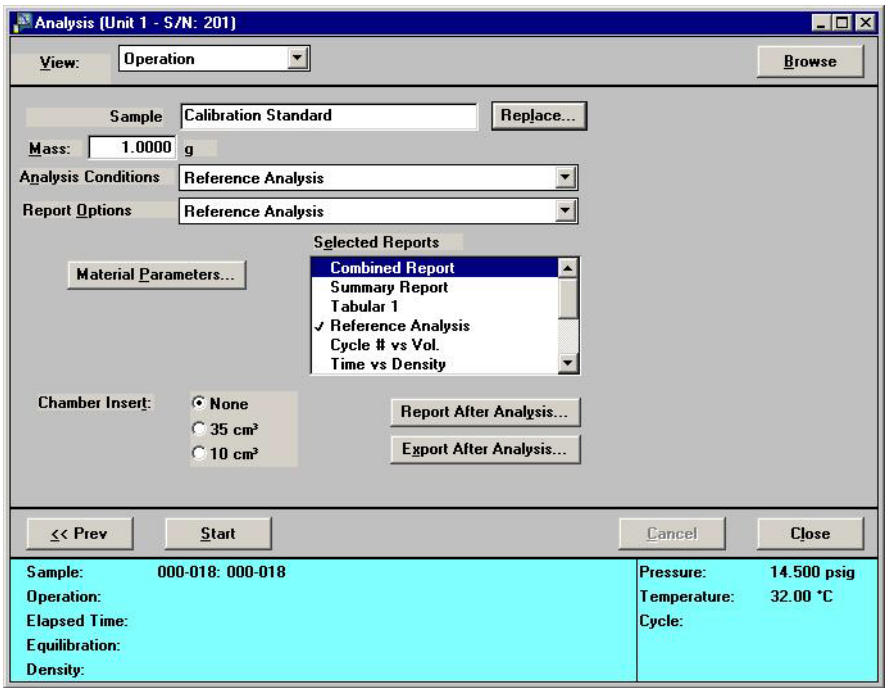
Verifying Operation

Verify operation of the pycnometer by performing an analysis on the calibration standard(s) to ensure that the pycnometer is operating properly.

1. Select **Unit > Sample analysis**; the Analysis dialog with the Open Sample Information dialog displayed on top is displayed.

2. Click **OK**, then **Yes** to create the file; the Analysis dialog containing default values is displayed.

3. Click **Replace**, choose the file named **refanly.smp**, and click **OK**; the analysis dialog containing the appropriate values for the reference analysis is displayed.



4. Click **Start** to begin the analysis; a dialog containing data as collected is displayed.

5. Click **Report** in the upper right-hand corner of the dialog to generate a report to the screen.

6. Compare the value displayed for the average volume to the value recorded on the Calibration Standards case. These two values should agree plus or minus the variance obtained using the following calculation:

   Variance = (chamber volume * 0.0003) + (Value recorded on Standards case * 0.0003)

   Example: calculate the variance for a **10-cm**^{3} pycnometer with a value of **6.372242** recorded on the case as follows:

   Variance = (10 * 0.0003) + (6.372242 * 0.0003) = 0.003 + 0.0019116726 = **0.005**

If the values do not agree, a leak is indicated. Refer to **Checking the Cell and Expansion Chambers for Leaks**, page **9-7** and test the system for leaks. Then repeat steps 1 through 6. If the values continue to disagree, contact your service representative.

7. Remove the standard(s) and place them back into the case.

It is recommended that you read Chapter 3, **User Interface** before performing analyses. This will familiarize you with the hardware and software of the AccuPyc.

Using the Setup Program for Other Functions

After initial installation of the AccuPyc Windows program, the application setup program can be used to:

- install software upgrades, page **2-21**
- move an analyzer from one computer to another computer, page **2-22**
- remove an analyzer from the computer, page **2-25**
- change the analyzer setup (port configuration), page **2-26**
- uninstall the analysis program, page **2-28**

The Setup program is not used for connecting additional analysis modules; refer to Appendix E, page E-1 for these instructions.

To start the application setup program:

1. Ensure that the analysis program is not operating and the analyzer is idle.

2. Insert the CD-ROM into your CD-ROM drive; after a few seconds the menu for the AccuPyc installation instructions is displayed. Click **X** in the upper right-hand corner to close the menu.

To prevent the CD from AutoPlay and the menu from displaying, hold the Shift key before closing the CD door. Do not release the Shift key until the CD light stops blinking.

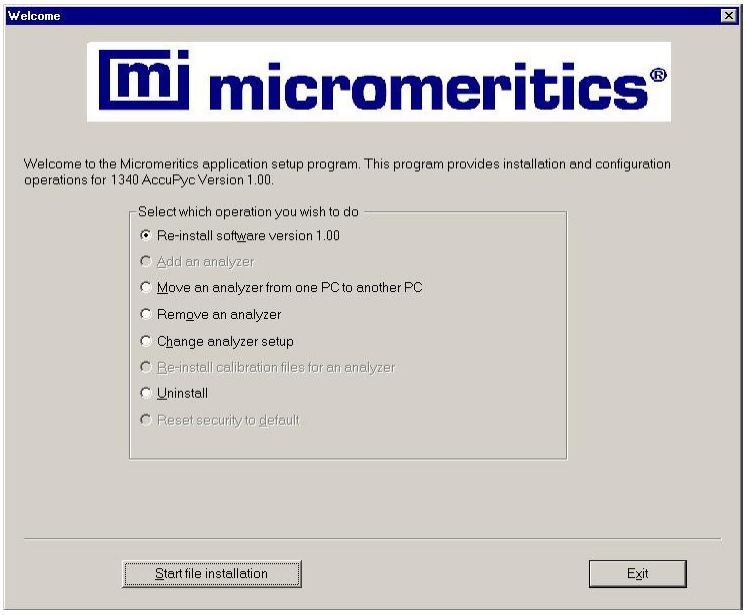
3. Select **Start** from the Status bar, then **Run** from the start menu.

4. Enter the drive designator for the CD-ROM drive, followed by **setup**. For example:

   e:setup

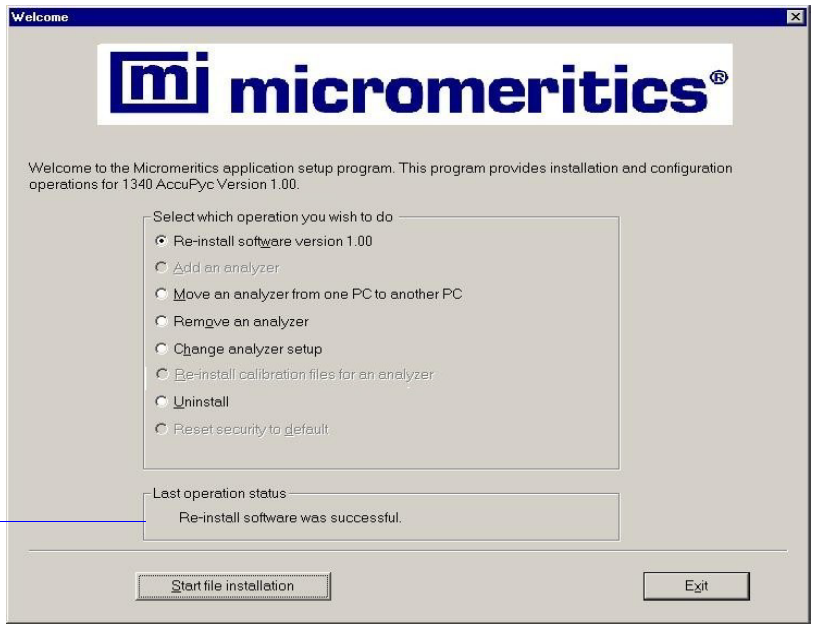
   Alternatively, you can click **Browse**, navigate to the CD-ROM drive, and select **setup.exe**.

5. Click **OK**; the setup Welcome screen showing the options available is displayed.



6. Select the operation you wish to perform. Procedures for performing each operation are located in subsequent sections.

   After the requested operation is completed, the setup Welcome screen is again displayed. A confirmation message indicating completion of the operation is shown in the lower section of the dialog.



Indicates status of last operation.

7. After you have completed all desired operations, click **Exit** to close the dialog.

8. Remove the CD and store in a secure location.

Installing Subsequent Software Versions

When you install a software upgrade, existing data files are not overwritten. There are three types of subsequent installations; the software version controlled by the setup program is:

- a later version than the version installed on the computer
- the same version as the version installed on the computer
- an earlier version than the version installed on the computer

The setup program automatically detects which type of installation applies and customizes the selection in the setup Welcome dialog accordingly.

1. Start the Setup program. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

2. Choose the software option; remember, only the applicable option will display:

   - Upgrade software to version (number) from version (number)
   - Reinstall software version (number)
   - Downgrade software to version (number) from version (number)

3. Click **Start File Installation**; the application installs the software and the setup Welcome dialog is displayed.

Moving an Analyzer from one PC to another PC

You can move your analyzer, along with its status files, from one computer (Source PC) to another computer (Destination PC).

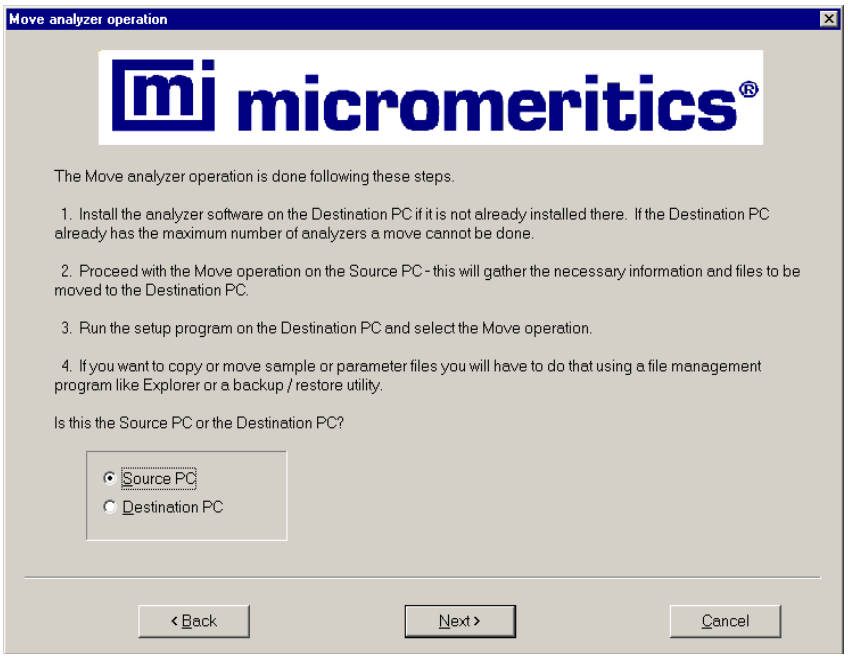
This operation does not move sample or parameter files. To move these files, use a file management program such as Explorer or a backup/restore utility.

1. Install the analysis program on the destination computer. Refer to **Installing the Software**, page **2-8**. Be sure to select **0** as the number of instruments; all related instrument information will be transferred in the **Move** operation.

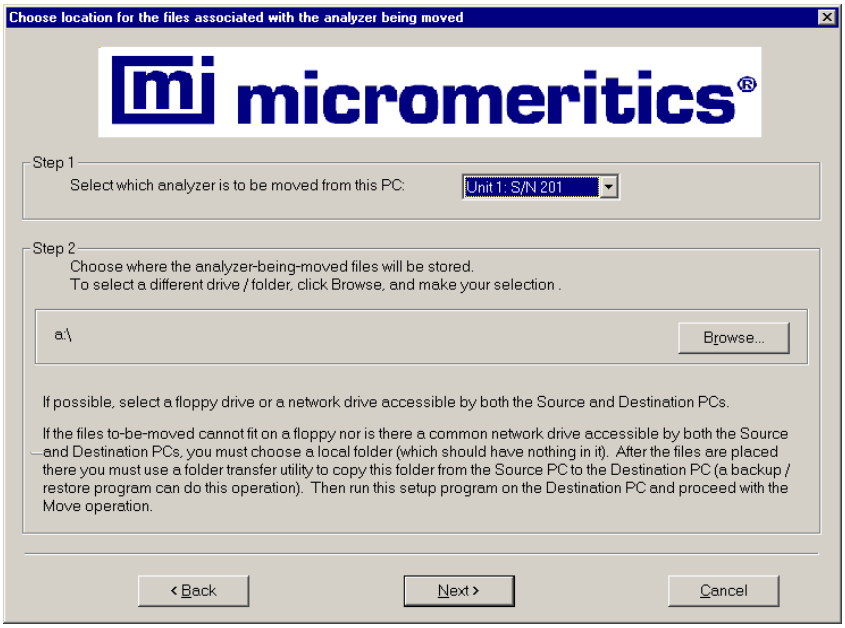
   If the analysis program is already installed on the destination computer, proceed to Step 2.

2. Start the application setup program on the source computer. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

3. Select **Move an analyzer from one PC to another PC** on the setup Welcome dialog, then click **Next**; the Move analyzer operation dialog is displayed.



4. Select **Source PC**, then click **Next**; the following dialog is displayed.



5. In the **Step 1** group box, select the analyzer that is to be moved.

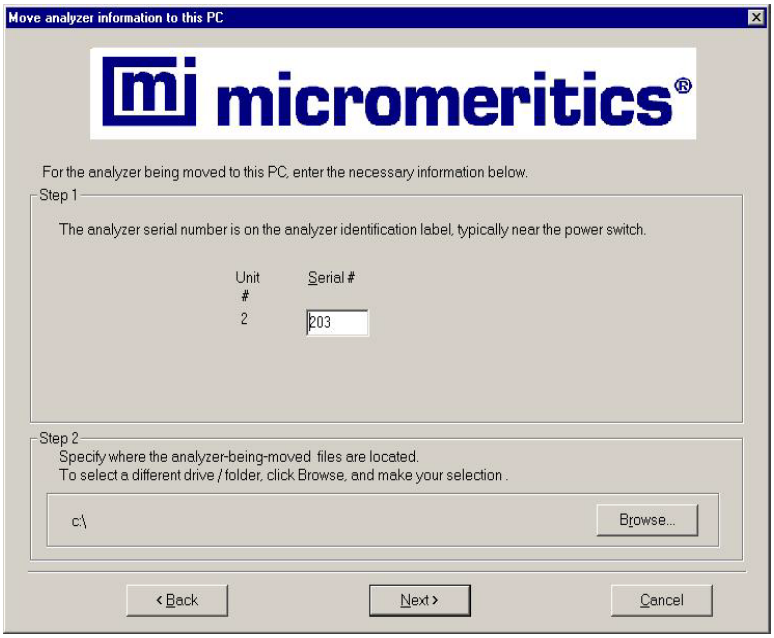
6. In the **Step 2** group box, choose a location in which the moved files will be stored. If possible, choose a floppy drive or a shared network drive. If this is not possible, select a local folder. After the files are placed there, use a folder transfer utility to copy this folder from the **Source PC** to the **Destination PC**.

7. Click **Next**; the files are moved and the setup Welcome screen is displayed.

8. Start the application setup program on the destination computer.

9. Select **Move an analyzer from one PC to another PC** on the Welcome setup dialog; the Move analyzer operation dialog is displayed (shown on previous page).

10. Select **Destination PC**, then click **Next**; the following dialog is displayed.



11. In the **Step 1** group box, enter the serial number of the analyzer you are moving to this PC (this is the serial number of the control module).

12. In the **Step 2** group box, click **Browse** and choose the location of the moved files.

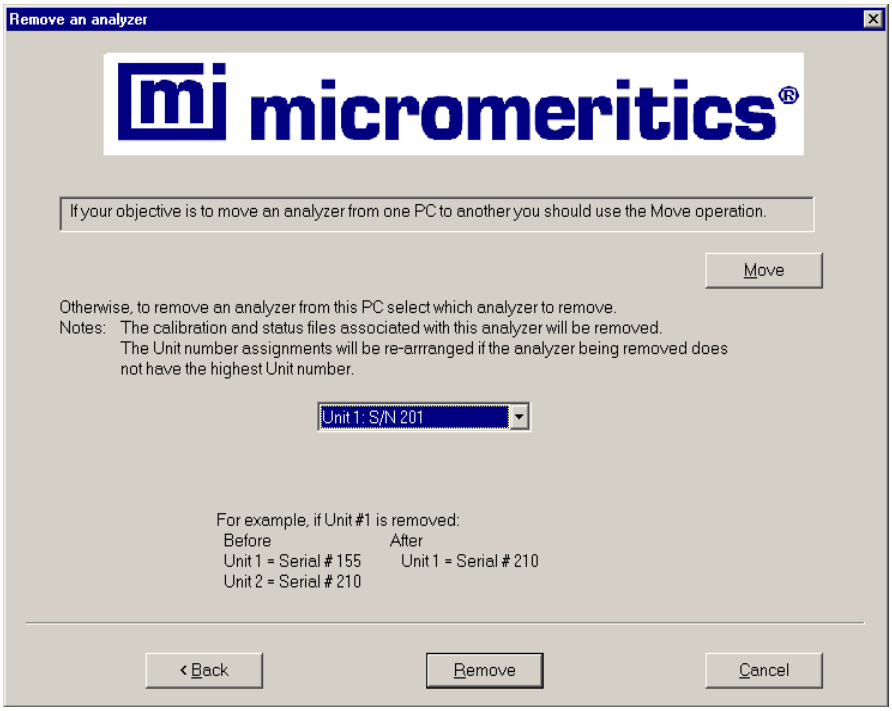
13. Click **Next**; the files are moved and the setup Welcome dialog is displayed.

Removing an Analyzer

You can remove an analyzer from the computer as follows. When you remove an analyzer, the status files also are removed; data files are not.

1. Start the Setup program. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

2. Select **Remove an analyzer** on the setup Welcome dialog, then click **Next**; the Remove an analyzer dialog is displayed.



3. From the drop-down list, choose the serial number of the analyzer you want to remove.

4. Click **Remove**; the analyzer is removed and the Welcome screen is again displayed.

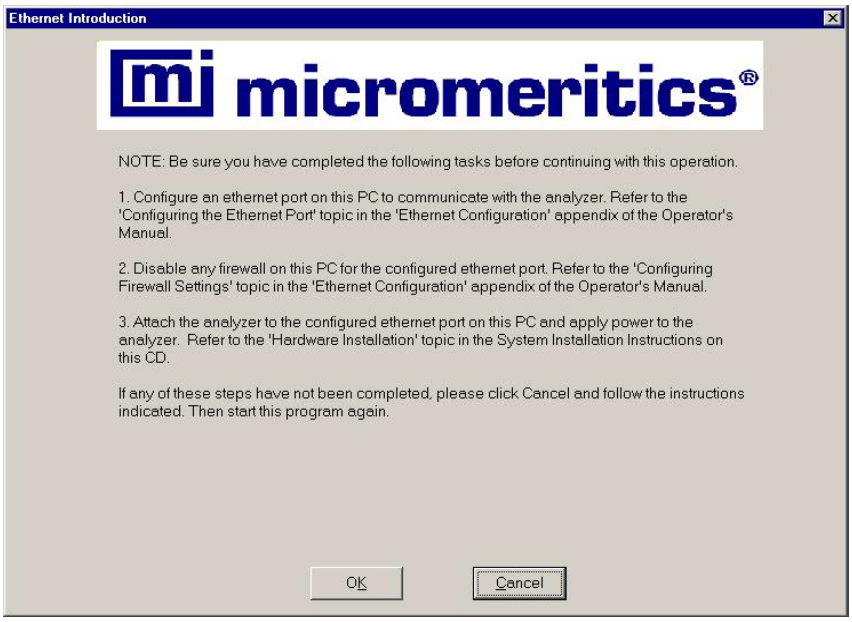
Changing the Analyzer Setup

This option allows you to change the ethernet port being used by the analyzer. For example, use this option to move the analyzer to another ethernet port if the current ethernet port malfunctions.

Be sure that the ethernet port you are switching to has been configured and the firewall setting between the computer and the analyzer is turned off. Refer to **Configuring the Ethernet Port**, page **D-1** and **Configuring the Firewall Setting**, page **D-7**.

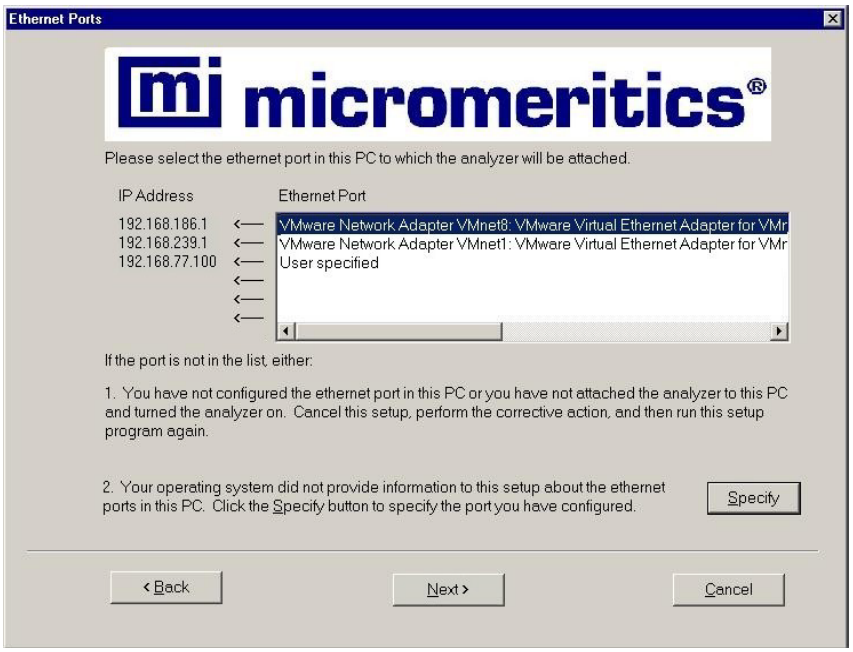
1. Start the Setup program. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

2. Select **Change analyzer setup**, then click **Next**; the Ethernet Introduction screen is displayed. This screen outlines the steps that should be completed to configure the ethernet port to which the analyzer will be connected.



If these tasks have not been completed, click **Cancel** and complete them; then restart the setup program. Do not proceed until the ethernet port in the computer has been configured.

3. Click **OK**; the Ethernet Ports dialog is displayed.



4. Choose one of the following:

If	Then ....
the port you plan to use is listed:	select the port and proceed to the next step.
the port you plan to use has been config-ured but is not listed:	Click **Specify**, the Specify Ethernet Port dialog is displayed.
	Enter the remaining portion of the IP address in the enabled fields, then proceed to the next step.

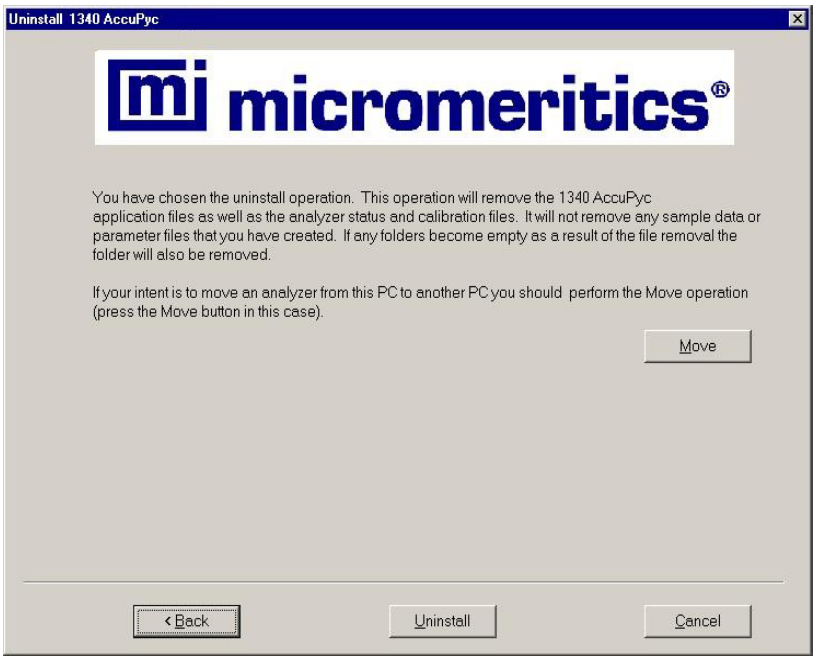
5. Click **Next;** the change is completed and the Welcome dialog is again displayed.

Uninstalling the Analysis Program

When you uninstall the AccuPyc Windows program, the application removes the analysis program, status files, analyzer setup files, and resulting empty directories. It does not remove data files. Perform the following steps to uninstall the program:

1. Start the Setup program. Refer to **Using the Setup Program for Other Functions**, page **2-19**.

2. Select **Uninstall** on the setup Welcome dialog, then click **Next**; the Uninstall dialog is displayed.



3. Click **Uninstall**; the Select Uninstall Method dialog is displayed.

4. Choose one of the following:

   - **Automatic**: click **Next**; the Perform Uninstall dialog is displayed confirming the uninstall operation. Click **Finish** to uninstall the analysis program; the setup Welcome dialog redisplays.

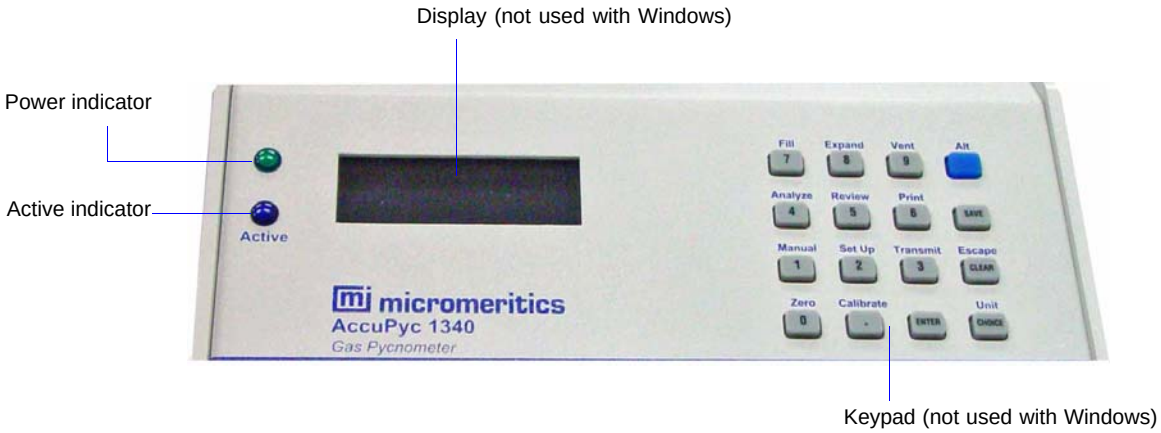
   - **Custom**: click **Next**; a series of dialogs is displayed, allowing you to choose the files you wish to uninstall. After all files are selected and uninstalled, the setup Welcome dialog redisplays.

3. USER INTERFACE

This chapter contains information to familiarize you with the hardware and software of the AccuPyc II 1340. It is recommended that you read this chapter before attempting to operate the AccuPyc.

Controls, Indicators, and Connectors

Front Panel



Display window

Displays **Remote Operation** when the Windows application is being used.

Displays the following when the Windows application is closed:

```
Unit1    SN1234      10 cm3
         X - X - X
Reload
P = (current pressure)
```

Line 1: Unit #, serial #, and nominal cell volume
Line 2: Represent the Fill, Expand, and Vent valves in the closed positions; O = open position
Line 3: Indicates idle state
Line 4: Displays alternately the pressure and temperature of the sample chamber

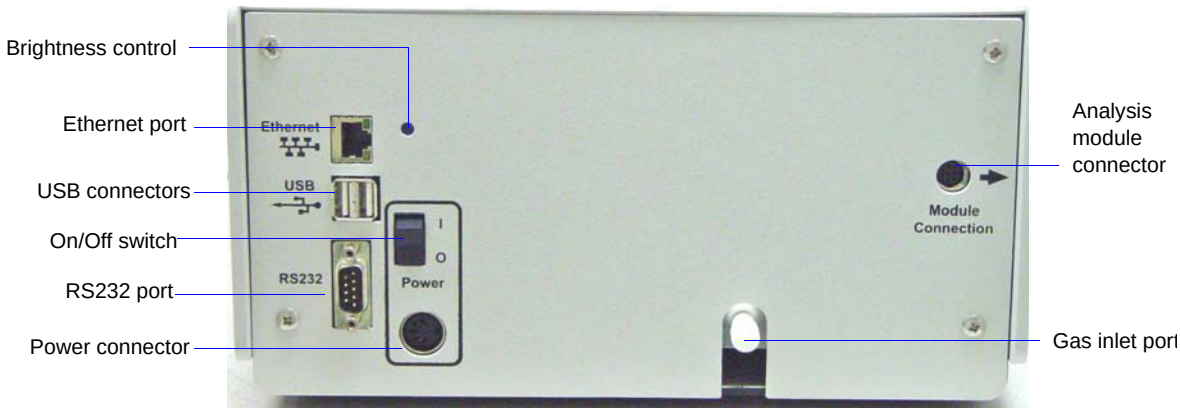
The AccuPyc can be operated in the keypad mode when the Windows application is closed; a complete manual for operating the keypad is included.

Power indicator This is a green LED which illuminates when the analyzer is turned on. A power indicator is included on all analysis and control modules.

Active indicator This is a blue LED which illuminates when an operation is in progress. It is included on all analysis modules; it is not included on stand-alone control modules.

Keypad Not used with Windows software.

Rear Panel



Brightness control Enables you to adjust the brightness of the display.

Insert a small-blade screwdriver into the opening. Rotate the screwdriver until you feel it engage in the slot, then turn clockwise to darken and counterclockwise to lighten.

Ethernet port For attaching the communications cable.

USB connectors Not used

On/Off switch For turning the analyzer on and off.

RS232 port Not used

Power connector	For connecting the AC/DC adapter cord, which provides power to the pycnometer. The pycnometer power cord is plugged into the adapter.
Analysis module connector	For connecting an additional analysis module; you can attach up to five analysis modules to the initial control/analysis module. Each module contains Analysis module input and output connectors.
Gas inlet port	For connecting the analysis gas; Helium is recommended (refer to **Gases**, page **1-14** for other types of gases that can be used). If you have multiple analysis modules attached, each module contains a gas inlet port. Multiple gases can be attached using the Multigas option (refer to **Ordering Information**, page **10-1**).

Top Panel

The top panel contains the sample chamber in which the sample container is placed for analysis, or the standard(s) for calibration.

The sample chamber should remain capped except when inserting or removing a sample. When left uncapped, water vapor adsorbs on the inner surface of the chamber or the chamber temperature becomes unstable; either condition can affect analysis results. If water vapor accumulates in the chamber, the pycnometer must be purged to remove it.

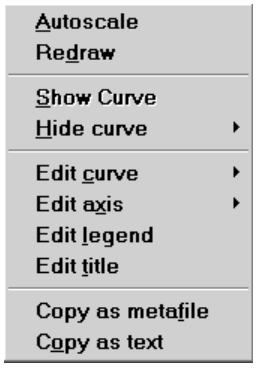
The stand-alone control module, often used for the glove-box pycnometer, does not contain a sample chamber.

Using the Software

The AccuPyc analysis program operates in the Windows environment and requires familiarity with standard Windows operations such as using the mouse, menus, and dialog boxes. This manual provides brief instructions for standard operations; however, you may need to refer to your Windows documentation or the Windows help system to clarify functions which are specific to Windows.

Shortcut Menus

Shortcut menus (sometimes referred to as context-sensitive menus or pop-up menus) are available for onscreen graphs, tabular reports, and the valves on the instrument schematic. These menus are accessed by right-clicking in the graph or table area, or on a valve on the instrument schematic. For example, right-click in the graph area of an onscreen report and the following menu is displayed.



You can also use the key combination **Shift + F9** to access the shortcut menu.

Shortcut Keys

Shortcut keys can be used to activate some menu commands. Shortcut keys or key combinations (if assigned) are listed to the right of the menu item. Instead of opening the menu and choosing the command, simply press the key combination. For example, to open a sample information file, press **F2**; the Open Sample Information dialog is displayed.

You can also use shortcut keys to access a menu or any function that contains an underlined letter by pressing **Alt** plus the underlined letter in the command. For example, to access the **File** menu, press **Alt**, then **F**.

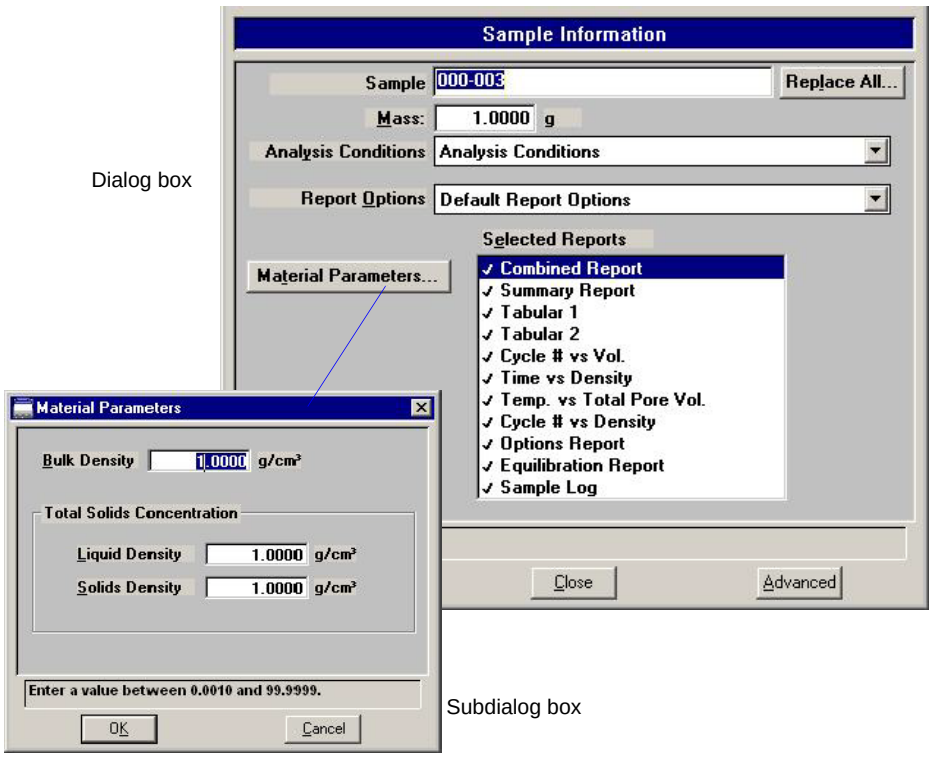
Table 3-1 lists the shortcut key(s) available for operating the AccuPyc program.

Table 3-1. Shortcut Keys

Key(s)	Function
F1	Access online operator's manual
F2	Open a sample information file (main menu bar)
	Clear the field of existing date (Select Dates dialog)
F3	Open an analysis conditions file (main menu bar)
	Insert the current date (Select Dates dialog)
F4	Display a calendar from which to choose a date (Select Dates dialog)
F5	Open a report options file
F6	Tile windows
F7	Cascade windows
F8	Start a report
F9	Close all open reports
Alt + F4	Exit the AccuPyc program
Shift + F2	List sample information files
Shift + F3	List analysis conditions files
Shift + F5	List report options files
Shift + F9	Displays the shortcut menu for onscreen reports and for valves on the instrument schematic

Dialog Boxes and Subdialog Boxes

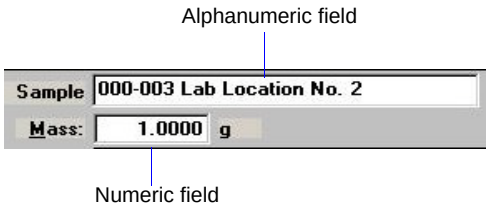
Dialog boxes are displayed when an item followed by an ellipsis (...) is selected. Subdialog boxes are displayed when a push button on a dialog box is selected.



Both types of dialogs may contain one or more of the following:

Data entry field

These fields may be numeric (numbers only) or alphanumeric (numbers, letters, or printable characters). If you make an invalid entry in either of these fields, an error message occurs.

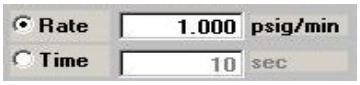


Push button

Typically, a push button is used to display subdialog boxes in which to edit, enter, or specify additional information about the subject matter like the **Material Parameters** push button shown above. Some push buttons, however, are used to invoke an action; *for example*, **Save** saves entries in the current dialog.

Radio button

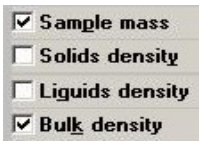
Radio buttons allow you to choose one option from a group of two or more. When you select a radio button, any previously selected radio button becomes deselected.



Some radio buttons enable data entry fields in which values are to be entered.

Check Boxes

Check boxes also are used to select options. However, with check boxes, you may select as many items as you wish.

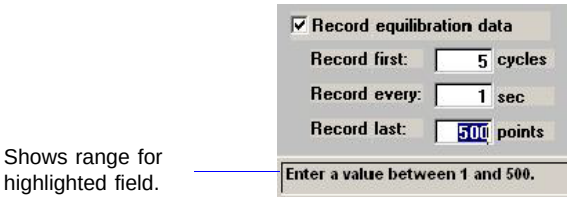


Drop-down lists

A drop-down list is indicated by a down arrow to the right of the field. Drop-down lists contain a list of options from which you may choose one.

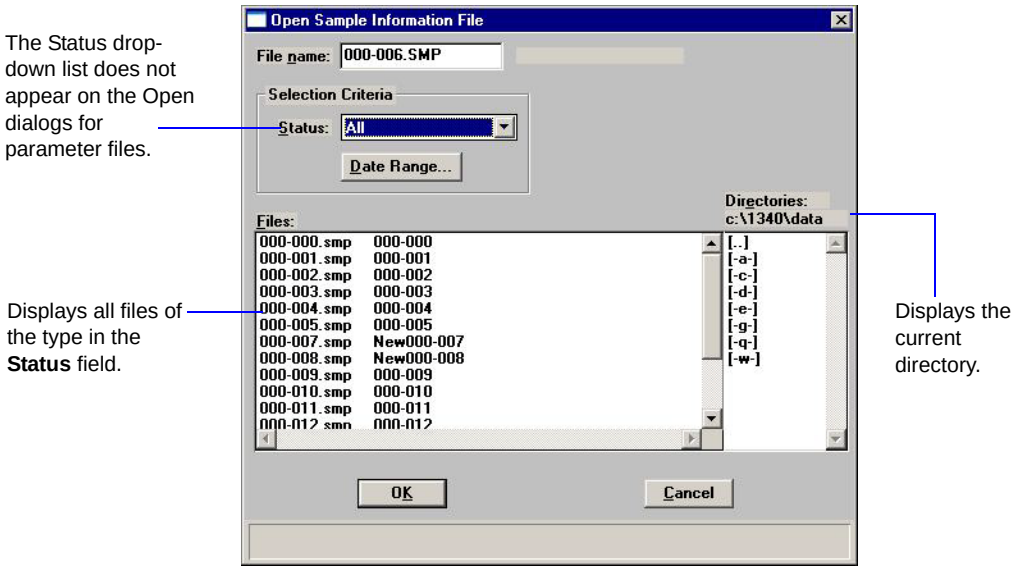
Information Bar

Some dialog boxes contain information pertinent to the selected field in an information bar across the bottom of the dialog. For example, a range is shown for fields in which numeric entries are required.



Selecting Files

Sample information is stored in files and saved under file names. Certain dialog boxes contain a **Files** list window which displays a list of files available for that particular operation. One example is the Open Sample Information dialog:



When opening sample information files, the next automatically sequenced file number appears in the **File name** field. For parameter files, a wildcard character with the default extension for the type of file you are opening appears in the **File name** field. Simply select the desired file displayed in the **Files** list window, then click **OK** to open the file. Alternatively, you can double-click on the desired file.

You may limit the list of files displayed in the **Files** list window by choosing one (or more) of the following:

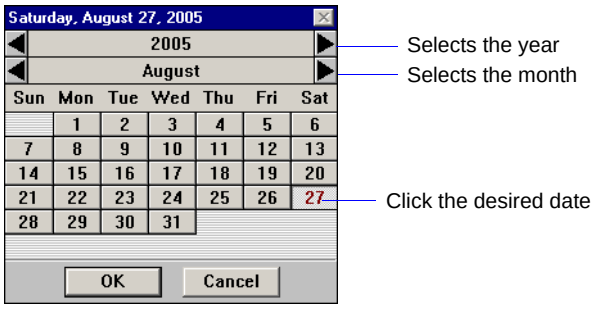
- Use wildcard characters in the path name you enter in the **File name** field. Wildcard characters such as * and ? can be used to filter file names. For example, you could filter a list to display files beginning with **F** by entering **F*.smp** (or other appropriate extension) in the **File name** field.

- Enter a range of dates. Click **Date Range**; the Select Dates dialog is displayed.

Select the **Show Date Range** radio button. This enables the **From** and **To** fields so that you may enter a range of dates in which to display files. Alternatively, you can double-click in each field to display a calendar from which to choose a date. The range you specify remains the default until you change the dates or select **Show All Dates**.

For convenience, the following shortcut keys are available when the Select Dates dialog is displayed:

F2 Clears the field
F3 Inserts the current date
F4 Displays a calendar from which you may select a date



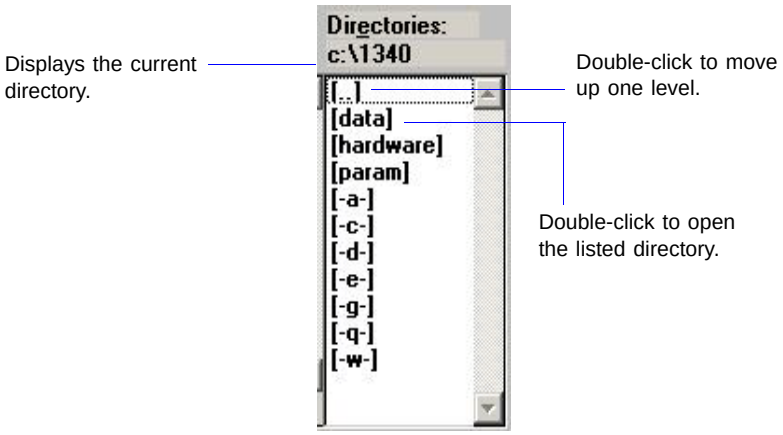
You may change the date format by using the Date and Time function on the Windows Control Panel.

- Select a file status from the Status drop-down list (displays only for sample files).

Table 3-2. File Status and Description

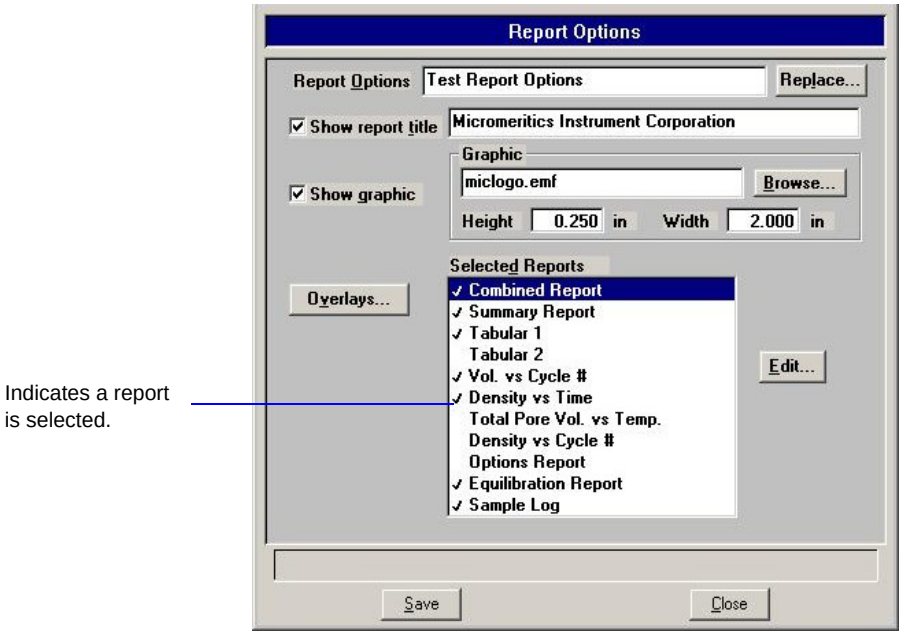
Status	Description
All	All sample information files in the specified directory and within the specified range of dates
Analyzing	Sample information files that are currently being used in an analysis
Complete	Sample information files that have been used in a completed analysis
No Analysis	Sample information files that have not been used in an analysis

- Navigate to a different directory. The current directory is displayed just above the **Directories** list box. You can change directories by double-clicking a directory in the **Directories** list box, double-clicking **[...]** to move up one level, or by entering the desired directory in the **File Name** field. For example, enter C:\1340\files\sample*.smp to display sample files in the1340file**s\sample** directory on your local drive.



Selecting Reports

Reports are selected from the Report Options dialog. Simply select (highlight) the report and then double-click, or press the spacebar. A report is selected when it is preceded with a check mark. Reports are deselected in the same manner.



File Name Conventions

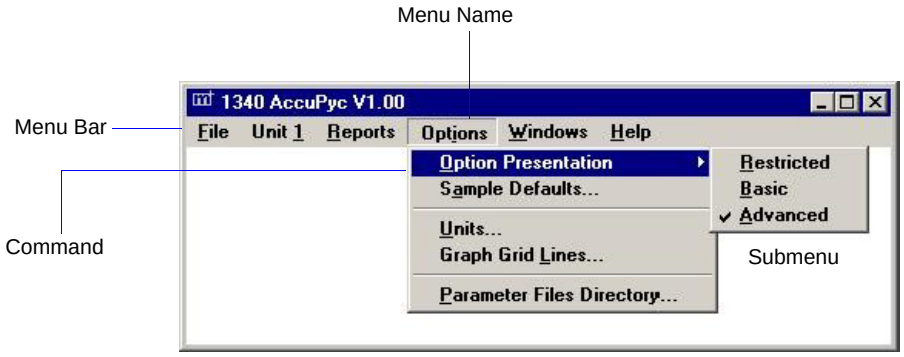
The following table shows the file name extensions for the AccuPyc program.

Table 3-3. Default File Name Extensions

File Type	Extension
Sample Information	SMP
Analysis Conditions	ANC
Report Options	RPO
Export to disk (text file)	TXT
Export to disk (spreadsheet)	XLS
Print to disk	RPT
List to disk	LST
The following types are available for reports saved from the Report window:	
Report	REP
Spreadsheet	XLS
ASCII	TXT

Menu Structure

All functions for the AccuPyc program are located on menus which are accessed from the Menu bar. Each menu contains commands, and in some cases a submenu. A submenu is indicated when the command is followed by an arrow.



Brief descriptions of each menu are provided below; refer to the chapter given in parentheses for a detailed description of the commands contained on that menu.

File — The options on the File menu enable you to create and manage sample and parameter files. (**FILE MENU**, page **5-1**)

Unit [n] — Enables you to perform analyses and other instrument operations. If you have multiple analysis units connected to your control unit, a unit menu is shown for each. (**UNIT MENU**, page **6-1**)

Reports — Enables you to generate, close, and open reports; also provides examples of some of the reports available with the AccuPyc program. (**REPORTS MENU**, page **7-1**)

Options — Allows you to choose sample editing mode, select data presentation formats, and specify a location for predefined parameter files. (**OPTIONS MENU**, page **8-1**)

Windows — Enables you to arrange the windows and icons on your screen. This menu also displays the names of all open windows. (this chapter, page **3-13**)

Help — Displays information about the AccuPyc program. Also provides access to the online operator's manual. (this chapter, page **3-13**)

Windows Menu

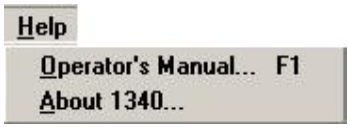
Tile Resizes all open windows and arranges them side by side.

Cascade Resizes all open windows and arranges them in a stacked fashion. The active window is positioned on top of the stack. Each window's title remains visible, making it easy to select other windows.

Arrange Icons Arranges all minimized dialogs in an orderly manner.

Open Files Displays all currently open files. The active file is preceded with a check mark.

Help Menu



Operator's Manual Launches Adobe Acrobat, providing a copy of the operator's manual. Refer to **Online Manual**, page **1-8** for tips on using the online manual.

About 1340 Displays information about the AccuPyc program

4. OPERATIONAL PROCEDURES

This chapter contains brief step-by-step instructions on how to:

- specify sample file defaults, beginning on this page
- create sample information files, page **4-5**
- define parameter files, page **4-8**
- prepare and load your sample, page **4-13**
- perform an analysis, page **4-15**
- print file contents, page **4-17**
- list statistics on sample or parameter files, page **4-19**
- export run or equilibration data from a sample information file, page **4-21**
- overlay graphs, page **4-22**

This chapter does not contain detailed descriptions of the dialogs used to perform these procedures. Refer to Chapters 5 through 8 for dialog descriptions. Use the index of the printed manual or the online manual to assist you in locating the appropriate dialog.

Specifying Sample File Defaults

You can specify sample defaults in the Basic or Advanced format. The defaults you specify are the ones you see when you create a new sample file in the respective format. Therefore, it is best to specify (or enter) parameters that you plan to use most frequently. For example; specify defaults for your most commonly analyzed sample material. You can always edit parameters when you create a file. The AccuPyc Windows system automatically generates sample information file names and uses the values you specify as the defaults.

Advanced Format

The Advanced Sample Defaults dialog consists of tabs for each parameter. You can move from one set of parameters to another by clicking the tab or by using **Next** and **Prev**. The values you specify in the parameter portions of the sample file (Analysis Conditions and Report Options) are saved as the defaults for newly created parameter files.

For example, after specifying defaults for a sample file in the Advanced format:

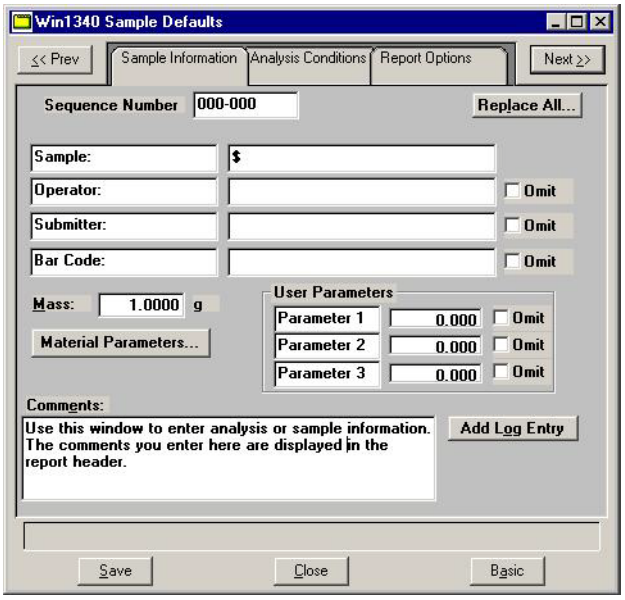
- Select **File > Open > Sample Information**, then **Yes** to create the file, and the defaults you specify display for all parameters.

- Select **File > Open > Analysis Conditions**, name and create the file, and the defaults you specify in the Analysis Conditions portion of the Advanced Sample Defaults dialog display in the fields.

Select Options > Option Presentation and ensure that Advanced is selected as the format.

Refer to **Advanced,** page **8-5** for a description of the fields associated with specifying defaults for sample information files in the Advanced format.

1. Select **Options > Sample Defaults**, the Advanced Sample Defaults dialog is displayed.



2. In the **Sequence Number** field, specify a default string for the sample file number; you can use up to eight characters. This is the number that appears in the **File name** field when you select **File > Open > Sample Information**.

3. In the right-side field of the **Sample** line, enter a format for the sample's identification. You can enter up to 42 characters. Be sure to include the $ symbol if you want the sample file number (Sequence) included as part of the identification.

4. Edit the **Operator** and **Submitter** lines as desired. Or have them omitted from the Sample File dialog by selecting **Omit**.

5. The **Bar Code** line is for entering bar codes. If you are not using bar codes, you can edit the label and use this line for additional information on the sample. Or, like the previous lines, you can select **Omit** to remove the line from the sample file editor.

   This field also accepts input from a bar code reader (if installed on a USB port on the computer).

6. Click **Material Parameters** to specify your sample material parameters.

7. Enter a default value in the **Mass** field. An approximate value is sufficient; a more accurate value for the sample mass can be entered at the time of analysis or post-analysis.

8. If you plan to report statistical process control (SPC) information, enter appropriate information. These are user-definable parameters that can be entered and tracked along with other statistical process control data; refer to **Sample Defaults**, page **8-8** for additional information on these parameters.

9. Click the **Analysis Conditions** tab. Choose the analysis conditions appropriate for your most commonly analyzed material.

10. Click the **Report Options** tab. Choose desired reports, using **Edit** to specify details; then click **Save**.

11. Click **Close** to close the dialog.

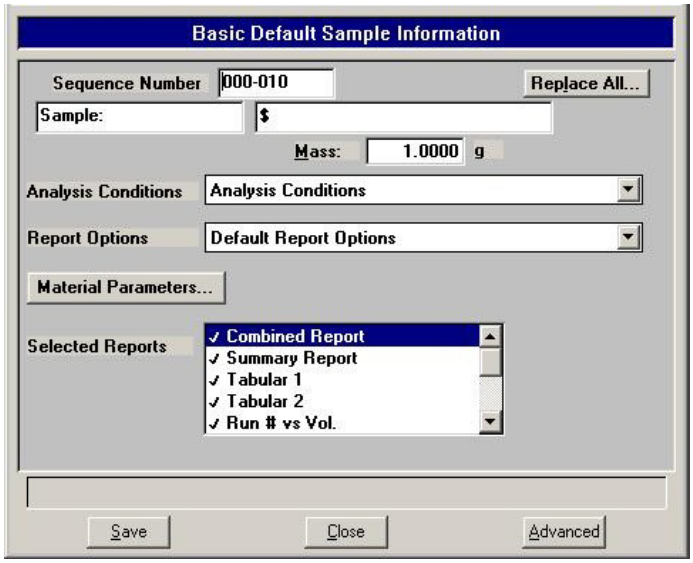
Basic Format

Perform the following steps to define defaults for a sample information file in the Basic format. The defaults you specify in this format also display as the defaults for sample files in the Restricted format.

Select Options > Option Presentation and ensure that Basic is selected as the format.

Refer to **Basic,** page **8-10** for a description of the fields associated with specifying defaults for sample information files in the Advanced format.

1. Select **Options > Sample Defaults**; the Basic Default Sample Information dialog is displayed.



2. In the **Sequence Number** field, specify a default string. This is the number that is incrementally sequenced and displays in the **File name** field when you select **File > Open > Sample Information**. You can use up to eight characters.

3. In the field on the right of the **Sample** line, enter a format for the sample identification. Be sure to include the $ symbol if you want the sample file number included as part of the identification. You can use up to 42 alphanumeric characters.

You also can edit the word *Sample*. For example, you may prefer to use *Material* or *Test*. You can enter up to 15 characters in this field.

4. Enter a default value in the **Mass** field. An approximate weight is sufficient; a more accurate value for the sample mass can be entered at the time of analysis or post-analysis.

5. Select the down arrow to the right of the **Analysis Conditions** and **Report Options** fields to choose default files.

6. Click **Material Parameters** to specify your sample material parameters.

7. Click **Save**, then **Close**.

Creating Sample Information Files

A sample information file must be assigned to every sample that is analyzed. When you create a sample file, you can accept the default values specified using **Sample Defaults**, or you can edit them as desired. You can create a sample information file using the Advanced, Basic, or Restricted format.

Advanced Format

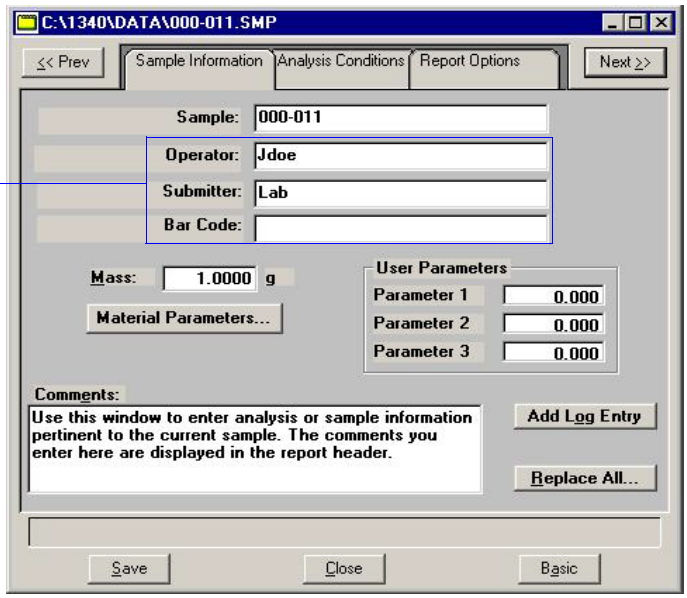
The Advanced format allows you to customize the parameters of a sample information file. Refer to **Advanced,** page **5-5** for a description of the fields associated with creating sample information files in the Advanced format.

1. Select **File > Open > Sample Information**; the Open Sample Information File dialog is displayed.

2. Accept the next sequenced file number or enter a new name in the **File name** field; you can use up to eight characters.

3. Click **OK**, then **Yes** to create the file; the Sample Information dialog is displayed.

These fields do not display if you selected Omit when specifying sample defaults.



The defaults that appear in the fields are the ones specified in **Sample Defaults**.

4. Accept the default identification in the **Sample** field or change it to an appropriate one. The dialog in Step 3 shows the sample file number because the dollar ($) symbol was used when specifying sample defaults.

If a sample information file already exists containing the values you want to use in this file, you can click Replace All to copy those values into this one. You can still edit the values after they are imported.

5. Edit the **Operator** and/or **Submitter** fields as needed. If these fields are not displayed, they were selected to be omitted in **Sample Defaults**.

6. Enter the bar code (if used), or use a bar code reader to transfer the information. If bar codes are not used, this line can be omitted from the sample editor or it can be used for some other type of information. Refer to **Sample Defaults,** page **8-7** for information on removing or editing this field.

7. Enter the sample's mass (if different from the default value) in the **Mass** field; this value can be edited after the analysis if desired.

   An analytical balance can be attached to a serial port on the rear panel of the computer for automatic transmission of sample mass. A third-party data transfer program is also required.

8. Click **Material Parameters** to specify your sample material parameters.

9. Use the **Comments** window to record specifics of the analysis or its conditions. Anything you enter in this window is printed in the report header.

10. Click **Save** to save the information you entered.

11. The steps for completing the remaining parameters of the sample information file are explained in subsequent sections:

    - **Analysis Conditions,** page **4-8**
    - **Report Options,** page **4-10**

    Simply click on the tabs to open its associated dialog.

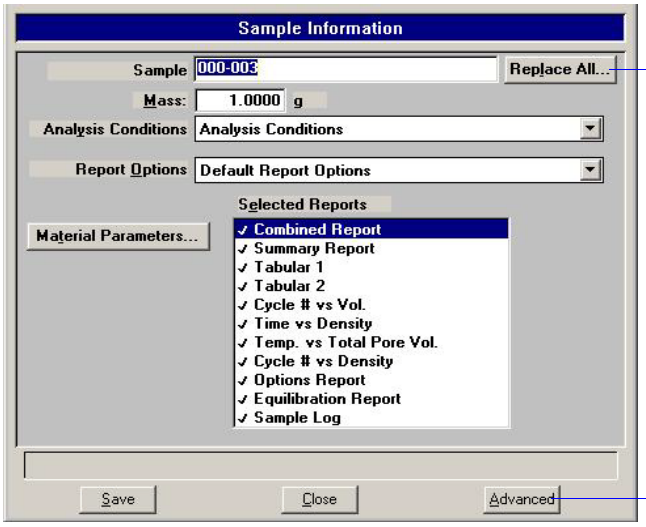
Basic and Restricted Formats

Sample information files are created in the Basic and Restricted formats using predefined parameter files. Refer to **Basic,** page **5-9** for a description of the fields associated with creating sample information files using the Basic or Restricted format.

1. Select **File** > **Open** > **Sample Information**; the Open Sample Information File dialog is displayed.

2. Accept the next sequenced file number or enter a new name in the **File name** field; you can use up to eight characters.

3. Click **OK**, then **Yes** to create the file; the Sample Information dialog is displayed.



Use this push button to copy parameters from an existing file into the current one.

Not displayed when using the Restricted format.

The defaults that appear in the fields are the ones specified in sample defaults.

4. Accept the default identification or change it to an appropriate one. The dialog above shows the sample file number because the dollar ($) symbol was used in Sample Defaults.

5. Enter the sample's mass (if different from the default value) in the **Mass** field; this value can be edited at the time of or after analysis if desired.

6. Using the down arrows to the right of each parameter field, select an appropriate file (or accept the defaults). You can review or edit the contents of these files by switching to the Advanced format if desired.

If you are using the Restricted format, you cannot switch to the Advanced format.

7. Click **Material Parameters** to specify material properties.

8. Click **Save**, then **Close**.

Creating Parameter Files

The following file types can exist as part of the sample information file or as an individual parameter file:

- Analysis conditions, beginning on this page
- Report options, page **4-10**

Having these files exist independently allows you to use them over and over again.

Several predefined parameter files (located in the PARAM directory) are included with the AccuPyc program. Although these files may come close to the needs of your laboratory, you may wish to define additional ones. Or you can use a predefined file as a starting point. This is easily accomplished by creating a new file and then selecting **Replace**. A dialog is displayed so that you can select the existing file containing the values you wish to use. After the values are copied into the current file, you can edit them as desired; the original file remains intact and ready for the next use.

If you wish to have parameter files display in the drop-down list on the Basic Sample Information dialog, be sure to save them to the directory specified as the Parameter Files Directory (see **Parameter Files Directory,** page **8-14**). Unless you have edited the parameter files directory, the files are saved to the default PARAM directory automatically.

You can also create parameter files from the Advanced Sample Information dialog. For example, select **File > Save As > Analysis Conditions** to save the analysis conditions of the current sample information file as a standalone Analysis Conditions parameter file.

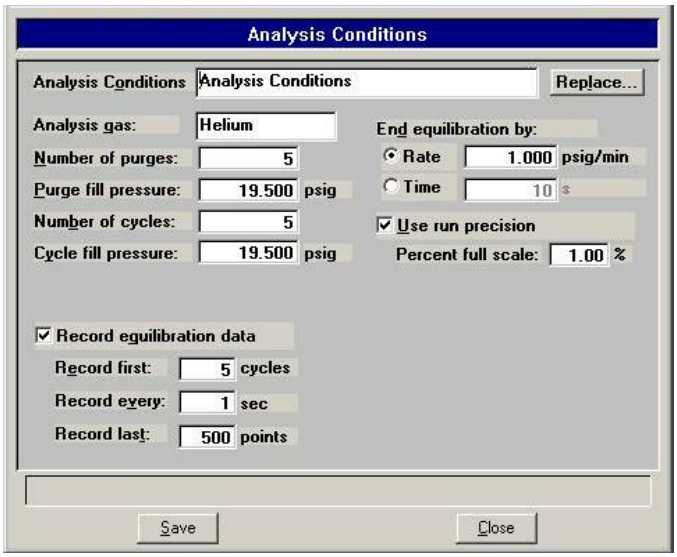
Analysis Conditions

Refer to **Analysis Conditions,** page **5-12** for a detailed description of the fields on this dialog.

1. Select **File > Open > Analysis Conditions**; the Open Analysis Conditions File dialog is displayed.

2. Enter a name (up to eight characters) in the **File name** field, then click **OK**.

3. Click **Yes** to create the file; the Analysis Conditions dialog is displayed.



4. Enter a description (up to 42 characters) in the **Analysis Conditions** field. Use an intuitive description, one that will help you identify the type of sample you plan to analyze using these analysis conditions.

5. Enter the number of purges and the purge fill pressure.

6. Enter the number of cycles and cycle fill pressure.

7. Choose whether to have equilibration end by rate or time, then enter a value in the adjacent field.

8. If using the run precision feature, select the option and enter an appropriate value in the **Percent full scale** field.

9. If you wish to record equilibration data, select **Record equilibration data** then enter the criteria. If you plan to generate an Equilibration report, you must select this option.

10. Click **Save**, then **Close**.

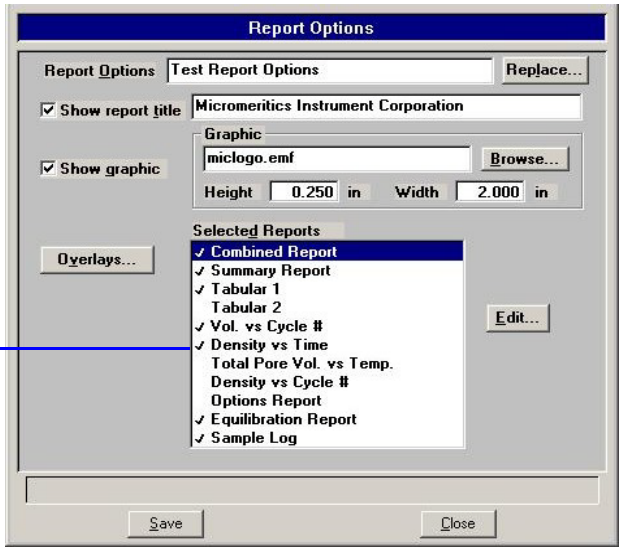
Report Options

Report options specify the types of reports to be generated from an analysis. They also help you customize details of reports such as axis scale, axis range, and column headings.

You can customize report options files to accommodate the requirements of your analyses. For example, you can generate a simple report that lets you determine the basic characteristics of the sample. Then use that report to make choices about the variables you want to include in more lengthy, sophisticated reports. You can specify for reports to be generated automatically after each analysis, or you can generate reports at any time during or after an analysis. A report generated during an analysis only includes data collected up to the time of the report.

Refer to **Report Options,** page **5-15** for a detailed description of the fields on this dialog.

1. Select **File > Open > Report Options**; the Open Report Options File dialog is displayed.
2. Enter a name (up to eight characters) in the **File name** field, then click **OK**.
3. Click **Yes** to create the file; the Report Options dialog is displayed.



4. Enter a description (up to 42 characters) in the **Report Options** field. Enter an identifier that gives a more intuitive description of the file's contents.
5. Select **Show report title** and enter the title you wish to appear at the top of the report. Or deselect this option if you prefer not to have a report title.

If your company logo exists as a bitmap (bmp) or enhanced metafile (emf), you can have it display in the report header by selecting *Show graphic*. Click Browse to select the file; use the *Height* and *Width* fields to specify the size.

6. If you wish to compare the same type of graph from multiple files, click **Overlays** and choose the files. Then be sure you edit the graph from the **Selected Reports** window and choose **Samples** from the **Overlay** drop-down list. (Refer to **Generating Graph Overlays,** page **4-22** for additional information on overlays.)

7. The reports that may be generated are listed in the **Selected Reports** list. Select reports by double-clicking on the desired report. Reports are deselected in the same manner. A report is selected when it is preceded by a check mark.

   You can edit some reports by highlighting and selecting the desired report; then click **Edit**.

8. Click **Save**, then **Close**

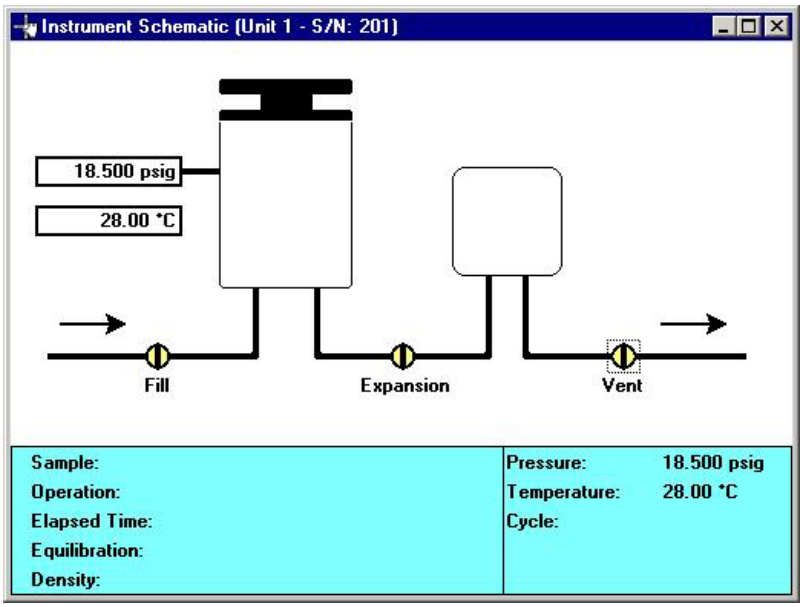
Preparing for Analysis

Setting Regulator Pressure

The Purge and Cycle fill pressures are specified on the Analysis Conditions dialog. Set the regulator pressure at the higher of the two, plus 2.0 psig. For example; if you have specified the Purge fill pressure as **19.500** psig (134.445 kPag) and the Cycle fill pressure as **19.000** psig (131.000 kPag), you should set your regulator pressure at **21.500** psig (148.237 kPag).

1. Be sure the tank pressure for the gas regulator is at least 200 psig (1379 kPag). Pressures less than 200 psig indicate the tank is low on gas. Analyses are terminated automatically if gas is depleted.

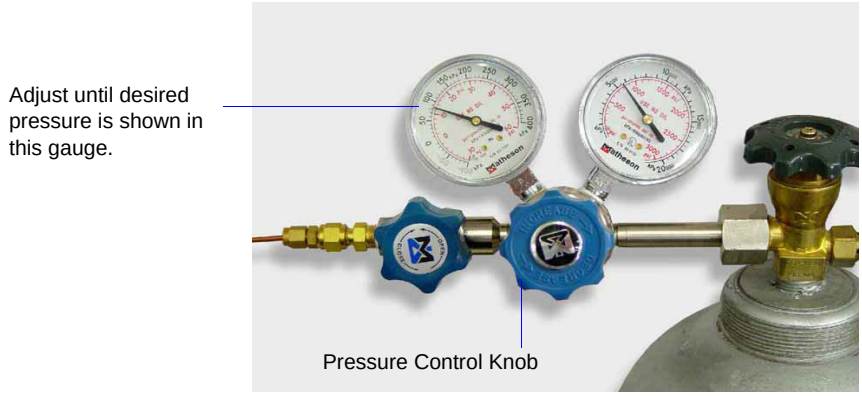
2. Select **Unit > Show Instrument Schematic**, then **Unit >Enable Manual Control.**



If you have a 1-cm³ pycnometer, the sample chamber displays on the right side and the expansion chamber on the left side.

3. Open the Expansion and Vent valves; then open the Fill valve (double-click on the valve or access the shortcut menu and select **Open**).

4. Adjust the regulator pressure control knob until the desired pressure is shown on the regulator gauge.



5. Close the Fill valve, then increase the regulator pressure by 2.0 psig (13.8 kPag).

6. Allow the pressure in the pycnometer to drop below 2.0 psig, then close the Expansion and Vent valves.

Preparing and Loading a Sample

It is important to prepare your sample properly to obtain accurate results. Samples must be free of moisture in order to obtain true sample mass and to avoid the distorting effect of water vapor on the volume measurement. The following procedures are recommended; however, modifications may be necessary for some materials.

- Heat-sensitive materials may have to be dried by long-time exposure to silica gel, freeze drying, etc.
- Materials having a low melting point may be dried using the purge process. In this case, do not weigh the sample and cup until after the purge and analysis have been completed.

The important thing to remember is to avoid exposure of the dried sample to atmospheric moisture during each step of the preparation process. This means weighing as rapidly as possible and installing in the instrument without unnecessary delay.

Keep the cap on the sample chamber except when actually inserting or removing a sample. When the chamber is left uncapped, water vapor adsorbs on the inner surface of the chamber or temperature instability occurs; either condition can affect analysis results.

1. Weigh the empty sample cup. (If volume only is to be measured, you may skip this step).

2. Place a quantity of sample in the cup. Use as large a quantity of sample as possible; we recommend that the cup be at least two-thirds full. Pack powders and fluffy materials (if permissible) to obtain maximum sample weight in the cup. (Refer to **Ordering Information**, page **10-1** to order specially designed cups for powders and fluffy materials.)

3. Place the sample cup with sample in a drying oven. The amount of time the sample must be heated depends on the material and the temperature it will tolerate; this may have to be established by other tests.

4. Remove the sample cup from the oven and transfer it to a desiccator provided with active desiccant. Allow it to cool until near room temperature. In the steps which follow, minimize air exposure of the sample.

5. Weigh the cup and sample and record the weight. Subtract the empty sample cup weight from the sample cup plus sample weight to determine the sample weight. (If volume only is to be measured, you may skip this step.)

6. Remove the cell chamber cap, place the sample cup (with sample) into the cell chamber, then replace the cap.

   It is best not to lay the cap down while loading the sample. Immediately replace the cap when the sample is loaded. This will prevent particles from accumulating on the greased surface (refer to **Handling System Components,** page **2-6** for guidelines on handling system components).

7. If you have a temperature-controlled AccuPyc, perform the following steps before proceeding with **Starting an Analysis** in the next section.

   a. Turn on the bath circulator and specify the temperature you wish to use for your analysis. (Refer to the manufacturer's manual for instructions on operating the bath circulator.)

   b. Allow the temperature to stabilize to the set temperature. Observe the temperature reading on the instrument schematic.

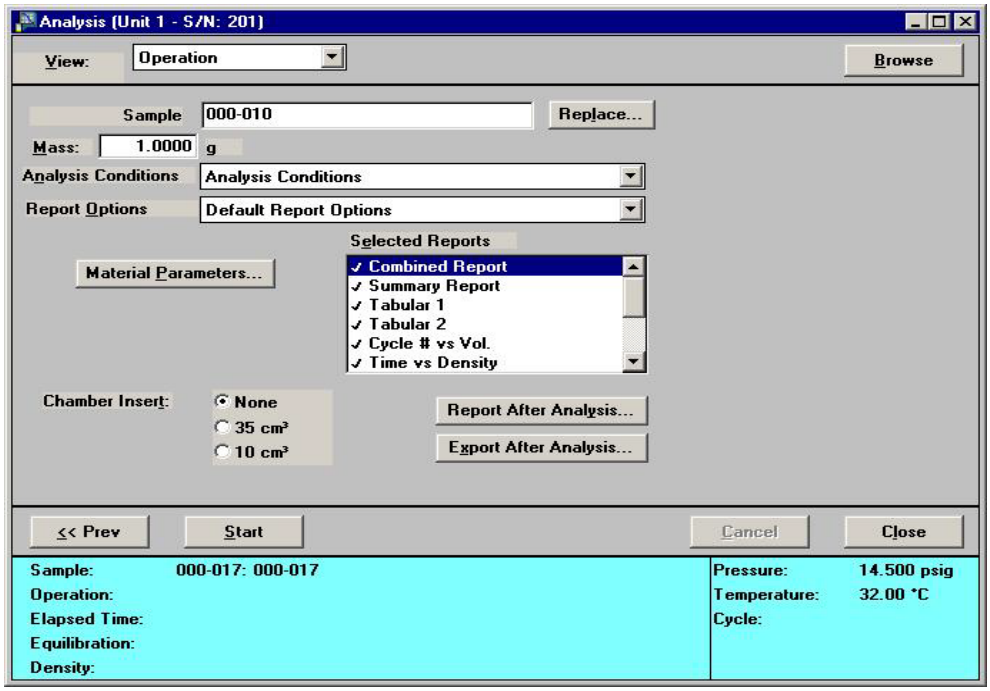
Starting the Analysis

After the sample has been properly prepared and loaded into the sample chamber, you can start the analysis.

1. Select **Unit > Start Analysis**; the Analysis dialog is displayed with the Start Analysis dialog positioned on top.

2. Choose a file for your analysis and click **OK**; the Analysis dialog containing the parameters of the selected file is displayed.

You can also accept the next sequenced number and create a new file if desired. Use the Replace push button to replace file parameters, or the parameter files drop-down lists.



3. Verify parameters and make any changes you feel necessary.

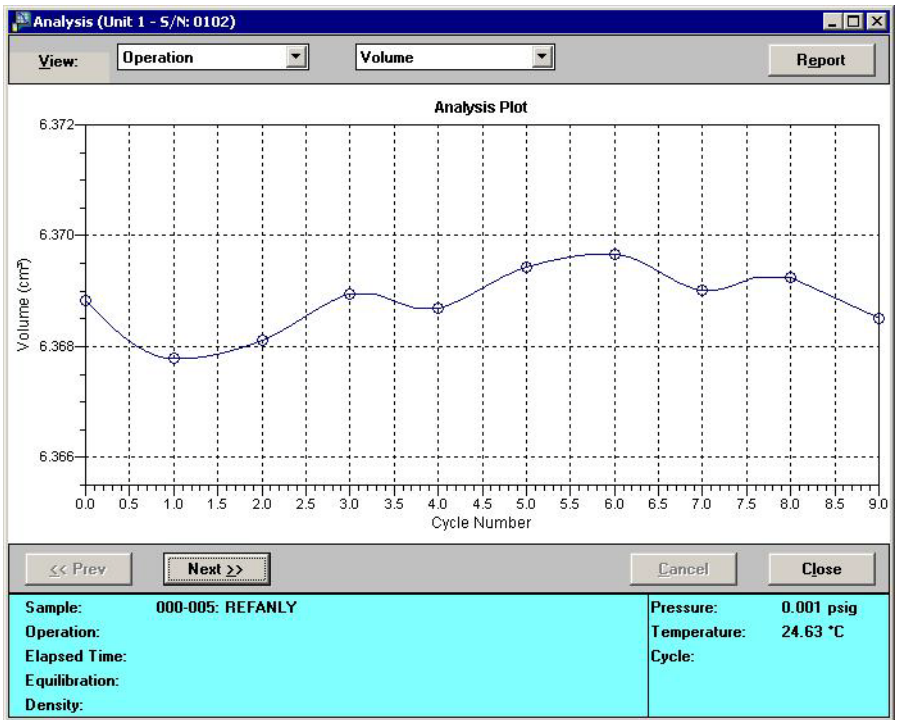
4. Click **Browse** if you wish to choose a different file.

5. Click **Report After analysis** and choose report output options to generate a report automatically after the analysis.

   You can generate reports to the screen, a printer, or to a file. If you choose **Screen**, many options for manipulating and customizing your reports are provided from the Report window. You can also print to a printer from the Report window. Or if you prefer, you can choose not to generate reports after analysis and generate them later using the **Start Report** command on the Reports menu.

6. Click **Export After analysis** to have data exported automatically after the analysis. Or, if exporting equilibration or cycle data, you can export data after the analysis using the **Export** command on the File menu. You cannot export the sample report with the **Export** command.

7. Click **Start** to begin the analysis; the next view of the Analysis dialog containing data as collected is displayed. The dialog contains the statement "No Data Available" until the first cycle is completed, then a graph is drawn and updated as points are collected.



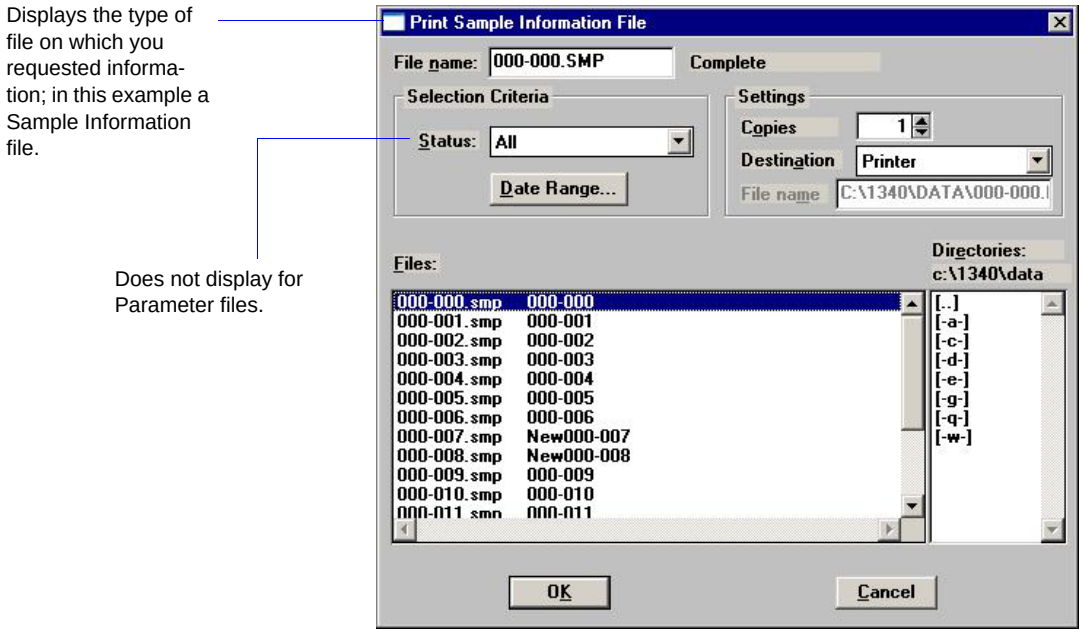
8. Click **Next** to perform another analysis; the first view of the Analysis dialog is displayed. Or click **Close** to exit the dialog.

Printing File Contents

Print enables you to print the contents of one or more sample or parameter files to the screen, a printer, or a file. For example, if you choose Analysis Conditions, you will receive the parameters used for all analysis conditions associated with the file(s). The print dialog is common to all file types.

Perform the following steps to print the contents of a sample or parameter file:

1. Select **File > Print >(File type)**; a dialog similar to the one shown below is displayed.

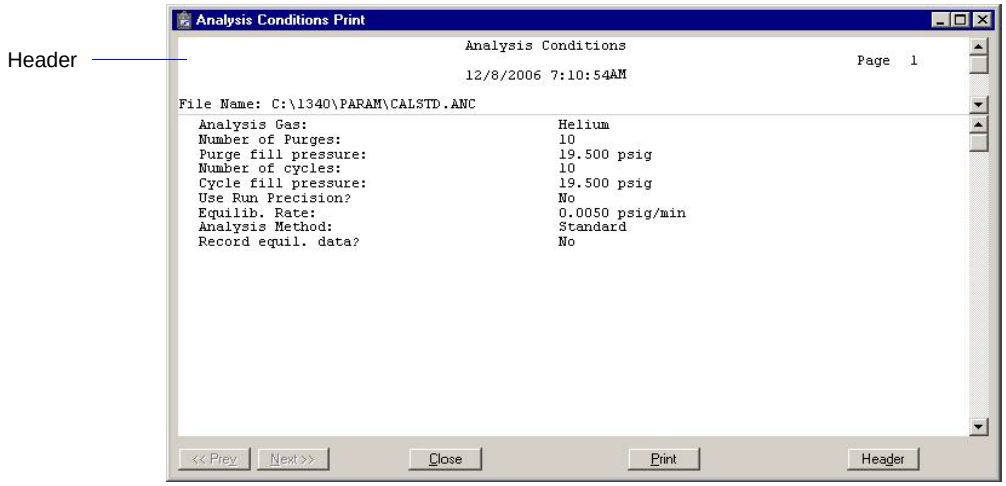


2. From the **Files** list window, choose the desired file(s). You can choose multiple files, by holding down **Ctrl** while making your selections.

3. At the **Destination** field, click on the down arrow and choose a destination for the list output.

   - If you choose **File**, enter a name in the **File name** field, or accept the default name.
   - If you choose **Printer**, the **Copies** field is enabled allowing you to print up to four copies.

4. Click **OK**, the contents of the requested file(s) is(are) sent to the selected destination; this example shows an Analysis Conditions file printed to the **Screen**.



Close: closes the dialog

Print: prints the report to the default printer

Header: toggles the header on and off

Prev and **Next**: enabled when the report contains multiple pages allowing you to advance to other pages

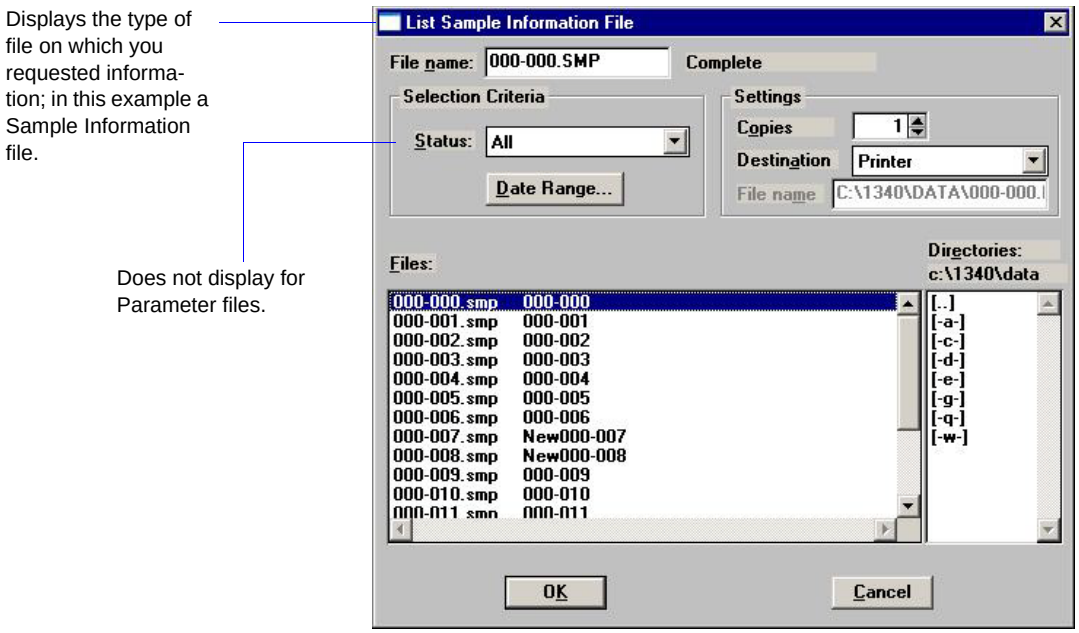
Listing File Statistics

You can generate a list of the following information on one or more sample or parameter files:

- File name
- Date the file was created (or last edited)
- Time the file was created (or last edited)
- File identification
- File status

The List dialog is common to all file types. Perform the following steps to generate a list of file statistics:

1. Select **File > List > (File type)**; a dialog similar to the one shown below is displayed.



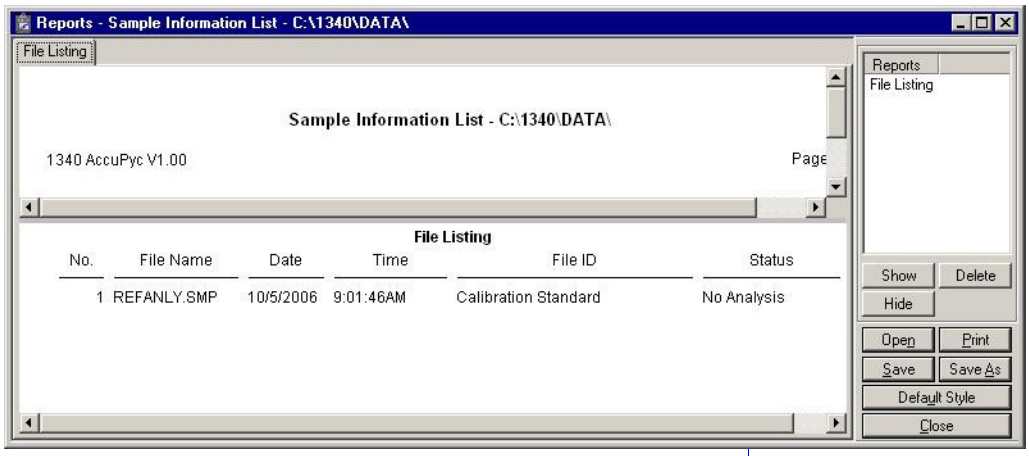
2. From the **Files** list window, choose the desired file(s). If you wish to include all files in the list, leave all files deselected.

3. At the **Destination** field, click on the down arrow and choose a destination for the list output.

   - If you choose **File**, enter a name in the **File name** field, or accept the default name.

   - If you choose **Printer**, the **Copies** field is enabled allowing you to print up to four copies.

4. Click **OK**, a list for the requested file(s) is sent to the selected destination; this example shows a sample file sent to the **Screen**.



This column will be empty for parameter files.

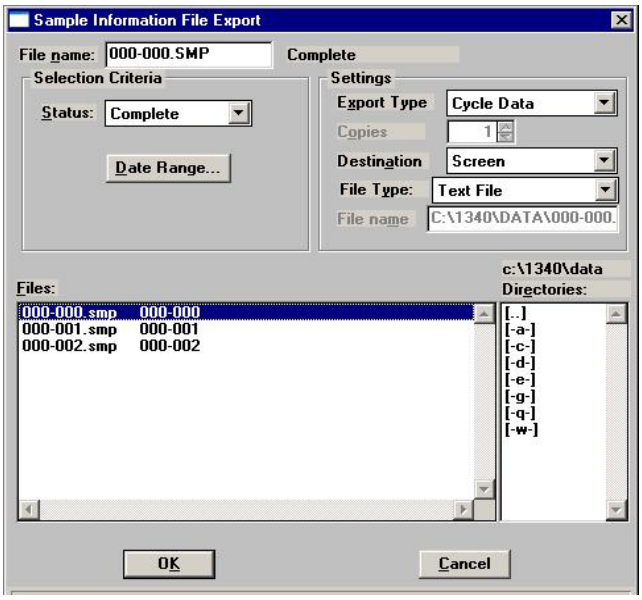
Refer to **Tool Bar,** page **7-16** for an explanation of the buttons on the tool bar.

Exporting Data

The Export option on the File menu allows you to copy the equilibration or run data in the sample information file and reformat it in ASCII text. The output file consists of:

- **Cycle data:** five columns containing the elapsed time, P1 (fill pressure), P2 (expansion pressure), Volume, and Temperature
- **Equil data:** one column of equilibration data

1. Select **File > Export**; the Export Sample File dialog is displayed.



2. From the **Files** list window, select the file(s) you wish to export. To choose multiple files, hold down **Ctrl** while making your selections.
3. From the **Export Type** list, choose the type of data you wish to export.
4. Choose an output destination.
   - If you choose **File**, the **File name** field is enabled so that you may enter a name (or you can accept the default). If you have selected multiple files, each file is exported as its file name with the appropriate **File Type** extensioin.
   - If you choose **Printer**, the **Copies** field is enabled, allowing you to print up to four copies to the printer.
5. From the **File Type** list, choose the manner in which the file is to be exported; in a text format or in a spreadsheet format.
6. Click **OK**; the file(s) is(are) exported to the specified destination.

Generating Graph Overlays

Use graph overlays when you wish to compare graphically results for multiple samples or multiple graphs for one sample. Graphical lines are generated in different colors and reported in a legend on the report.

Graph overlays can be implemented in two ways:

- **Multiple Sample Overlays**
  Overlay results for up to eight samples on top of a previously selected sample.

- **Multiple Graph Overlays**
  Overlay two different types of graphs from one sample.

You must use the Advanced format to specify graph overlays.

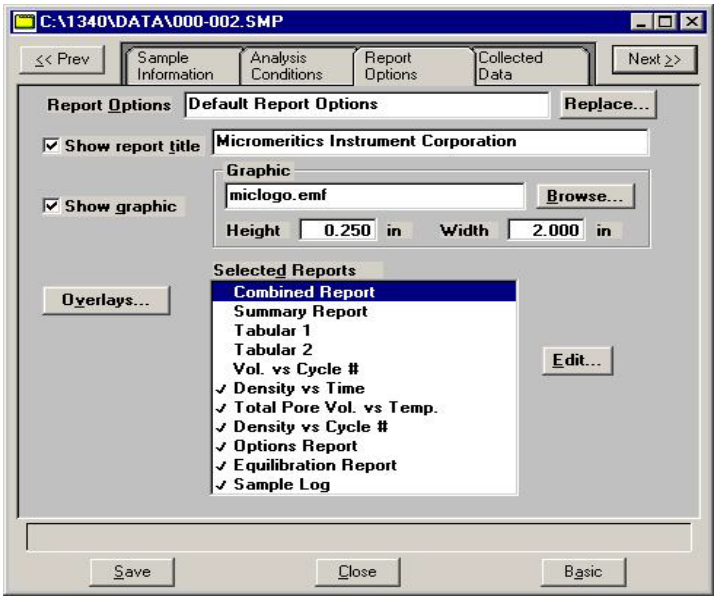
Multiple Samples Overlay

This type of overlay enables you to choose up to eight sample files from which to overlay data of the same type as the currently selected one.

1. Select **File > Open > Sample Information** to display the Open Sample Information File dialog.

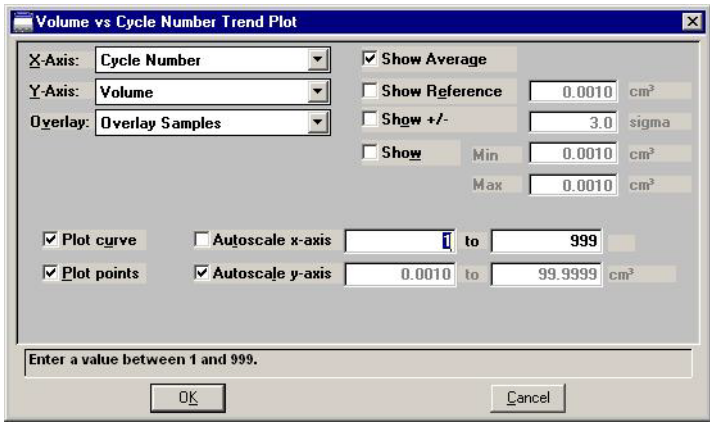
2. Select a sample on which to overlay graphs of other samples, then click **OK**; the Sample Information dialog is displayed. If your dialog is in the Basic format, click **Advanced** to switch to the Advanced format.

3. Click the Report Options tab to display the Report Options dialog.



4. Select reports as desired.

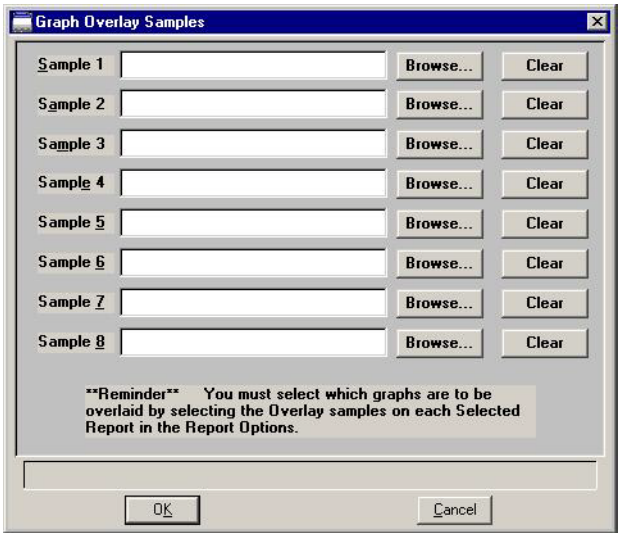
5. Choose the type of graph you wish to overlay, then click **Edit** (this example shows Cycle # vs. Vol.); the Cycle Number vs. Volume Trend Plot dialog is displayed.



6. Ensure that **Overlay Samples** is chosen in the **Overlay** drop-down list; if not, click the down arrow to the right of the field and choose it.

7. Select any other desired options on the dialog, then click **OK** to return to the Report Options dialog.

8. Click **Overlays**; the Graph Overlay Samples dialog is displayed.



9. Click **Browse** to the right of the **Sample 1** field; the Plot Overlay Sample Selection dialog is displayed.

10. Choose a sample file, then click **OK**. You may choose up to eight files in this manner.

11. After selecting the desired number of sample files, click **OK** to return to the Report Options dialog.

12. Click **Save** if you wish to save your selections. Even when you don't save, all specified report options are available as your reports are generated.

    You must click **Save** if you are specifying overlay options on a file that has not been used in an analysis. For example; you may be creating a Report Options file containing overlay options that you can load into a sample file as needed.

13. Select **Reports > Start Report**. The Start Report screen is displayed with the name of your primary file in the **File name** field.

14. Choose the output destination, then click **OK**; the Select Reports dialog is displayed.

15. Ensure that the desired graph is selected (preceded with a check mark), then click **OK**.

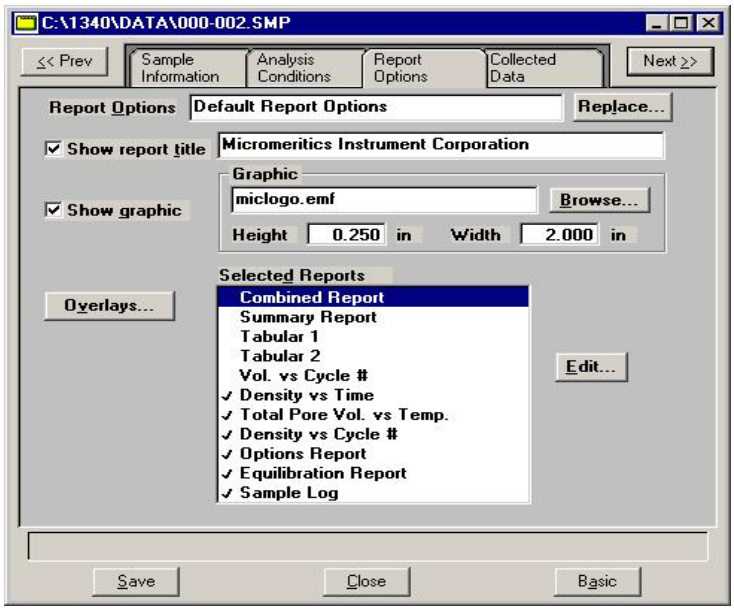
Multiple Graphs Overlay

This type of overlay enables you to overlay two graphs in the same file.

1. Select **File > Open > Sample Information** to display the Open Sample Information File dialog.

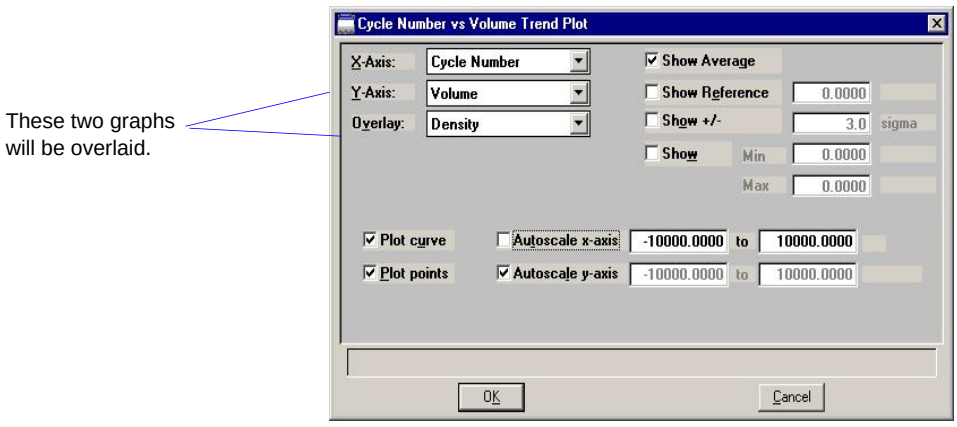
2. Select a sample for which you want to overlay two graphs; then click **OK**. The Sample Information dialog is displayed. If your dialog is in the Basic format, click **Advanced** to switch to the Advanced format.

3. Click the Report Options tab to display the Report Options dialog.



4. Make your report (or graph) selections.

5. From the **Selected Reports** list, select the graph for which you want multiple graph overlays, then select **Edit**. A Report Options dialog for that report (or graph) is displayed (this example shows Cycle # vs. Vol.).



6. Click the down arrow at the **Overlay** field and select a graph type from the list. This selection will be overlaid on the graph selected in the **Y-Axis** field.

7. Click **OK** to return to the Report Options dialog.

8. Click **Save** if you wish to save your selections. Even when you don't save, all specified report options are available as your reports are generated.

   You must click **Save** if you are specifying overlay options on a file that has not been used in an analysis. For example, you may be creating a Report Options file containing overlay options that you can load into a sample file as needed.

9. Select **Reports > Start Report**; the Start Report screen is displayed with the name of your primary file in the **File name** field.

10. Choose the output destination, then click **OK**; the Select Reports dialog is displayed.

11. Ensure that the desired graph is selected (preceded with a check mark), then click **OK**.

5. FILE MENU

The File menu contains options which allow you to manage sample and parameter files.

Description

Listed below are brief descriptions of the File menu options. Detailed descriptions follow this section.

Open — Allows you to open an existing sample or parameter file, or to create a new one. Page 5-3.

Save — Saves the file in the active window. Page 5-27.

Save As — Saves the file in the active window as a different name. You also can use this option to save a subset of the sample file as a parameter file. Page 5-27.

Save All — Saves all open files. Page 5-27.

Close — Closes the file in the active window. Page 5-27.

Close All — Closes all open files. Page 5-27.

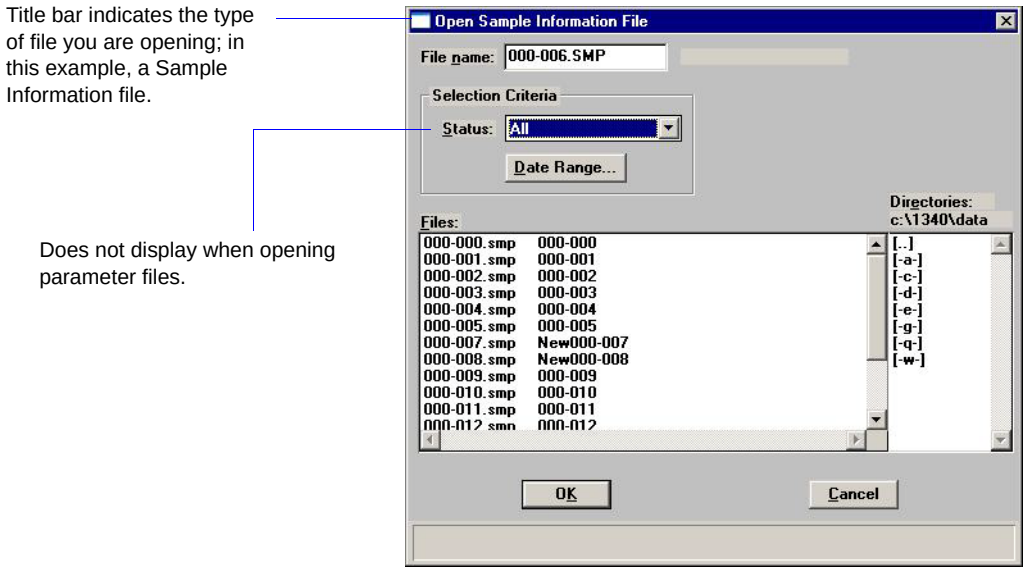
Print — Prints the contents of a sample or parameter file. Page 5-28.

List	Generates a list of certain information for sample or parameter files. Page **5-29**.
Export	Exports the cycle or equilibration data contained in a sample file. Page **5-31**.
Exit	Exits the AccuPyc Windows program. Page **5-33**.

Open

Open allows you to create a new sample or parameter file, or to open an existing one.

When you open a sample or parameter file, a dialog similar to the one shown below is displayed.



File name

For *sample information* files, this field contains the next sequenced file name (number) generated by the software. If this is a new file, you can accept this number or you can enter a name consisting of up to eight characters.

For *parameter files*, the file name displayed includes an asterisk (*) and a default extension as follows:

*.ANC for analysis conditions
*.RPO for report options

If this is a new file, enter a name in the **File name** field. You can enter up to eight characters.

Status
Date Range
Directories

Refer to **Selecting Files**, page **3-8** for a description of these fields.

Files list

Lists the files contained in the selected directory of the type chosen in the **Status** field and within the selected date range. The first column in the list is the file name (number). The second column is the description entered in the file.

If you are opening an existing file, simply select the file and click **OK** (or double-click on the file).

Sample Information

Sample information files contain information used to control the analysis. Therefore, every analysis must be linked with a sample information file before the analysis can proceed. A sample information file consists of the following:

- sample identification
- analysis conditions
- report options
- collected data (when an analysis has completed)

Parts of the sample information file can also exist as parameter files which are separate from the sample information file itself. Having these files exist independently allows you to use them as many times as you wish. For example, if you typically use the same analysis conditions for many of your analyses, you can create an analysis conditions file containing those conditions. Then when you create your sample file, select that file for your analysis conditions. After it becomes part of the new sample file, you can edit it in any way you wish without changing the file from which it was copied.

Sample information files are presented in three formats: Advanced, Basic and Restricted.

Specify or change your format by selecting Options > Option presentation.

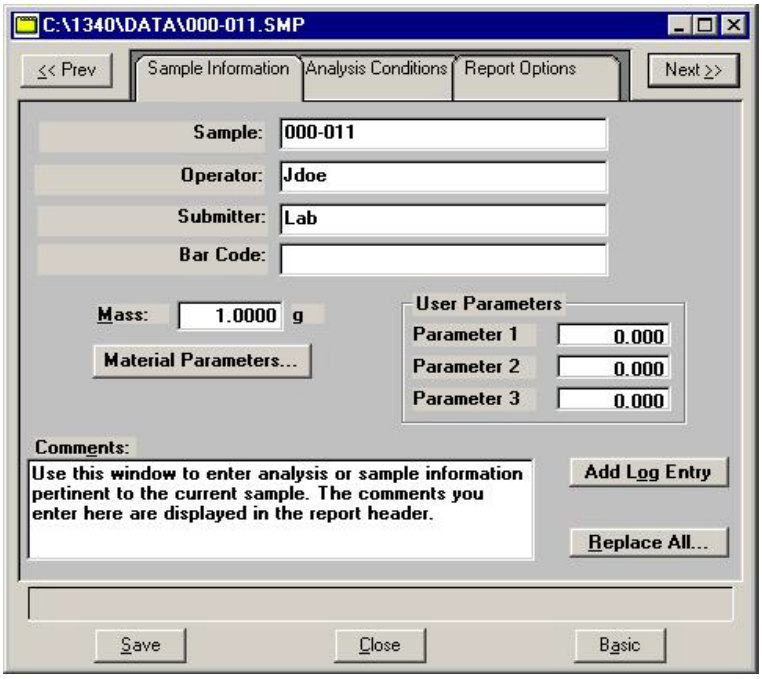
- **Advanced**
  Presents all parts of the sample information file in a tabbed dialog, allowing easy access to each parameter. Use this format to customize files.

- **Basic**
  Presents the sample information file in a single dialog. With this format, you can quickly create a sample information file using previously defined parameter files. This format also allows you to switch to the Advanced format to view or edit parameters.

- **Restricted**
  Presents the sample information file in a single dialog similar to the Basic format. With the Restricted format, however, you cannot switch to the Advanced format to edit parameters. Some menu items also are unavilable.

Advanced

The Advanced format displays all parts of the sample file in a tabbed dialog, allowing easy access to each parameter. Simply click the desired tab or use the **Prev** and **Next** push buttons to access the parameter dialog. Refer to **Advanced Format**, page **4-5** for step-by-step instructions on creating a sample information file using the Advanced format.



Sample

Displays the description of the file you are opening. If this is a new file, the description specified in sample defaults is displayed. The sample file name (number) is shown in the example above because the dollar ($) sign was used in Sample Defaults. You may enter a new description or edit the existing one.

Range: 50 alphanumeric characters

Operator
Submitter

Enter the name of the operator who will be performing the analysis and the name of the person (or department) submitting the sample for analysis.

Range: 40 alphanumeric characters

The label(s) for these fields may be customized to display differently or omitted from displaying at all using the options available in **Sample Defaults**, page **8-5**.

Bar code

This field enables you to enter bar code information. If bar code information is not used, you can use this field to enter additional information about the sample; for example, you may wish to enter the lot number of your sample.

This field will also accept data from a bar code reader. A bar code reader can be attached to one of the USB connectors on the computer. Simply scan the bar code and the number will transfer to the highlighted field.

Range: 40 alphanumeric characters

The label for this field may be customized to display differently or omitted from displaying at all using the options available in **Sample Defaults**, page **8-5**.

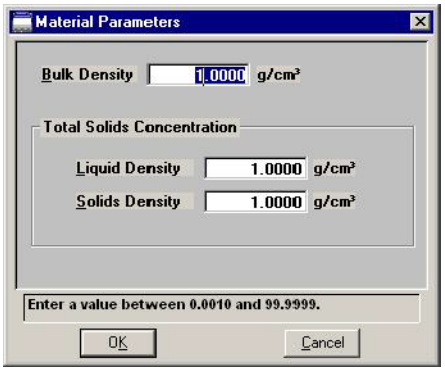
Mass

Enables you to enter the sample's mass.

This field will accept input from an analytical balance. The analytical balance must be connected to a serial port on the computer; a third-party software is required to handle the data transfer (refer to the manufacturer's manual for transfer instructions).

Material Parameters

Displays the Material Parameters dialog.



The information on this dialog is only pertinent if you are reporting porosity or total solids concentration.

Bulk density represents total density of the sample, including open pores, etc.

Liquid density is the density of the liquid only, where **Solids** density is the density of the sample (solid).

User Parameters

These fields are used primarily for SPC (Statistical Process Control) reporting. However, they can be used for other data as well. You may wish to enter specific analysis conditions or sample criteria. These parameters print on the Options report. Select **Options > Sample Defaults** to specify the parameters you wish to report. The parameter(s) you specify replace the **User Parameter** label(s) displayed here.

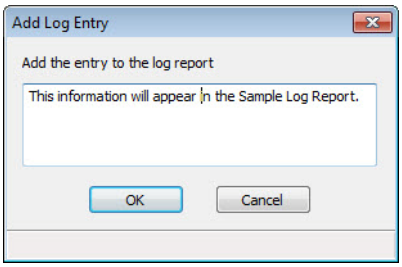
If desired, you can have these fields omitted from the sample information file (refer to **Sample Defaults**, page **8-5**).

Comments

Enter comments about the sample or its analysis conditions. Comments entered here are printed in the header of the reports.

Add Log Entry

Displays the Add Log Entry dialog



This dialog enables you to enter analysis and/or sample criteria that you wish to display in the Sample Log report, but is not recorded automatically by the analysis program. You may make multiple entries by selecting this push button as many times as you wish.

Replace All

Allows you to copy an existing sample file's values into the current sample information file. A dialog is displayed so that you may select the desired file. You may edit the values in the new file; the file from which they were copied remains unchanged. This replaces all parameters of the entire sample information file, excluding any collected data from the other file.

Each of the individual tabbed dialogs contains a push button if you wish only to replace specific parameters and not the entire contents.

Save

Saves the information you have specified for this sample file.

Close

Closes the dialog. If a file containing unsaved changes is open, you are prompted to save before the dialog closes.

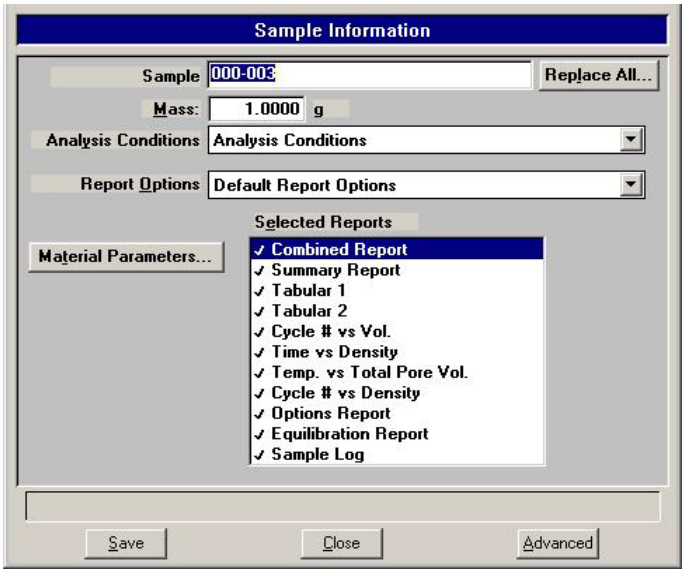
Basic

Displays the sample information file in the basic format.

Basic

The Basic format displays all parameters in a single, non-tabbed dialog. With the Basic format, you can quickly create a sample information file using previously defined parameter files. This format also allows you to switch to the Advanced format to view or edit parameters.

Refer to **Basic and Restricted Formats**, page **4-7** for step-by-step instructions for creating a Basic sample information file.



Sample

Displays the description of the file you are opening. If this is a new file, the description specified in sample defaults is displayed. You may enter a new description or add to the existing one.

Range: 50 alphanumeric characters

Replace All

Allows you to copy all parameters of an existing sample file into the current sample file. A dialog is displayed so that you may select the desired file. After you have copied the values into the current file, you may edit them as desired.

Mass

Enables you to enter the mass of the sample.

Refer to page **5-6** for information on using an analytical balance to enter the sample mass.

Analysis Conditions
Report Options

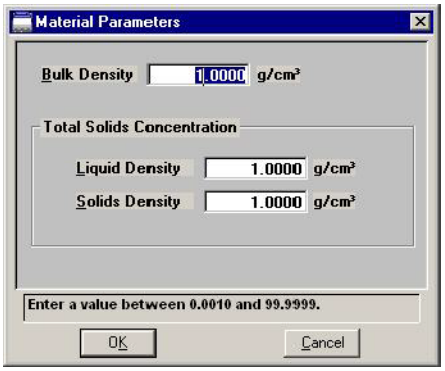
These drop-down lists contain previously defined parameter files, some of which were supplied with the analysis program.

Each parameter field contains the description of the file used in the current sample file. If this is a new file, these fields contain descriptions of the files you chose as defaults. Click the down arrow to choose a different file.

Click **Advanced** to view or edit parameter file values.

Material Parameters

Displays the Material Parameters dialog.



Refer to page 5-6 for an explanation of the fields on this dialog.

Selected Reports

Contains a list of available reports. The ones selected for the current Report options file are indicated with a check mark; these selections may be edited if desired.

Save

Saves the information you have specified for this sample file.

Close

Closes the dialog. If a file containing unsaved changes is open, you are prompted to save before the dialog box closes.

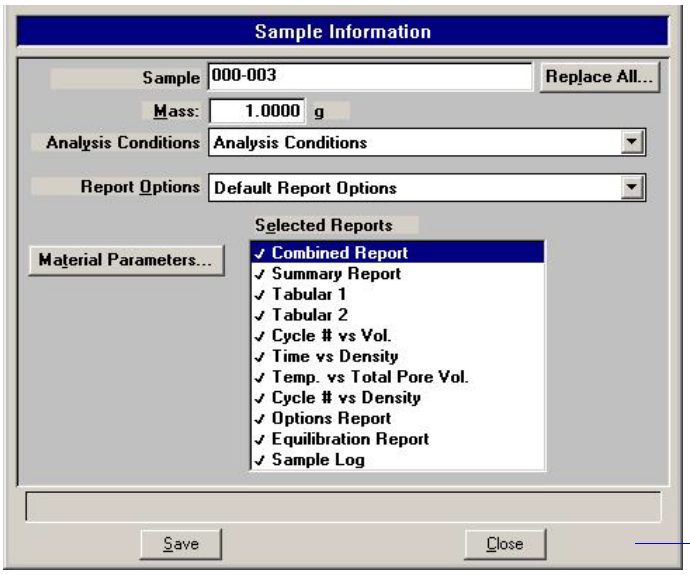
Advanced

Displays the sample information file in the advanced format, allowing you to view or edit parameters.

Restricted Format

The Restricted format is used when analysis parameters must remain constant; for example, in the pharmaceutical industry where consistency and accuracy are crucial. A password is required to enter and exit this format. Refer to **Restricted**, page **8-4** for additional information on the Restricted format.

The Restricted format displays in the same manner as the Basic format. Some menu functions, however, are disabled and you cannot switch to the Advanced format to edit file parameters.

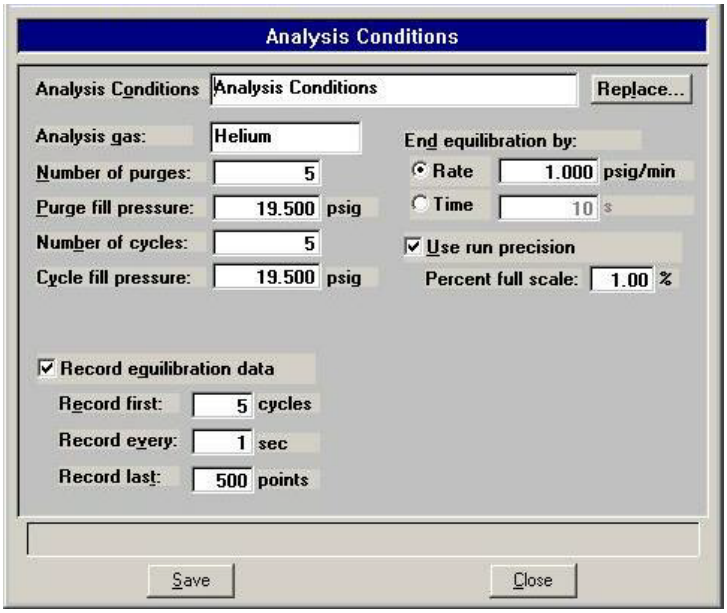


The Restricted format does not contain an Advanced push button allowing you to switch to the Advanced format.

Analysis Conditions

This dialog enables you to specify the analysis conditions for your sample. An analysis conditions file can be created as an independent parameter file or as part of the sample information file.

Be sure to save this file to the directory you specified as the Parameter Files directory if it is to be included in the drop-down list of the Basic Sample Information dialog (see Parameter Files Directory, page 8-14).



Analysis Conditions

Displays the description of the file you are opening. If this is a new file, the description specified in sample defaults is displayed. You may enter a new description or add to the existing one

Range: *40 alphanumeric characters*
(at least one character is required)

Replace

Allows you to replace the values in the current file with those from an existing file. A dialog is displayed so that you may select the desired file. After the values are copied into the file, you can edit them as desired; the file from which they were copied remains unchanged.

Analysis Gas

Enables you to enter the analysis gas to be used; helium is recommended.

Number of purges

Enables you to enter the number of purges.

Purging cleans the cell and expansion chambers before an analysis begins. The greater the number of purges, the cleaner the sample will be when analyzed.

Purge fill pressure

Enables you to enter the fill pressure for the purging process.

Typically, the greater the fill pressure, the easier it is to measure the volume precisely. For most applications, the default of 19.500 is appropriate.

Some materials, such as organic polymers, may require a lower pressure in order to limit permeability into the sample matrix.

Number of cycles

Enter the number of cycles you wish to be performed. A cycle is a series of functions which equals to a single volume measurement.

Cycle fill pressure

Enter the fill pressure for the cycles; typically, the default of 19.500 psig is appropriate for most samples.

Like the purge fill pressure, some materials may require a lower pressure in order to limit permeability into the sample matrix.

End equilibration by

Enables you to end the equilibration by **Rate** or **Time**.

Rate: equilibration ends when the rate of pressure change goes below the value you enter in the adjacent field.

A high rate will produce faster results, but results may not be as precise as desired. The lowest rates may cause errors when some materials (such as those with appreciable vapor pressures or organics) are analyzed.

Time: equilibration ends when the specified time interval is attained.

Use run precision

This feature enables early termination of the analysis when certain criteria are met.

The analysis terminates after five consecutive cycles are within the specified tolerance. Typically, you should request a large number (50 to 99) of cycles. If you select a small number of cycles, the analysis stops when the number you entered is reached even though the specified tolerance has not been met.

If less than five cycles are requested, this feature is disabled.

Percent full scale

Enabled when you choose **Use run precision**, enabling you to enter the run precision volume tolerance which is expressed as a percent of nominal cell volume (sample capacity).

Record equilibration data

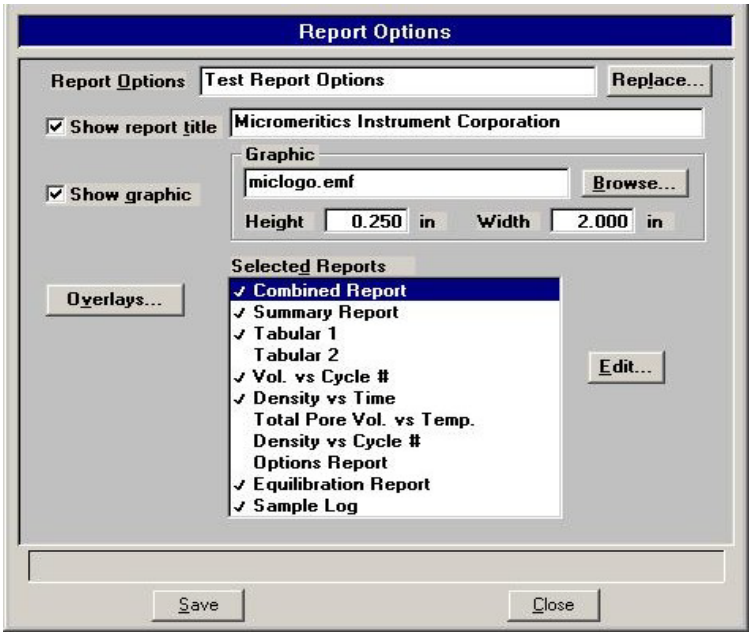
Select this option to record the equilibration data. The **Record first**, **Record every**, and **Record last** fields are enabled so that you can enter the pertinent values.

You must select this option if you plan to generate an Equilibration report.

Report Options

This dialog allows you to specify report options for a new file or to open an existing one. A report options file can be created as an independent parameter file or as part of the sample information file.

Be sure to save this file to the directory you specified as the Parameter Files directory if it is to be included in the drop-down list of the Basic Sample Information dialog (see Parameter Files Directory, page 8-14).



Report Options

If you are opening an existing file, this field displays a description of the report options file. You may change the name if you wish.

If this is a new file, the default report options description is displayed. Enter a name for this file. Use an intuitive name that will help you to recognize it for future use.

Range: *40 alphanumeric characters*
(at least one character is required)

Replace

Allows you to replace the values in the current report options file with those from an existing file. A dialog is displayed so that you may select the desired file. You may edit the values in the new file; the file from which they were copied remains unchanged.

Show report title

This option enables you to have a title appear on your report and provides a field for entering the text.

If this is a new file, the title you specified as the default is displayed. You can accept the default title or enter a new one.

Range: 50 alphanumeric characters

If you deselect this option, a title will not display on the report.

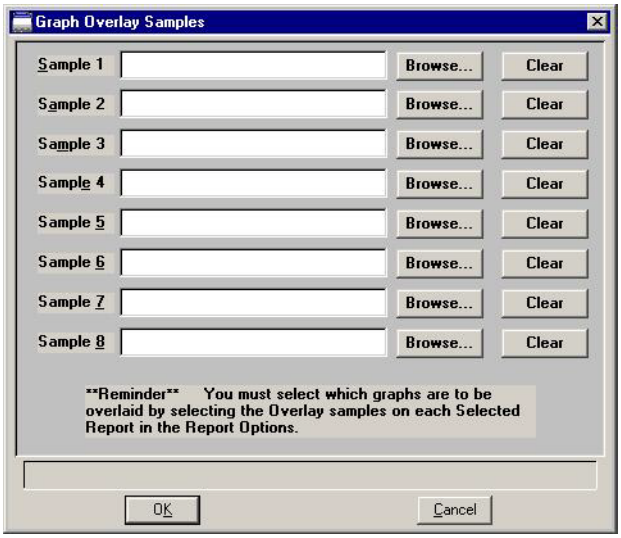
Show graphic

Select this option to have a graphic display above the report title. The graphic can be a bitmap (bmp) or an enhanced metafile (emf). For example, you may wish to display your company logo.

Click **Browse** to choose the graphic, then enter the height and width in the appropriate fields. This image can be edited, or removed, from the report window.

Overlays

Displays the Graph Overlay Samples dialog.



Choose the sample files you wish to overlay onto the selected plot(s).

Overlays

(continued)

Click **Browse** to the right of the **Sample [n]** field to choose a file. You may select up to eight files. Use **Clear** to clear a field of its entry.

After choosing your file(s), be sure to select the **Overlay samples** option for each report type you plan to overlay. Refer to **Multiple Samples Overlay**, page **4-22** for step-by-step instructions.

Selected Reports

Contains a list of available reports:

- Combined Report
- Summary Report
- Tabular 1
- Tabular 2
- Volume vs. Cycle #
- Density vs. Time
- Total Pore Volume vs. Temperature
- Density vs. Cycle #
- Options Report
- Equilibration Report
- Sample Log

Using the mouse pointer or the arrow keys, move to the desired report and double-click the left mouse button, or press the **Spacebar**. A report is selected when it is preceded with a check mark (3); it is deselected in the same manner.

You can find examples of some of these reports in Chapter 7, beginning on page **7-25**.

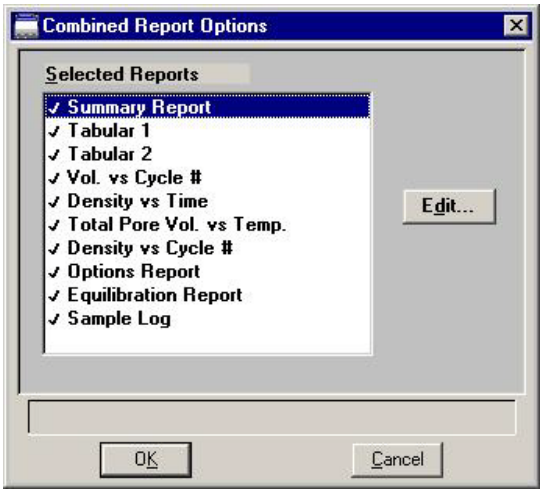
Edit

Displays an associated dialog for the selected report. Editing options for available reports are shown in subsequent sections.

This button is disabled for the Options and Sample Log reports; the parameters for these reports cannot be edited.

Combined Report

Select the Combined Report to edit; the Combined Report Options dialog is displayed.

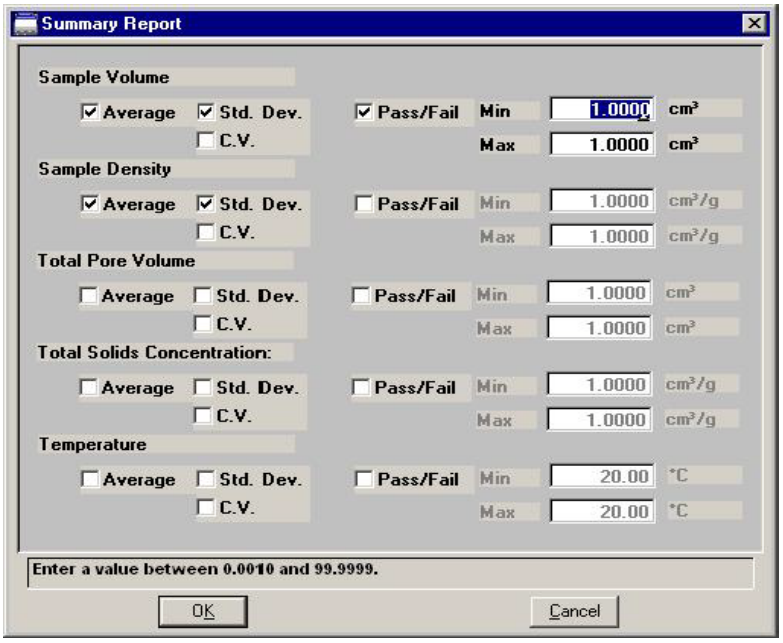


The list of reports for the Combined Report is identical (with the exception of the Combined report) to the list of reports generated in the normal manner. The difference is that the reports generated from the selections on this dialog contain no page breaks or headings. And, unless too many are selected, all reports display on a single page.

Use the **Edit** push button to edit report details. Refer to **Tabular Report**, page **5-20** and **Trend Plots**, page **5-21** if you need assistance on any of the fields on the editing dialogs.

Summary Report

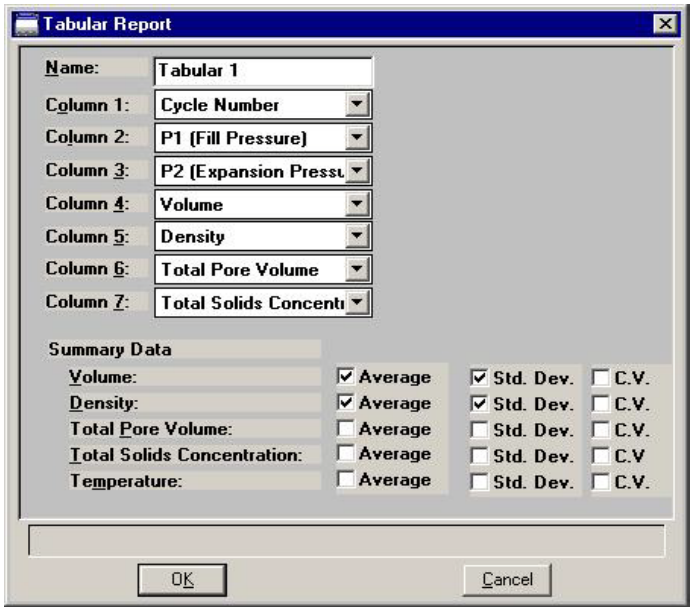
The summary report provides a condensed listing of data results. The Summary Report dialog allows you to choose the type of information you wish to include in the report.



If you choose the **Pass/Fail** option, the **Min** and **Max** fields are enabled allowing you to enter a range. The **Pass/Fail** operation will be determined from the values you enter in these fields.

Tabular Report

Two user-defined tabular reports are available.



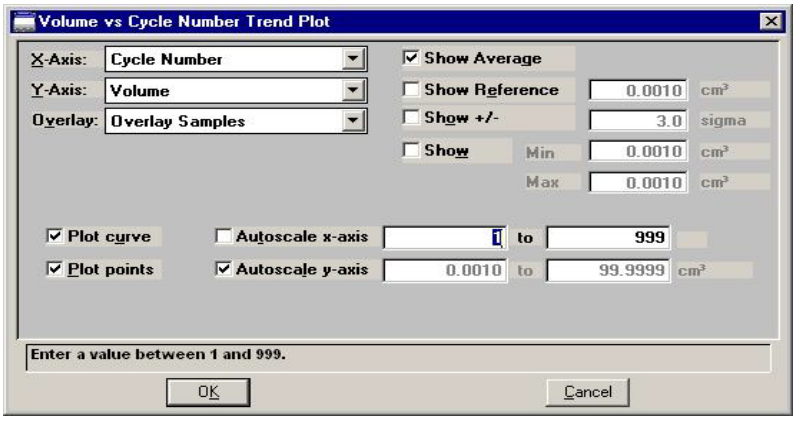
Name — Enables you to enter a name for the report; you can use up to 20 characters.

Columns 1 through 7 — Contain a drop-down list of variables to choose for each column.

Summary Data — Provides choices for reporting the average, standard deviation, and coefficient of variation (C.V.) for certain report parameters.

Trend Plots

There are four types of graphical reports available. The titles are based on the parameters you choose for the x- and y-axes. For example, this report's title is Cycle Number (X-axis variable) vs. Volume (Y-Axis variable) Trend Plot.



Each time you change the X- or Y-axis variable, the change is reflected in the title bar.

X-Axis

Contains the variables available for the X-Axis.

Choices: Cycle Number, Temperature, Time

Y-Axis

Contains the variables available for the Y-Axis.

Choices: Density, P1 (fill pressure), P2 (expansion pressure), Temperature, Total Pore Volume, Total Solids Concentration, Volume

Overlay

Contains choices for overlaying plots. From this drop-down list, you can select:

- another Y-Axis variable to overlay with the variable shown in the **Y-Axis** field, or
- **Overlay Samples** to overlay data of the type selected in the **Y-Axis** field with the same type of data contained in other sample files. The other sample files are selected by clicking Overlays on the Report Options dialog.

Choose **None** if you are not generating overlays.

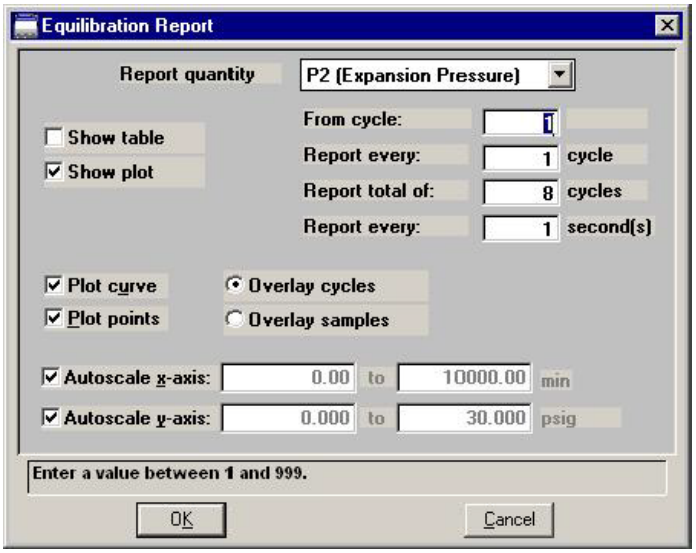
Show Average	Select this option to show the average of all cycles; a horizontal line is placed at the average point for the cycles.
Show Reference	Select this option to have a horizontal line placed at a reference point specified in the adjacent field.
Show +/-	This option places two horizontal lines on the graph. The top line will be placed at a point relative to the average and standard deviation of the data. The bottom line will be placed at the point entered in the adjacent field.
Show (min/max)	This option places two horizontal lines on the graph. The top line will be placed at a point relative to the average and standard deviation of the data. The bottom line will be placed at the point entered in the adjacent fields.
Plot curve **Plot points**	Select these options to display the manner in which data are plotted. You can plot a curve, points, or both.
Autoscale x-axis **Autoscale y-axis**	Select these options to have the X- and/or Y-axes scaled automatically. If you choose not to autoscale data, the adjacent fields are enabled, allowing you to enter a range.

Options Report

The Options report cannot be edited; it provides information on the sample, its material properties, and analysis conditions.

Equilibration Report

This report is available only if you have recorded equilibration data (using the **Record equilibration data** option on the Analysis Conditions dialog; refer to page 5-12).



Report quantity — This drop-down list contains the variables on which to report.

Choices: *Density, P2 (expansion pressure), Total Pore Volume,Total Solids Concentration, Volume*

Show table — Select this option to generate a tabular report for the specified Report quantity.

Show plot — Select this option to generate a plot (graph) for the specified Report quantity.

From cycle — This field enables you to enter the cycle with which to start the report.

Report every — Enables you to enter the cycles to report; for example, enter 1 to report every cycle or 3 to report every third cycle.

Report total of	Enables you to enter the number of cycles to report; you can report up to eight cycles.
Report every	Enables you to enter the time between cycles; you can enter up to 60 seconds (one minute) between cycles.
Plot curve **Plot points**	Select these options to display the manner in which data are plotted. You can plot a curve, points, or both.
Overlay cycles	Select this option to overlay the number of cycles requested in the **Report total of** field.
Overlay samples	Select this option to overlay the last cycle in the current file with the last cycle contained in other files. Click **Overlays** on the Report Options dialog to select the other sample files.
Autoscale x-axis **Autoscale y-axis**	Select these options to have the X- and/or Y-axes scaled automatically. If you choose not to autoscale data, the adjacent fields are enabled, allowing you to enter a range.

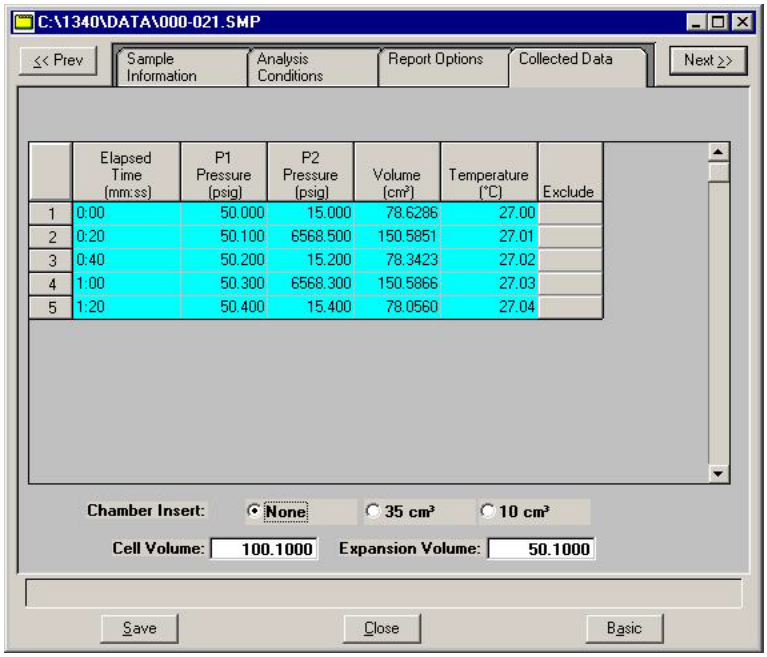
Sample Log Report

The Sample Log report cannot be edited; it displays the following:

- Automatic operations
- Information entered using **Add Log Entry** on the sample file editor
- Warnings and/or errors which occurred during analysis

Collected Data

The Collected Data dialog displays after an analysis has been completed



Pressure table

Columns for the following are displayed:

- elapsed time
- P1 pressure (fill)
- P2 pressure (expansion)
- volume
- temperature
- exclude

Select the **Exclude** column for the cycle(s) you do not wish to include in the average calculations. Any excluded parameters are indicated with an asterisk on the generated report.

Chamber Insert

Enables you to select the appropriate insert if using one. The choices depend on the type of unit being used for the current analysis.

Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 1.0 cm^3, 3.5 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

The values in the **Volume** column of the table are recalculated automatically if you edit the choice for the chamber insert.

Cell Volume

Displays the nominal cell volume for the current unit, or for the insert if one is selected.

Expansion Volume

Displays the expansion volume for the current unit, or for the insert if one is selected.

Save

Save enables you to save any changes you have made to the file in the active window. The file is saved under its current name.

Save As

Save As enables you to:

- save a sample or parameter file in the active window under a different name. This option is useful for making a duplicate copy of a file that you can modify as desired without changing the original one. The original file remains open when you use this function, so be sure to open the new file before making any changes.
- save a subset (parameter) of the sample file in the active window as a standalone parameter file. For example, select Analysis Conditions from the **Save As** menu to create a standalone parameter file of the analysis conditions portion of the active sample file.

Save All

Save All enables you to save all open files under their current names. This option provides a faster way to save all open files at one time and avoids having to perform a Save operation on each individual file.

Close

Close enables you to close the file in the active window. The following message is displayed if changes have been made to the file:

(File name) has been changed. Save changes before closing?

Yes No Cancel

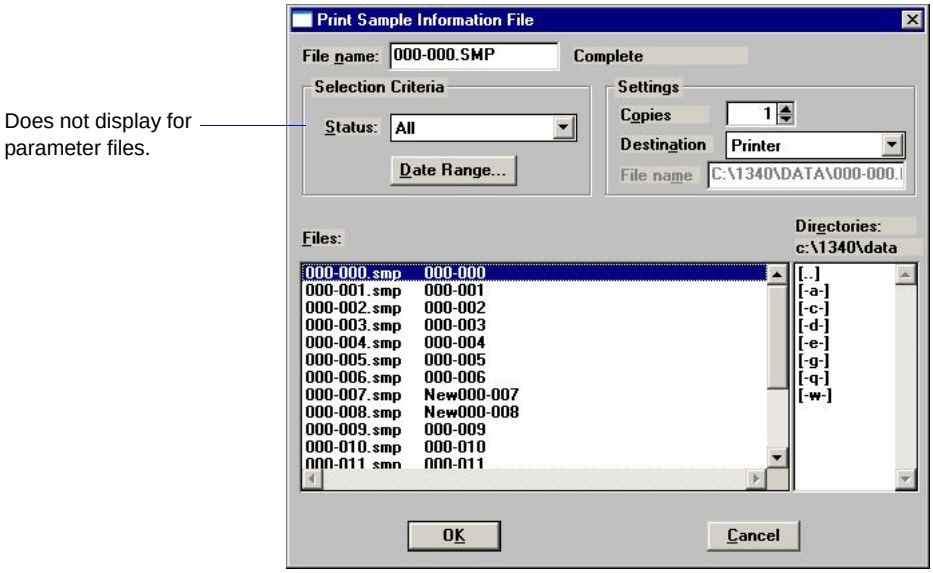
Click **Yes** to save the changes and close the file.
Click **No** to discard the changes and close the file.
Click **Cancel** to return to the open file.

Close All

Close All enables you to close all open files under their current names. The message shown above for Close is displayed for each file in which changes have been made. The same actions apply.

Print

Print enables you to print the contents of a sample or parameter file. You can choose multiple files by holding down the **Ctrl** key while making your selections. Regardless of which file type you select, a dialog similar to the one shown below is displayed.



File name

The name of the file you select from the **Files** list is copied to this field.

Status
Date Range
Files
Directories

These options are explained in **Selecting Files** beginning on on page **3-8**.

Settings

Enables you to choose output options. Select the down-arrow to the right of the **Destination** field to choose the destination:

- **Printer**: enables the **Copies** field allowing you to print up to four copies to a printer.
- **Screen**: enables you to view the information onscreen; you can print a copy from the onscreen window if desired.
- **File**: generates a text file which can be viewed with a text editor or other text file manipulation tool. Also enables the **File name** field so that you can enter a name for the file (or you can accept the default).

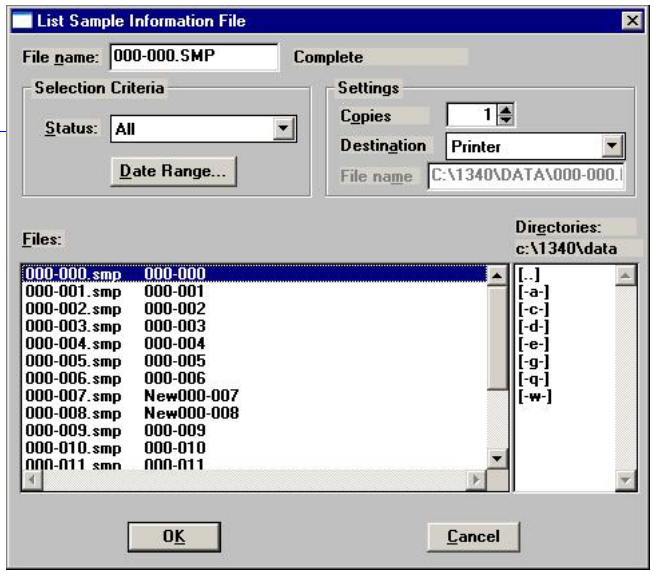
List

List enables you to generate a listing of the following information on a selected sample or parameter file. You can choose multiple files by holding down the **Ctrl** key while making your selections.

- File name
- Date the file was created (or last edited)
- Time the file was created (or last edited)
- File identification
- File status

The List dialog is common to all file types. The title bar displays the type of file for which you have requested information.

Does not display for parameter files.



File name

If you select only one file from the **Files** list, the name is copied to this field. If multiple files are selected, the last one selected displays in this field.

If no files are selected, a list is generated for all files in the **Files** window.

Status
Date Range
Files
Directories

These options are explained in **Selecting Files** beginning on on page **3-8**.

Settings

Enables you to choose output options. Select the down-arrow to the right of the **Destination** field to choose the destination:

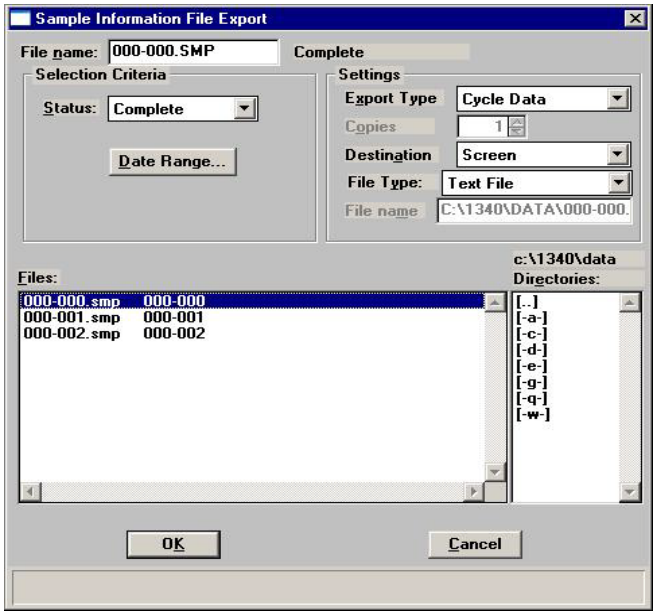
- **Printer**: enables the **Copies** field allowing you to print up to four copies to a printer.
- **Screen**: enables you to view the information onscreen; you can print a copy from the onscreen window if desired
- **File**: generates a text file which can be viewed with a text editor or other text file manipulation tool. Also enables the File name field so that you can enter a name for the file (or you can accept the default)

Export

Export allows you to copy the cycle or equilibration data in a sample information file and export it in a text (*.TXT) or spreadsheet (*.XLS) format. The output file for:

- **Cycle** data consists of five columns containing the elapsed time, P1 (fill pressure), P2 (expansion pressure), Volume, and Temperature.
- **Equilibration** data is one column of equilibration data.

Select **File > Export** from the main menu; the Export Sample File dialog is displayed.



File name

The name of the file you select from the **Files** list box is copied to this field. You can export multiple files by holding down **Ctrl** while selecting the files.

Status
Date Range
Files
Directories

These options are explained in **Selecting Files** beginning on page **3-8**.

Settings

Enables you to choose output options.

Export Type

Enables you to choose the type of data to export; you can export cycle data or equilibration data.

Copies	Enabled when you choose **Printer** as the destination, allowing you to print up to four copies to a printer.
Destination	Contains a list of output destinations; you can print output to a **Printer**, to the **Screen**, or to a **File**.
File type	You can export data in a spreadsheet (*.XLS) or text (*.TXT) format.
File name	Enabled when you select **File** as the destination, allowing you to enter a name, or you can accept the default (the sample file name). If you are exporting multiple files, the sample file name is automatically assigned.

Exit

Exit enables you to exit the AccuPyc program. If an analysis is in progress, it will continue until completion; analysis data are collected and stored in an embedded controller.

- If a window containing a modified file is open, the following message is displayed:

  (File name) has been changed. Save changes before closing?

  Yes No Cancel

  Click **Yes** to save the changes and close the file.
  Click **No** to discard the changes and close the file.
  Click **Cancel** to return to the open file.

- If an analysis is in progress, the following message is displayed:

  2459- An instrument is busy. A delay in restarting this application could result in loss of new data. Continue with program exit?

  Yes No

  Click **Yes** to exit the analysis program.
  Click **No** to return to the analysis program and allow the analysis to continue.

Although data are stored in an embedded controller when you exit the program, data are not saved to disk in the computer until you reopen the program and save the data. If a power failure occurs and the analyzer does not have an Uninterruptible Power Supply (UPS), any unsaved data are lost.

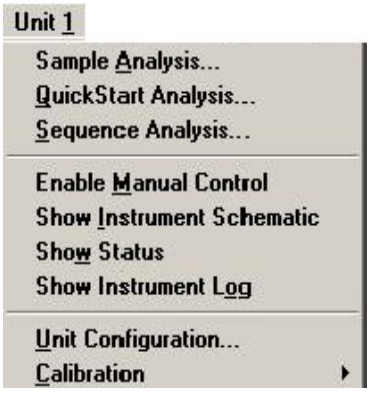
6. UNIT MENU

The Unit menu contains the operations which can be performed with the AccuPyc analyzer. The main menu contains a Unit menu for each analysis unit that is connected to the controlling unit. For example, if you have two analysis units, the main menu contains two Unit menus.

The unit number and the serial number also are displayed in the title bar of the operational windows. The status windows also display in different colors.

The Unit menu does not appear on the menu bar if the analysis program is being used for offline data manipulation.

Description



Listed below are brief descriptions of the Unit menu options. Detailed descriptions are found later in this chapter.

Sample Analysis — Use this mode of operation to perform single sample analyses. This option is disabled if analyses are being performed in another mode. Page 6-3.

QuickStart Analysis — Use this mode of operation to perform successive sample analyses using the same analysis conditions. Page 6-8.

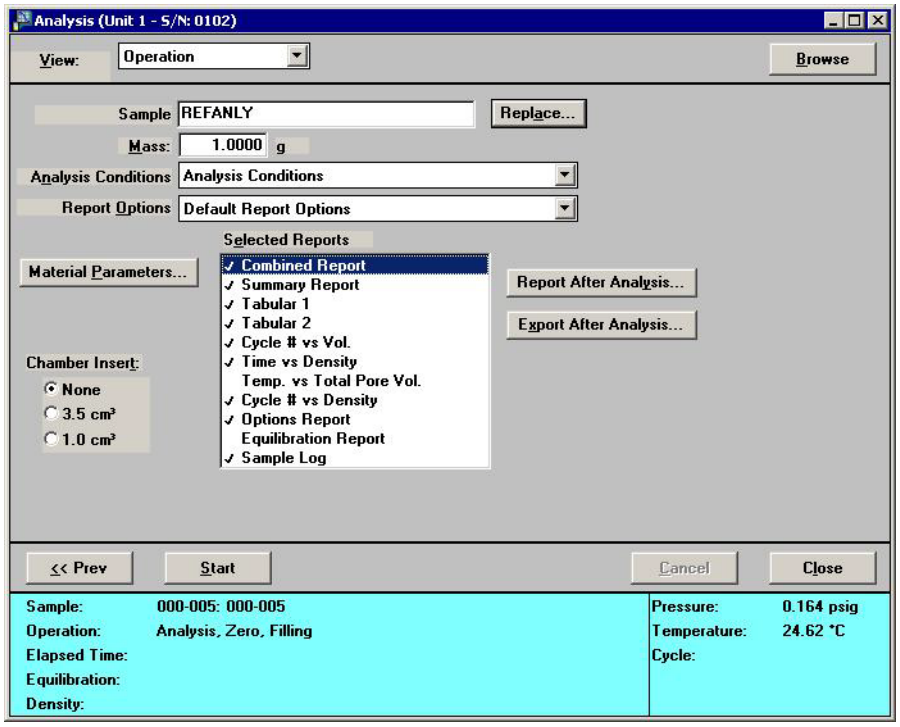
Sequence Analysis — Use this mode of operation to perform up to eight analyses with different conditions in sequence. Page 6-12.

Enable Manual Control	Allows you to open and close the valves manually. Page **6-14**.
Show Instrument Schematic	Displays the instrument schematic. Page **6-16**.
Show Status	Displays only the status portion of the operational window, enabling you to view the status of the operation in progress. Page **6-17**.
Show Instrument Log	Displays the instrument log. Page **6-18**.
Unit Configuration	Displays the configuration of the analyzer. Page **6-20**.
Calibration	Enables you to perform certain instrument calibrations. Page **6-21**.

Sample Analysis

Use this mode of operation to analyze a single sample. When you select this option from the Unit menu, the Analysis dialog is displayed with all fields disabled (greyed) and the Open Sample Information File dialog positioned on top. This allows you to select a sample file for your analysis or to create a new one.

After a sample file has been designated, the Analysis dialog is displayed. The fields now contain the values for the selected file, or if creating a new file, the specified defaults.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic; refer to page **6-15** for a description of the components on the schematic
- the instrument log; refer to page **6-18** for a description of the instrument log

Browse

Displays the Open Sample Information File dialog, allowing you to select a sample file for your analysis, or to create a new one.

Sample

Displays the identification of the sample file.

Replace

Enables you to replace the values for all parameters of the current file with the values from an existing file. Simply click the push button, choose the desired file, and click OK. The values of the chosen file are copied into the current file; you can edit them if desired.

Mass

Displays the sample mass; you can edit this value if desired. An entry in this field is important for density measurement.

This field also accepts input from an analytical balance (if attached to a serial port on the computer). A third-party data transfer program is also required.

Analysis Conditions

Displays a description of the analysis conditions file in the selected sample information file.

Use the drop-down list to select a different file.

Report Options

Displays a description of the report options file in the selected sample information file.

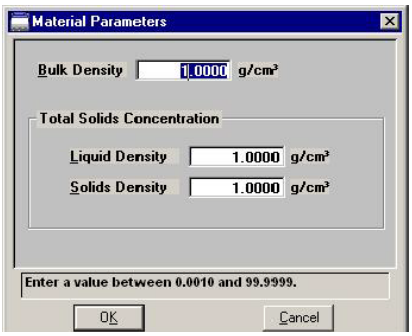
Use the drop-down list to select a different file.

Selected Reports

Displays the reports selected for the current Report Options file (the ones preceded with a check mark); these selections may be edited if desired.

Material Parameters

Displays the Materials Parameters dialog allowing you to view material properties and edit if needed prior to analysis.



Refer to **Material Parameters**, page 5-7 for an explanation of the fields on this dialog.

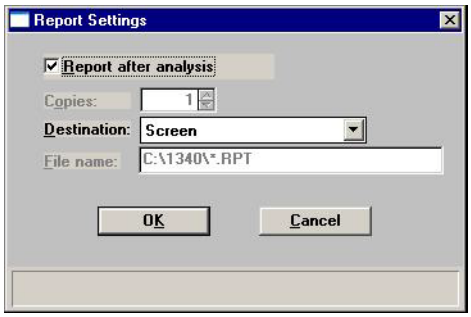
Chamber Insert

Enables you to select the appropriate insert if using one. The choices depend on the type of unit being used for the current analysis.

Choices: None, 0.1 cm^3 (for 1 cm^3 unit)
None, 3.5 cm^3, 1.0 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

Report after analysis

Displays the Reports Settings dialog so that you can specify report output options.



Select the option on this dialog to have reports printed automatically after analysis. If you do not wish to have reports generated automatically, you can generate the reports from the Analysis dialog. You can also generate them after the analysis using the **Start Report** option on the Reports menu.

Copies

Enabled when you choose **Printer** as the destination, allowing you to print up to four copies.

Destination

This drop-down list contains report output options.

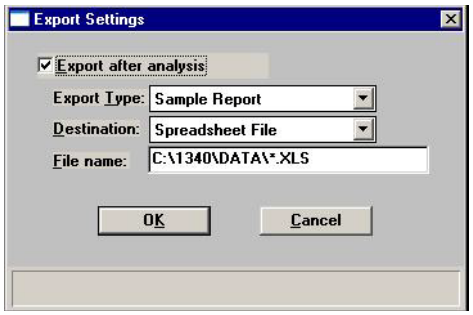
Choices: *Screen, Printer, File*

File name

Enabled when you choose *File* as the destination, allowing you to enter a name (or you can accept the default).

Export after analysis

Displays the Export Settings dialog so that you can specify export options.



Select the option on this dialog to export data automatically after analysis.

Export Type

Enables you to export the sample report, equilibration data, or cycle data. If you choose sample report, the entire report is exported, including all header information. Refer to **Export**, page **5-31** for details on exporting equilibration or cycle data.

Destination

This drop-down list contains report output options.

Choices: *Spreadsheet, Text File*

File name

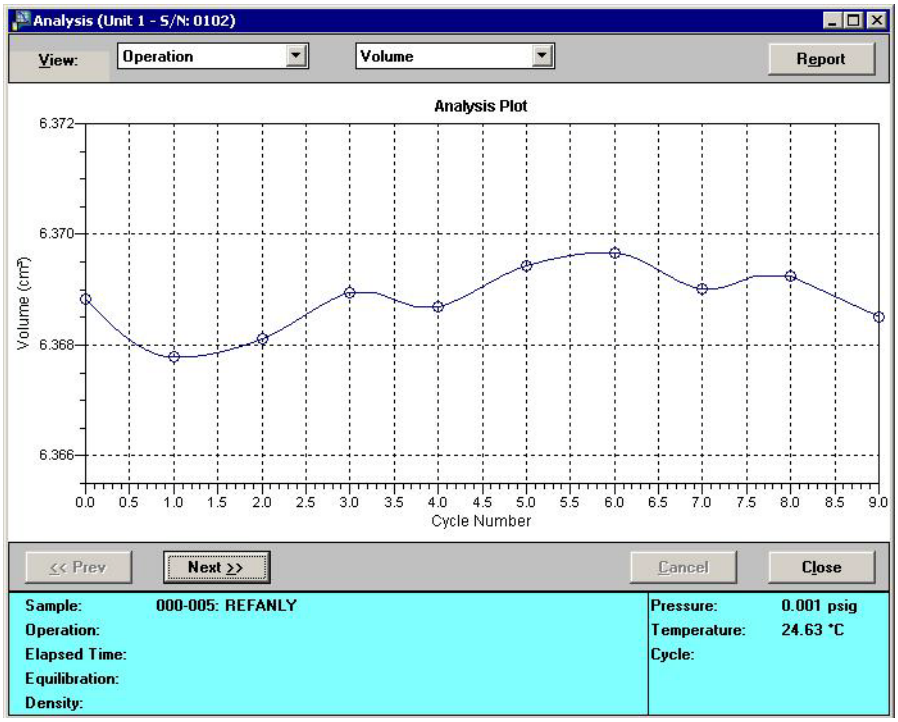
Allows you to enter a name for the exported file. If you do not enter a name, the file will be exported with the same name as the sample file, except with the extension shown.

Cancel

Cancels the analysis.

Start

Begins the analysis; displays the second view of the Analysis dialog. The dialog contains the statement “No Data Available” until the first cycle is completed, then a graph is drawn and updated as points are collected.



Volume

This drop-down list contains the parameters for which you can view data.

Choices: Density, Total Pore Volume, Total Solids Concentration, Volume

Report

Generates report data to the screen.

Next

Returns you to the first view of the Analysis dialog, enabling you to select (or create) another sample file and start a new analysis.

Close

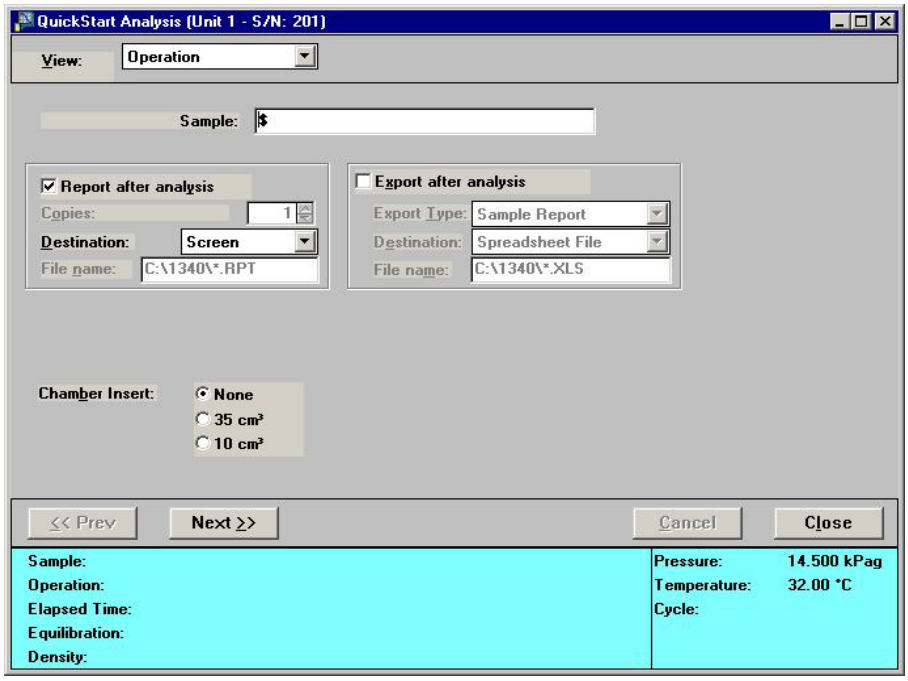
Closes the dialog.

Status Window

Displays the status of the current analysis. Refer to **Show Status**, page **6-17** for additional information on this window.

QuickStart Analysis

Use this mode of operation to analyze a series of samples of the same type which contain the same analysis conditions; sample files are created automatically using default values. When you select this option from the Unit menu, the QuickStart dialog is displayed.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

Sample

Displays the description specified in Sample Defaults; you can edit this description for this series of samples if desired.

Report after analysis
Export after analysis

Refer to page **6-5** for an explanation of these options.

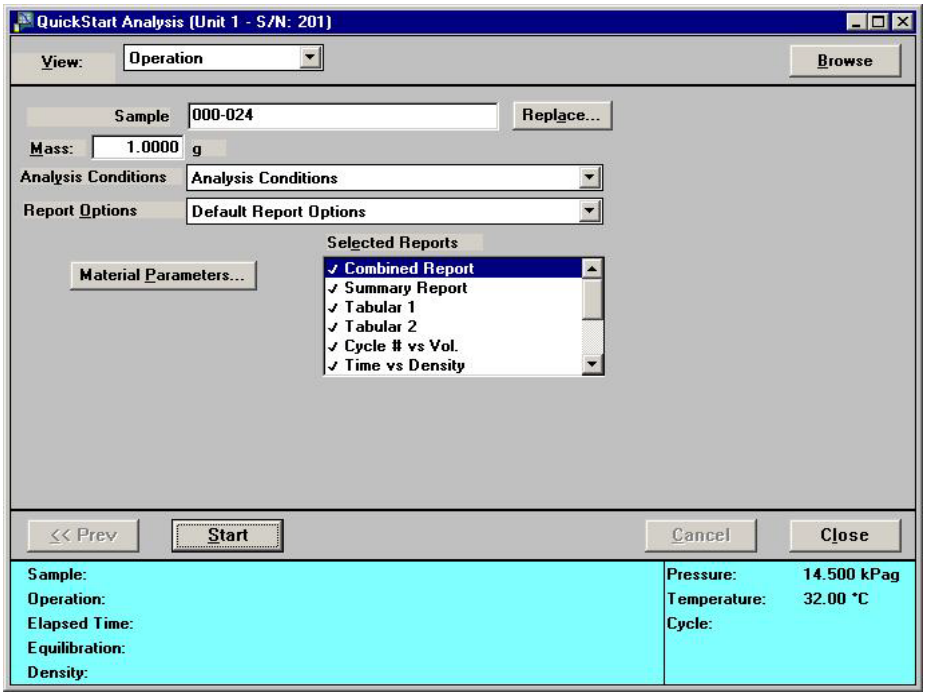
Chamber Insert

Enables you to select the appropriate insert if using one. The choices depend on the type of unit being used for the current analysis.

Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 3.5 cm^3, 1.0 cm^3 (for 10 cm^3 unit)
None, 3.5 cm^3, 10.0 cm^3 (for 100 cm^3 unit)

Next

Advances you to the next view of the QuickStart dialog.



Sample

Displays the identification you entered on the previous screen. If the dollar symbol ($) was included, it will also show the next sequenced file number.

Click **Browse** if you wish to use an existing sample file.

Click **Replace** to replace the values in the current file with those from an existing file.

Mass

Displays the sample's mass. An entry in this field is important for density measurement.

Analysis Conditions

Displays the description of the Analysis Conditions file being used for this analysis; you may select a different file if desired.

Report Options

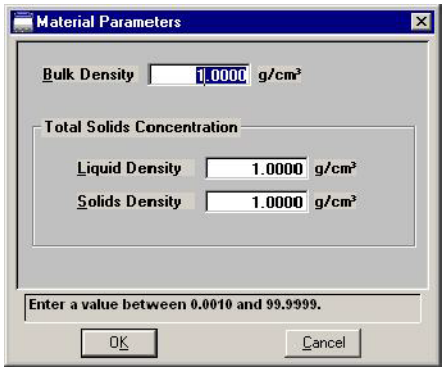
Displays the description of the Report Options file being used for this analysis; you may select a different file if desired.

Selected Reports

Displays the reports selected for the current Report Options file (the ones preceded with a check mark); these selections may be edited if desired.

Material Parameters

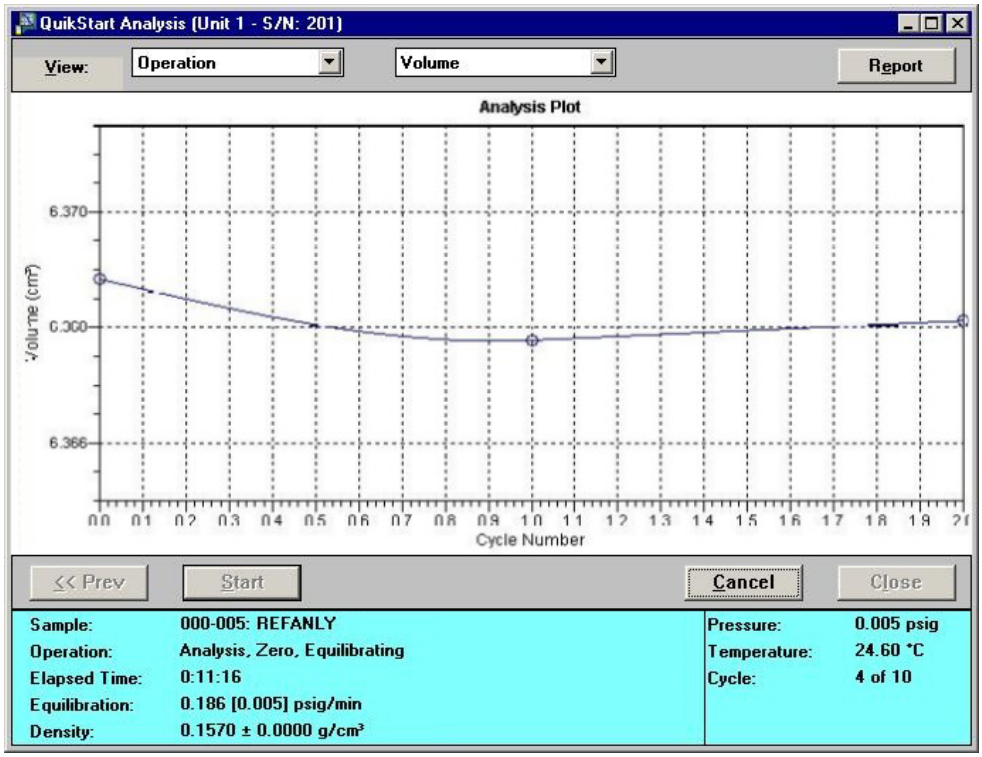
Displays the Materials Parameters dialog allowing you to view material properties and edit if needed prior to analysis.



Refer to **Material Parameters**, page 5-7 for an explanation of the fields on this dialog.

Start

Begins the analysis; displays the analyzing view of the Analysis dialog. The dialog contains the statement “No Data Available” until the first cycle is completed, then a graph is drawn and updated as points are collected.

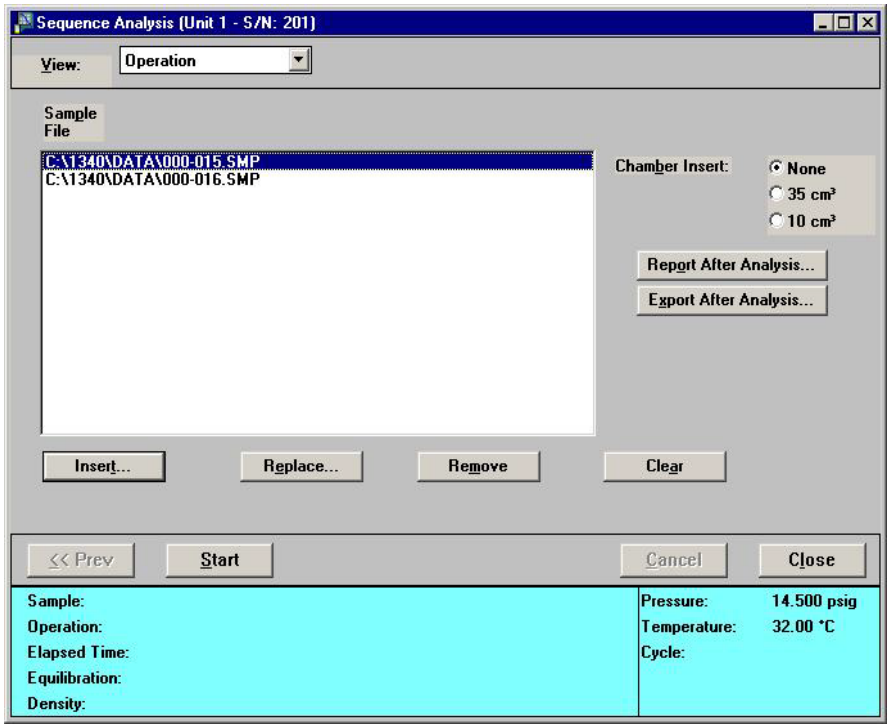


After the analysis is finished, you are automatically returned to the second view of the Analysis dialog (page **6-9**) to begin the next analysis.

If you have requested a report after analysis, the report window containing the requested reports is displayed.

Sequence Analysis

Use this mode of operation to analyze the same sample using up to eight different sample files containing the same analysis conditions, or different analysis conditions. When you select this option from the Unit menu, the Sequence Analysis dialog is displayed.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

Sample File

Displays the descriptions of the selected sample files.

Chamber Insert

Enables you to select the appropriate insert if using one. The choices depend on the type of unit being used for the current analysis.

Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 3.5 cm^3, 1.0 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

Report After Analysis
Export After Analysis

Select this option to have reports printed and/or exported automatically after analysis. Refer to **6-5** for an explanation of this dialog.

Insert

Displays the Open Sample Information file dialog so that you can choose the file containing the conditions you wish to use; files must have a **No Analysis** status. You may insert up to eight files. You can also create a file from this dialog; sample defaults will apply.

Replace

Displays the Open Sample Information file dialog, enabling you to replace the selected file with another one.

Remove

Removes the selected file from the list.

Clear

Clears the window of all files.

Start

Starts the analyses; the second view of the Sequence dialog is displayed. This dialog contains the statement “No Data Available” until the first cycle is completed, then a graph is drawn and updated as points are collected.

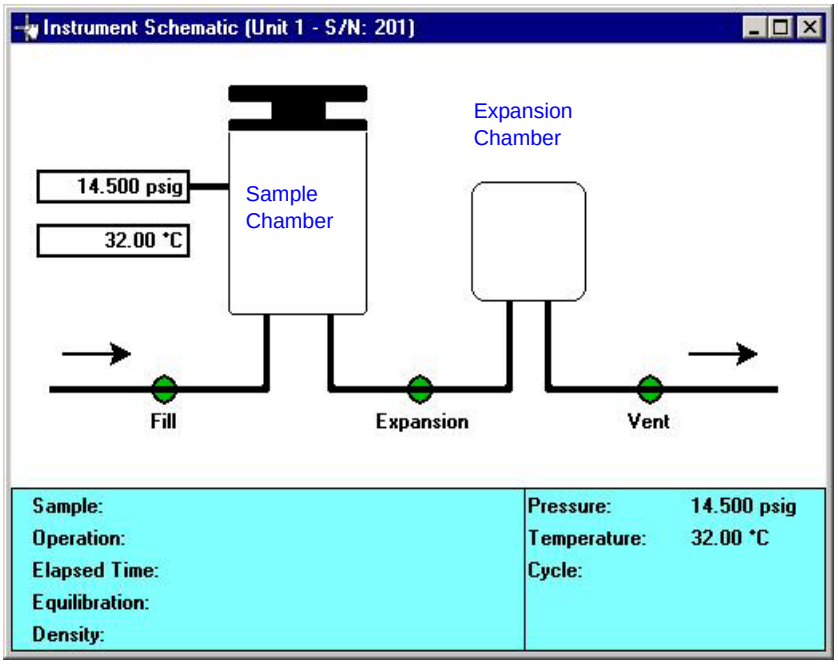
This view of the dialog will display for each sequenced analysis as it is performed. After all analyses are completed, the dialog closes automatically.

Enable Manual Control

Select this option to manually control the valves on the pycnometer. If the instrument schematic is not displayed, select **Unit > Show Instrument Schematic**.

Manual Control is disabled when an automatic operation is in progress.

Sample chamber displays on the right side for 1-cm³ units (see page **6-16**)



When you enable manual control, the symbols for valves change color on the control screen to indicate manual operation.

Open = Green

Closed = Yellow

Use one of the following options to move to the valves on the instrument schematic:

- click on the desired valve
- use the **Tab** key or arrow keys to move to the desired valve

A valve is selected when it is surrounded by a dotted line. Each valve has a shortcut menu displaying the operations available. This menu is accessed by right-clicking on the valve, or by using the shortcut keys **Shift + F9** when the valve is selected.

Components on the instrument schematic are:

Valves

Closed position.

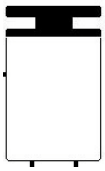
Open position.

The Fill, Expand, and Vent valves are the only items on the schematic that can be manually controlled.

Actions: *Open*
Close
Close All

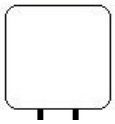
Close All enables you to close all three valves at one time without having to select each valve.

Sample chamber



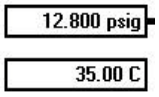
The sample chamber displays on the left side of the schematic for the 10-, 100-, and 350-cm^3 units, and on the right side for the 1-cm^3 unit.

Expansion chamber



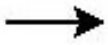
The expansion chamber displays on the right side of the schematic for the 10-, 100-, and 350-cm^3 units, and on the left side for the 1-cm^3 unit.

Pressure and temperature reading



These rectangular boxes located to the left side of the sample chamber show the pressure and temperature in the sample chamber.

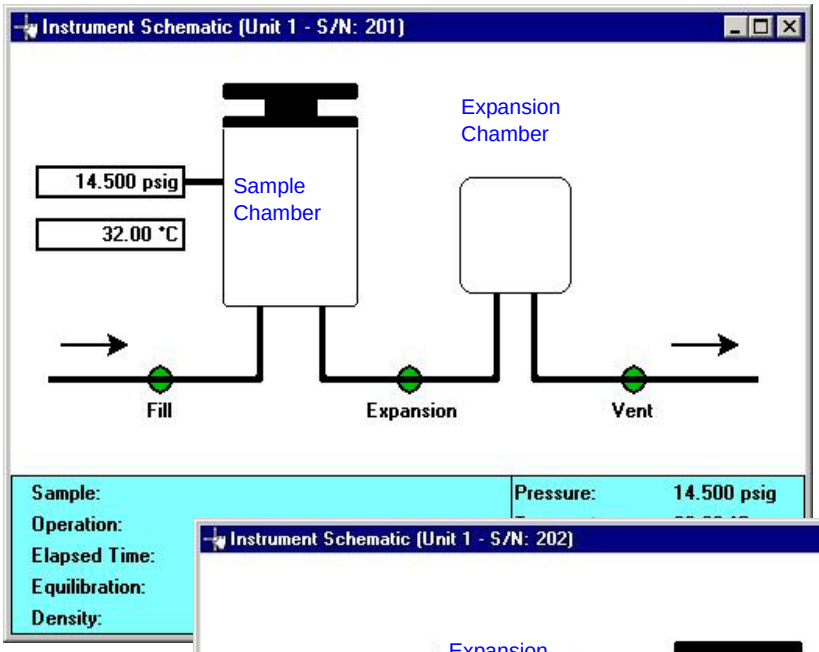
For 1-cm^3 units, the pressure is measured in the expansion chamber, thus the schematic depicts these readings attached to the expansion chamber.



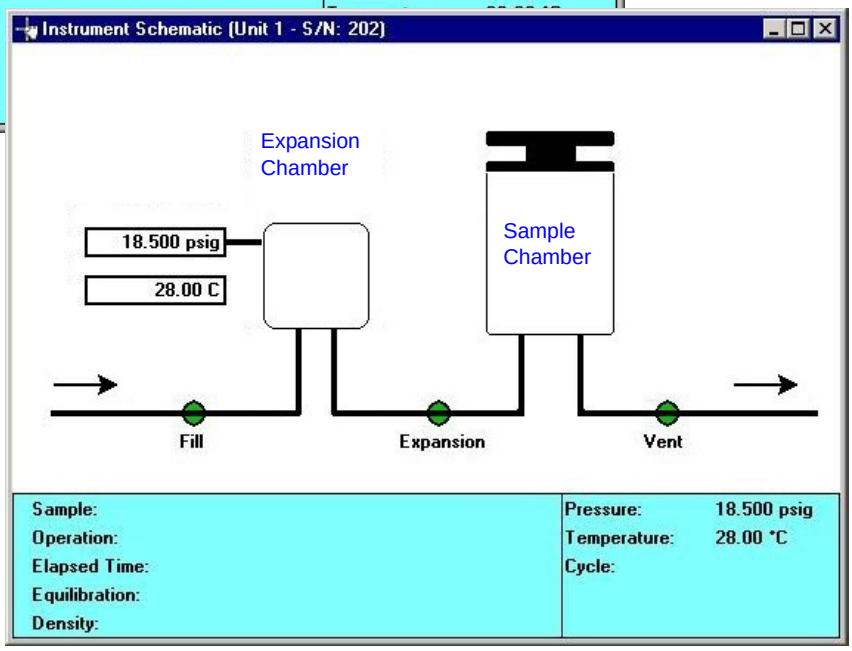
Indicates the direction in which gas flows through the system.

Show Instrument Schematic

Select this option to display a schematic of the AccuPyc.



Shows in this manner for the 10-, 100-, and 350-cm^3 units.



Shows in this manner for the 1-cm^3 unit.

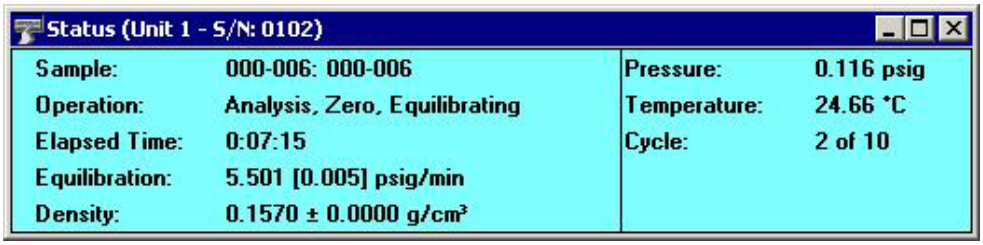
You can determine the state of the valve by the color.

Closed = White (yellow when manual control is enabled)
Open = Green

Select **Unit > Enable Manual Control** to control valves manually (refer to page **6-14** for a description of the components on the instrument schematic).

Show Status

Select this option to show only the status window of an operation in progress.



You may wish to use this option if:

- You have an automatic operation in progress and you wish to edit a sample file, for example. This way, you can monitor the operation while performing another task.
- You have multiple analysis units attached to the control unit of the AccuPyc. You can select **Show Status** on each unit menu and view the status of the operations on that unit.

The following items display in the status window:

Sample — The path and name of the sample file being used with the current analysis.

Operation — The operation, the task, and the step in progress. For example; Analysis (operation), Cycle (task), and Measuring P1 (step).

Elapsed Time — The elapsed time of the current step.

Equilibration — The measured equilibration rate and the limit.

Density — Last computed density and standard deviation, if applicable.

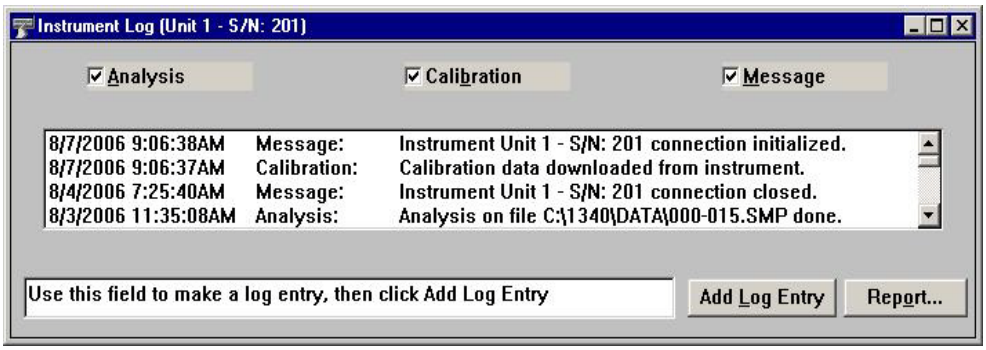
Pressure — The pressure in the sample chamber.

Temperature — The temperature of the sample chamber.

Cycles — The current cycle and the number of cycles requested. For example, 2 (current) of 10 (requested)

Show Instrument Log

Select this option to display a log of recent analyses, calibrations, and errors or messages. By default, information for analyses and messages are retained 60 days, and calibration information for 90 days. You may change the time for which this information is retained in the Unit section of the WIN.INI file.



You can choose the type of information to display in the window by selecting only the desired item(s). For example, check the **Analysis** box to display only analysis information.

Analysis
Calibration
Message

These options enable you to choose the type of entries to display in the log. For example, if you select **Analysis**, only Analysis operations are displayed.

Add Log Entry

Becomes enabled when you make an entry in the adjacent field. Entries display in the Log Report.

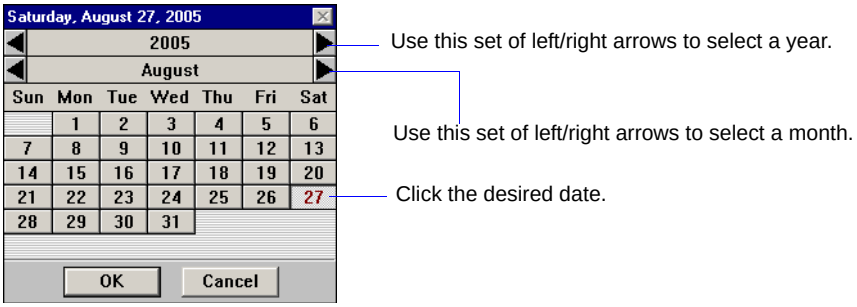
Report

Enables you to print or display on the screen a report of log entries; the Log Report Settings dialog is displayed.

Start Date

Use this field to specify a date at which to begin listing entries. You can specify a start date using any of the following methods:

- Highlight the field (or press **F2** to clear the field) and type in the desired date.
- Double-click in the field (or press **F4**) to display a calendar to choose a date.



- Press **F2** to clear the field, then **F3** to insert the current date.

Copies

Enabled when you choose **Printer** for the destination, allowing you to print up to four copies.

Destination

Specify a report destination.

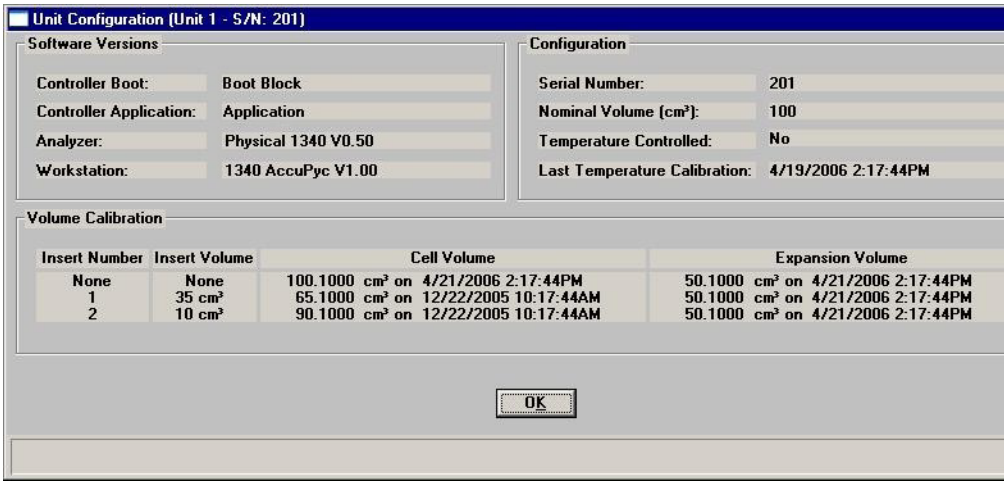
Choices*:* *Screen, Printer, File*

File name

Enabled when you select **File** for the destination, enter a file name.

Unit Configuration

Select this option to display software/hardware configurations for the selected analyzer. When you select Unit Configuration from the Unit menu, the Unit Configuration dialog is displayed.



Software Versions — Displays the software versions for components being used by the analyzer.

Configuration — Displays the serial number, the nominal cell volume, and the date and time of the last temperature calibration.

If your analyzer is temperature-controlled, that will also be shown.

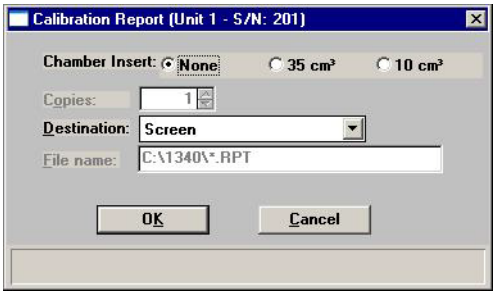
Volume Calibration — Displays the cell and expansion volumes for the analyzer, as well as for any inserts that are being used.

Calibration

The options on this menu enable you to generate a calibration report, and to calibrate certain parameters of the analyzer.

Calibration Report

This option enables you to generate a calibration report for the current calibration. A calibration report contains details for a zero cell volume and a volume calibration for your analysis module or for an insert if used.



Chamber Insert

Enables you to select the insert used in the calibration. The choices depend on the type of unit being used for the current analysis.

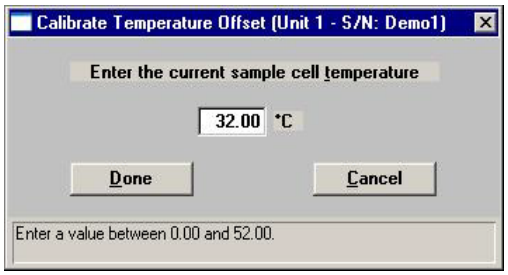
Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 3.5 cm^3, 1.0 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

Copies
Destination
File name

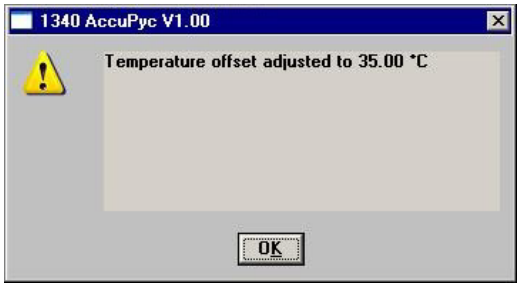
Refer to page **6-5** if you need assistance on these fields.

Temperature

This command enables you to calibrate the temperature offset; the Calibrate Temperature Offset dialog is displayed.



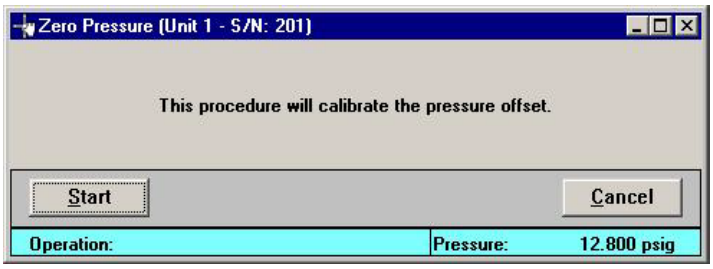
An external reference device is used to determine the sample cell temperature and typically is performed by Micromeritics personnel. After the temperature has been measured, enter the value in the field and click **Done**; a dialog confirming the adjustment is displayed. Click **OK** to close the dialog.



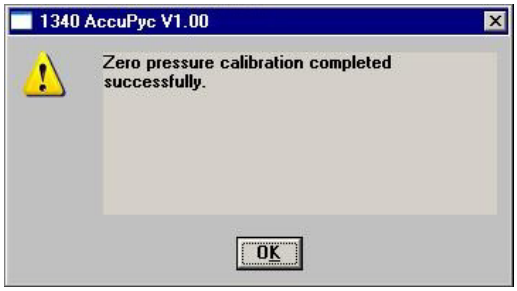
A Calibration report is not generated for the temperature offset; the entry is recorded in the Log Report. Click **Unit > Show Instrument Log**, then click **Report** if a report is desired.

Zero Pressure

This command enables you to zero the pressure scale. The zero pressure offset is measured when the system is at atmospheric pressure and thermal equilibrium, and is subtracted from all subsequent pressure readings in order to obtain a true gauge pressureThe Zero Pressure dialog is displayed.

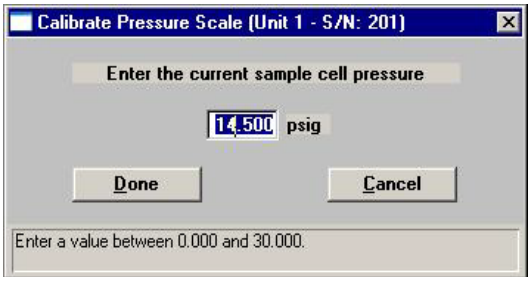


Click **Start** to begin the calibration; a confirmation dialog is displayed when calibration is complete. Click **OK** to close the dialog.



Pressure Scale

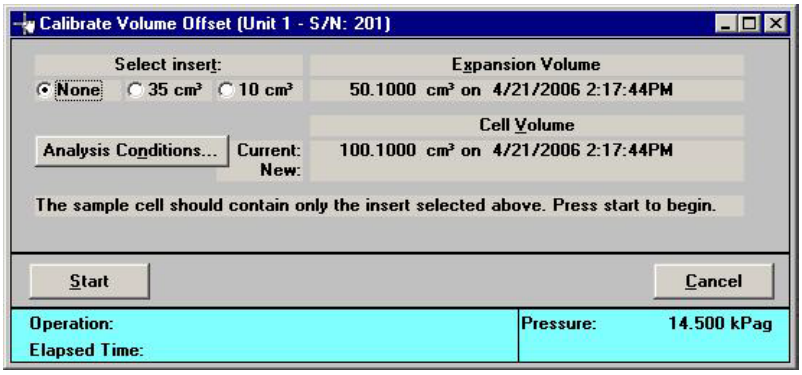
This command enables you to calibrate the pressure scale.



This procedure requires the use of a specially designed chamber cap containing a pressure gauge and can be performed only by Micromeritics personnel.

Zero Cell Volume

This command enables you to calibrate the cell volume offset; the Calibrate Volume Offset dialog is displayed.



Select insert

Select **None** when inserts are not being used; place an empty sample cup in the chamber.

If using inserts, select the appropriate one; place the insert and its sample cup into the chamber.

Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 3.5 cm^3, 1 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

Expansion Volume

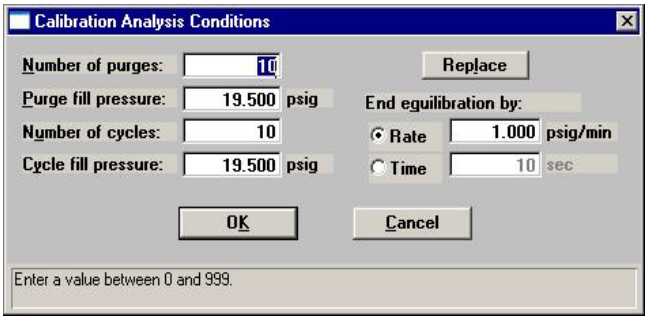
Displays the current expansion volume, and the date and time of calibration.

Cell Volume

Displays the current cell volume (without an isnert), or the volume of the selected insert.

Analysis Conditions

Displays the Calibration Analysis Conditions dialog.



This dialog enables you to specify conditions for the calibration.

Analysis Conditions

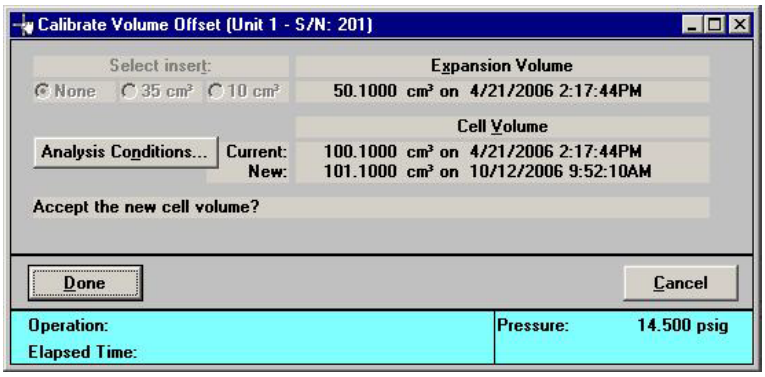
(continued)

Use the **Replace** push button to replace the values with those from an existing Analysis Conditions file. For example, some users create a file specifically for calibration.

Refer to **Analysis Conditions**, page **5-12** if you need assistance with the fields on this dialog.

Start

Begins the calibration. When calibration is complete, the second view of the Calibrate Volume Offset dialog is displayed.

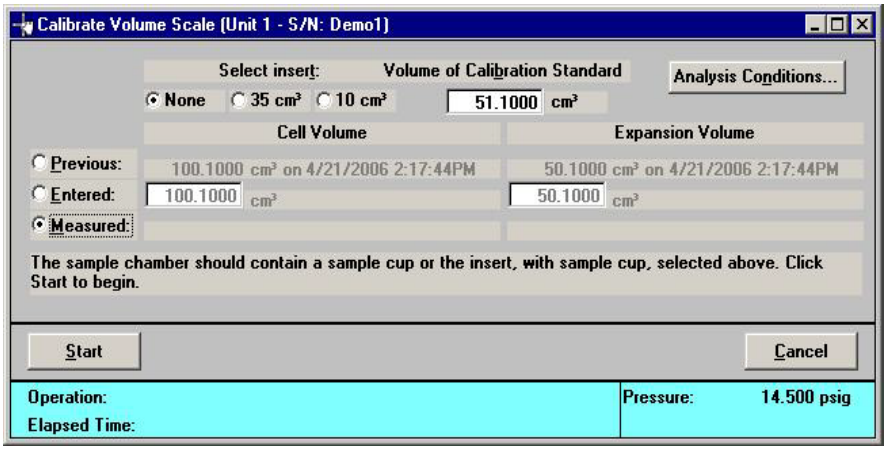


This dialog displays the current calibrated cell volume offset and the one just completed.

Click **Done** to accept the new value, or **Cancel** to retain the old (current) one.

Calibrate Volume

This command enables you to calibrate the cell volume and the expansion volume.



Refer to **Calibrating the Pycnometer**, page **2-13** for step-by-step instructions on performing a calibration.

Select insert

If an insert is not being used, select **None** and place an empty sample cup into the sample chamber.

Choices: *None, 0.1 cm^3 (for 1 cm^3 unit)*
None, 3.5 cm^3, 1.0 cm^3 (for 10 cm^3 unit)
None, 35 cm^3, 10 cm^3 (for 100 cm^3 unit)

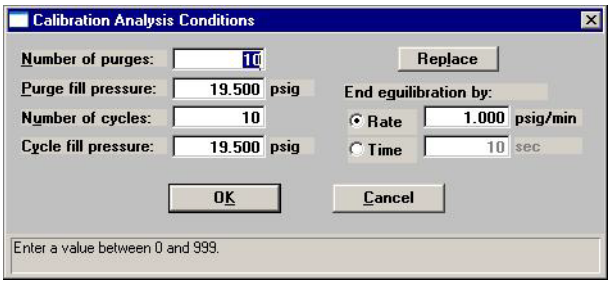
If an insert is being used, select the appropriate insert and place it and its sample cup into the sample chamber.

Volume of Calibration Standard

Displays the volume of the standard used for the previous calibration.

Analysis Conditions

Displays the Calibration Analysis Conditions dialog.



This dialog enables you to specify conditions for the calibration. Use the **Replace** push button to replace the values with those from an existing Analysis Conditions file. For example, some users create a file specifically for calibration.

Previous
Entered
Measured

These choices enable you to select the method for calibrating the cell and expansion volumes.

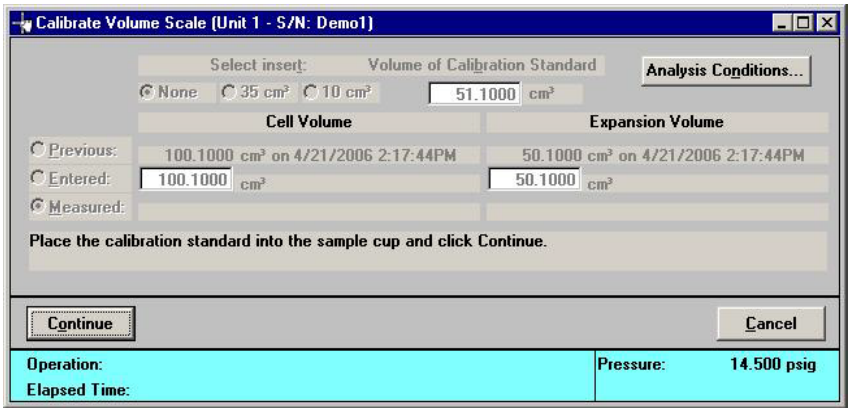
Previous uses the current cell and expansion volumes (shown to the right of the option).

Entered enables the fields for the cell and expansion volumes so that you can enter values.

Measured enables you to measure the cell and expansion volumes using a reference standard.

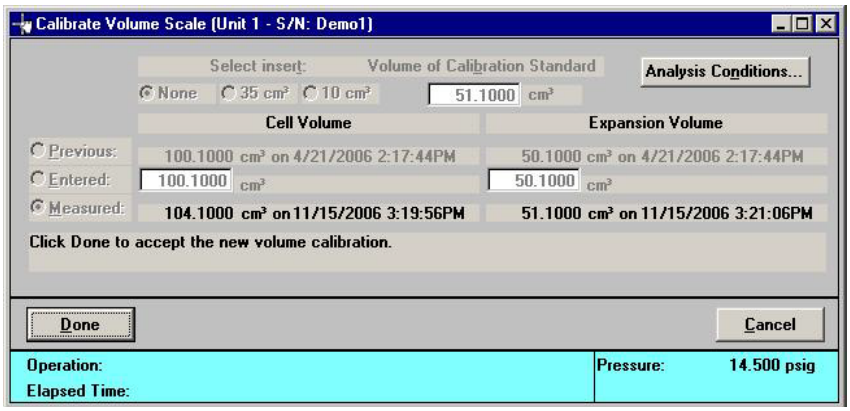
Start

Begins the first segment of the calibration; the volume offset. Status messages are shown as the calibration proceeds. When the volume offset calibration is complete, the following dialog prompting you to insert the standard(s) is displayed.



Continue

Click this push button after you have loaded the standard(s) into the chamber. This completes the remaining portion of the calibration; the volume scale. When calibration is complete, this view of the Calibrate Volume Scale dialog is displayed.

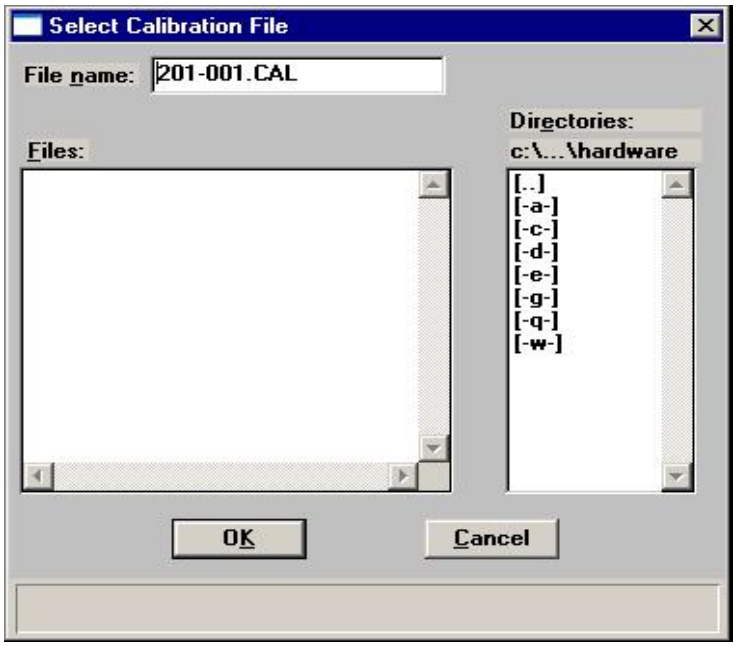


The new values are shown and you are prompted for acceptance.

Click **Done** to accept the new values, or **Cancel** to retain the previous ones.

Save to File

Use this option to save all of the current calibration settings to a file; the Select Calibration File dialog is displayed.



Some users like to archive calibration data; this option enables you to do so.

File name Defaults to the next sequence number for calibration files. The sequence number consists of: xxx-yyy.CAL, where xxx = serial number of unit and yyy = sequence number. For example, the number listed in the above dialog represents the first calibration file for unit serial number 201.

Load from File

Displays the Select Calibration File dialog (shown above) so that you can load a previously saved calibration file.

7. REPORTS MENU

The options on the Reports menu enable you to:

- start reports, page **7-3**
- close reports, page **7-5**
- open reports saved from the report window, page**7-5**
- specify SPC report options, page **7-6**
- generate SPC reports, pages **7-7** and **7-11**
- change the appearance of reports, page **7-15**
- manipulate onscreen reports, page **7-15**

This chapter also provides information on the tools available for customizing and manipulating onscreen reports, as well as examples of some of the reports available for the AccuPyc program.

Reports can be generated for data collected on a sample that has completed analysis, or on one that is currently being analyzed (includes only data collected up to the time of the report).

Description

Listed below are brief descriptions of the commands contained on the Reports menu. Detailed descriptions follow this section.

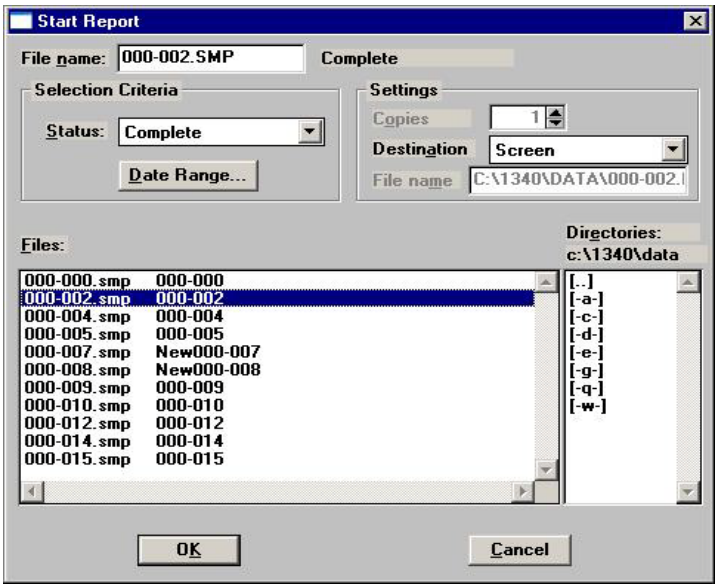
Start Report — Allows you to generate a report on a completed sample analysis or on the data collected thus far for an analysis in progress. Page **7-3**.

Close Reports — Closes all open report window(s). Page **7-5**.

Open Report	Enables you to open a report that was saved from the report window. Page **7-5**.
SPC Report Options	Allows you to specify the sample data to be included in SPC reports. Page **7-6**.
Regression Report	Allows you to generate a regression report. Page **7-7**.
Control Chart	Allows you to generate a control chart report. Page **7-11**.

Start Report

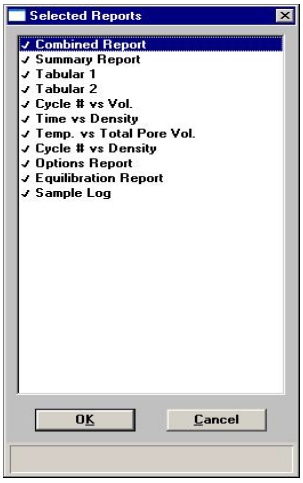
Select this option to generate a report on a sample analysis. Select **Reports > Start Report** to display the Start Report dialog.



File name

The name of the sample file you select from the **Files** list window is copied to this field. If you select multiple files, the last one selected is displayed. If you have a sample file open, its name defaults to this field.

- If you select multiple files, the reports specified in each sample file are printed to the output destination.
- If you choose a single file, the Select Reports dialog containing the available reports is displayed. This dialog allows you to confirm or edit the reports you wish to generate.



File name *(continued)*

Select (or deselect) reports by double-clicking on the desired report (reports are selected when they are preceded with a check mark). Alternatively, you can highlight the report and press the **Spacebar**.

Status

This drop-down list determines the type of sample files that display in the **Files** list window, and within the date range.

Choices: All, Analyzing, Complete

Refer to **Table 3-2. File Status and Description**, page **3-9** for a definition of the status types.

Date Range

Displays the Select Dates dialog so that you may specify a range of dates. Refer to **Selecting Files**, page **3-8** for a description of this push button.

Copies

Enabled when the **Printer** destination is chosen. This option allows you to print up to four copies of the selected report(s).

Destination

Displays a drop-down list of output destinations.

Choices: File, Printer, Screen

If you select **Printer**, requested reports are printed to the selected printer. This option also enables the **Copies** field allowing you to print up to four copies of each report.

If you select **Screen**, reports are displayed onscreen. Using this option allows flexibility for manipulating and customizing reports. Refer to **Onscreen Reports**, page **7-15**.

If you select **File**, the tabular reports of the requested file are converted to a text file which can be viewed with a text editor or other text file manipulation tool.

File name

Enabled when you select **File** as the destination. Allows you to enter a name, or you may accept the default.

Files list window

Displays a list of the available sample files for the choice shown in the **Status** field and within the range of dates specified in the **Select Dates** dialog.

Directories Displays a list of available drives and directories. The drive and directory last accessed is displayed immediately above the **Directories** list box. Refer to page **3-10** for information on navigating to other directories.

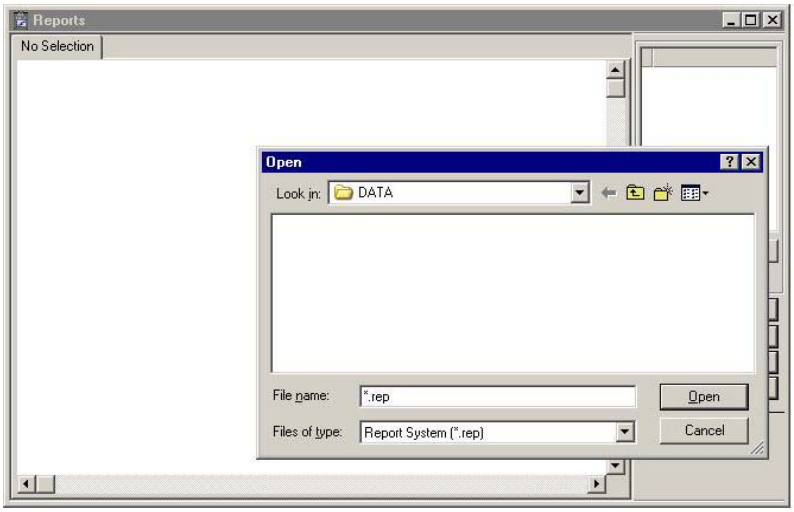
Close Reports

This option enables you to close all open report windows at one time. This avoids having to select **Close** on each report window. This option is unavailable if reports are being generated.

Open Report

This option enables you to open a report that was saved from the Report window; the Report window opens with an Open dialog positioned on top.

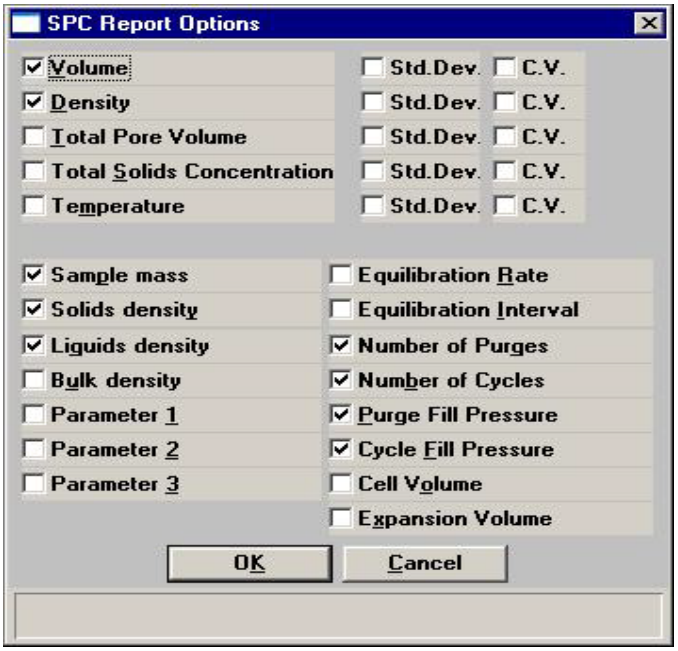
Report Window



After you navigate to the desired directory, select your file, and click **Open**, your saved report is displayed in the Report window.

SPC Report Options

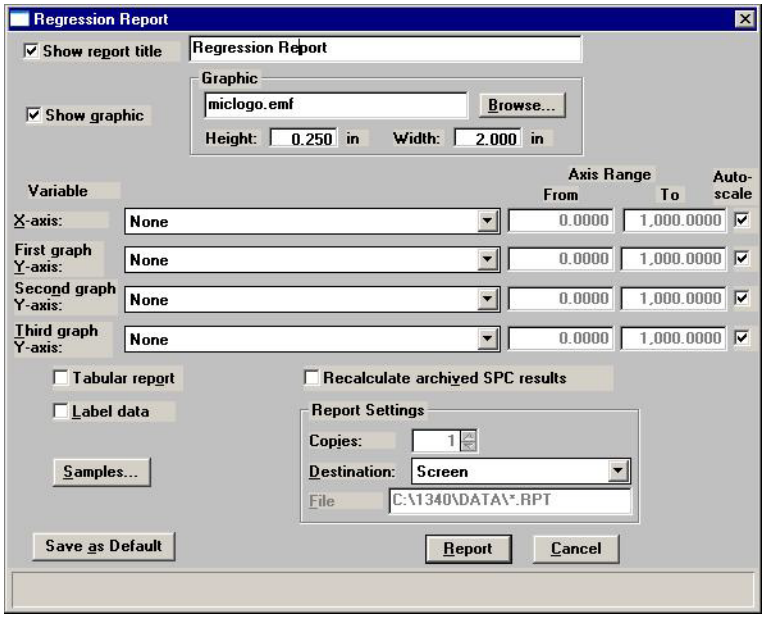
When you select SPC Report Options, the SPC Calculations dialog is displayed.



The SPC Calculations dialog lists the variables available for SPC reporting. You can check as many as desired. However, for efficiency, it is best to select only the variable you actually intend to us. All variables selected must be computed for *each* sample file used in an SPC report.

Regression Report

Select this option to generate a regression report. The regression report is used to determine the interdependency between two variables. Up to three dependent variables (Y-axis) may be plotted against a single independent variable (X-axis). The degree of correlation between the variables also is reported. The graphs for the regression report are scaled so that all three fit on a single page. If you choose less than three, the graphs are scaled to fill most of the page.



Show report title

Select this option to have a title display on your report. Accept the default or enter a new title. You can enter up to 40 alphanumeric characters.

Deselect this option to omit the report title.

Show graphic

Select this option to have a graphic display above your report title. For example, you may wish to display your company logo. The graphic must be a bitmap (bmp) or enhanced metafile (emf).

Click **Browse** to choose the file, then use the **Height** and **Width** fields to specify a size. This image can be edited in the report window (when printed to the screen), or removed if desired.

X- and Y-Axes Variable fields

Allows you to designate the X- and Y-axes variables. Click on the down arrow to display a list of variables. The variables in this list are the ones you specified in the **SPC report options**.

With this option, you can plot the regression of up to three Y-axis variables against the X-axis variable. The X-axis specifies the independent variable for the regression, while the Y-axes provide the dependent variables.

Axis Range

Enables you to specify the beginning and ending values for the X- and Y-axis ranges. Data collected outside these ranges are not included in the plot. These fields are disabled if you choose **Autoscale**.

Autoscale

Allows you to have the X- and/or Y-axes scaled automatically.

Recalculate archived SPC results

Select this option to have archived SPC values recalculated. This ensures that any changes made to the SPC Report Options are included in the new report; however, it does lengthen the time required to generate the report.

Tabular report

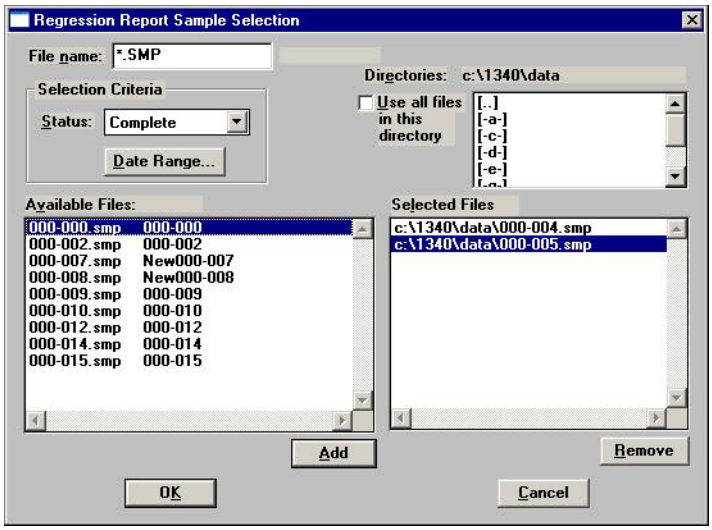
Enables you to generate tabular, as well as graphical, data of the included samples. A tabular report contains the numeric values contributed by each sample.

Label data

Allows you to label the points on the plot to correspond with the values in the sample files.

Samples

Displays the Regression Report Sample Selection dialog, allowing you to choose the sample files you wish to have reported.



File name

Use this field to limit the files displayed in the Available Files pane. For example; enter **g*.smp** to display only the files beginning with a **g**.

Status

This drop-down list determines the type of sample files that display in the **Available Files** pane in the selected directory for all dates, or within the specified range of dates (using **Date Range** push button). Refer to **Table 3-2. File Status and Description**, page **3-9** for an explanation of the Status types.

Date Range

Displays the Select Dates dialog so that you can specify a range of dates. Refer to **Selecting Files**, page **3-8** for an explanation of this push button.

Use all files in this directory

Select this option to include all files from the selected directory in the report.

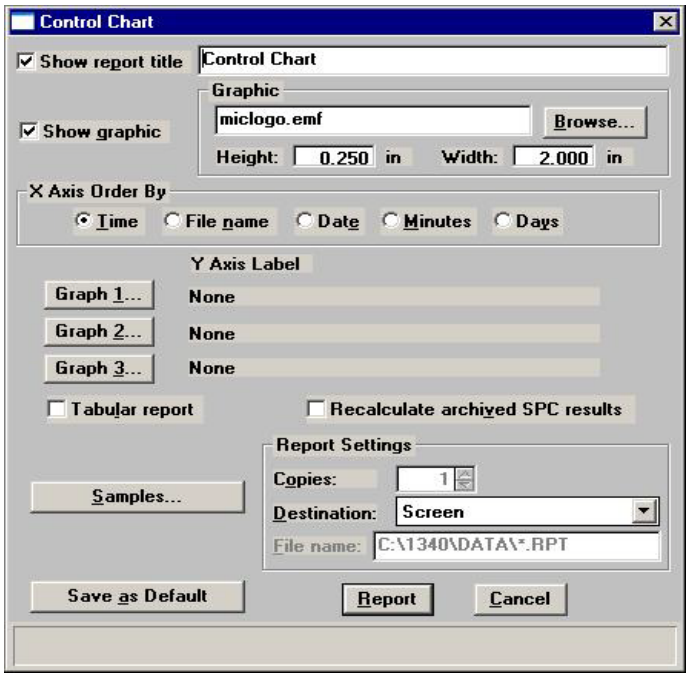
Directories

Lists the current directory. Use the directory window to navigate to a different directory. Refer to **Selecting Files**, page **3-10** for information on selecting different directories.

Add	Moves the selected file in the **Available Files** pane to the **Selected Files** pane. Alternatively, you can simply double-click on the desired file(s). You can select multiple files by holding down **Ctrl** while making your selections. You can include up to 200 sample files.
Remove	Removes the selected file from the **Selected Files** pane and places it back into the **Available Files** pane.
Save As Default	Saves the current definition of the report as the default.
Report Settings	The options in this group box enable you to choose output criteria. The **Copies** field is enabled when you choose **Printer** as the destination, enabling you to print up to four copies of the report.
Report	Generates the report.

Control Chart

This option enables you to generate a control chart report which plots the changes in a statistic.



Show report title

Select this option to have a title display on your report. Accept the default or enter a new title. You can enter up to 40 alphanumeric characters.

Deselect this option to omit the report title.

Show graphic

Select this option to have a graphic display above your report title. For example, you may wish to display your company logo. The graphic must be a bitmap (bmp) or enhanced meta-file (emf).

Click **Browse** to choose the file, then use the **Height** and **Width** fields to specify a size. This image can be edited in the report window (when printed to the screen), or removed if desired.

X-axis Order By

Enables you to choose the order in which X-axis statistics are placed. You can have them placed by **Time**, **File name**, **Date**, **Minutes**, or **Days**.

Time places the files on the graph at numerical points in the order of the date/time the files are analyzed.

File name places the files on the graph at numerical points in alphanumeric order.

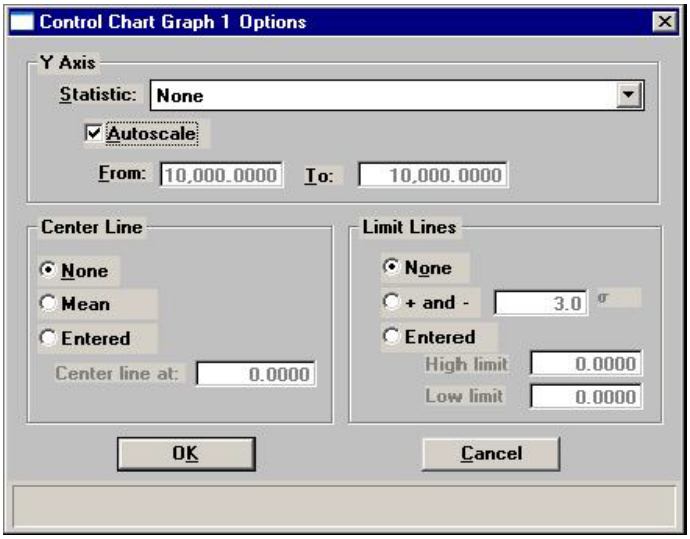
Date places the files on the graph at points representing the actual date/time the files are analyzed.

Minutes places the files on the graph at points representing the minutes that have elapsed from the first file placed on the list, which is the earliest-analyzed file.

Days places the files on the graph at points representing the number of days that have elapsed from the first file placed on the list, which the earliest-analyzed file.

Graph [n]

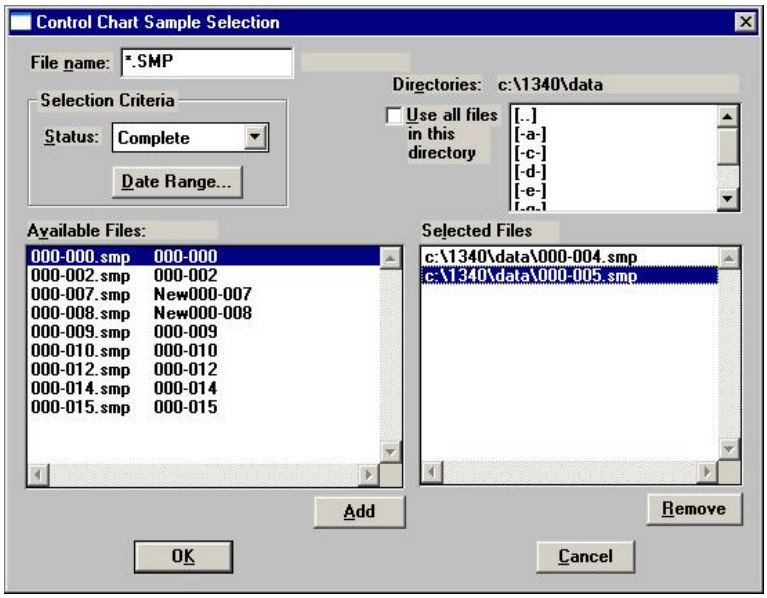
Displays the Control Chart Graph [n] Options dialog, allowing you to define the Y-axis of each graph.



Statistic

This drop-down list displays the SPC variables selected on the SPC Report Options dialog. The variable you choose will be plotted against time.

Autoscale	Allows you to have the Y-axis scaled automatically. If you wish to specify a range, deselect this option and enter a range in the **From** and **To** fields.
Center Line	Displays placement options for the variable's optional value. Choose *Entered* to specify placement of the line.
Limit Lines	Displays the options available for limiting lines. You can have the lines placed at some multiple of the standard deviation or at specified positions (*Entered*). When you select *Entered*, the **High limit** and **Low limit** fields are enabled, allowing you to enter appropriate values.
Tabular report	Allows you to generate tabular, as well as graphical, data of the included samples. A tabular report contains the numeric values contributed by each sample.
Recalculate archived SPC results	Select this option to have archived SPC values recalculated. This ensures that any changes made to the SPC Report Options are included in the new report. It also lengthens the time required to generate the report.
Samples	Displays the Control Chart Sample Selection dialog, allowing you to choose the sample files on which you wish to report.



This dialog functions in the same manner as the Regression Report Sample Selection Dialog explained earlier in this chapter. Refer to page 7-8 if you need assistance on the fields of this dialog.

Save as Default

Saves the current definition of the report as the default.

Report Settings

The options in this group box enable you to choose output criteria.

The **Copies** field is enabled when you choose **Printer** as the destination, enabling you to print up to four copies of the report.

Report

Generates the report.

Printed Reports

Header

All printed reports (either to the screen or to a printer) contain a header displaying file statistics.

- Tabular and graphical reports contain sample and instrument statistics such as serial number, date and time of analysis, analysis conditions, and so forth.

  The letter “T” is appended to the right of the serial number when the analysis module is temperature-controlled; for example, Serial # **201T**.

  The headers for these reports also contain notes of any changes to the sample file that occur after analysis.

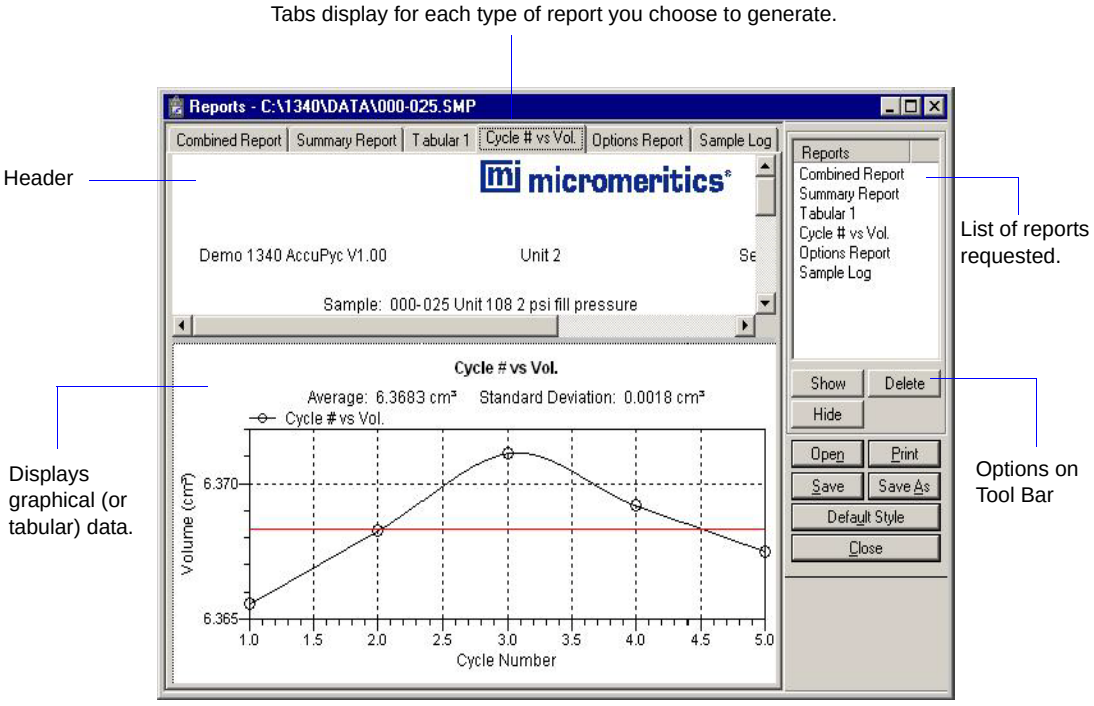
- Summary report headers contain the same type of information displayed in tabular and graphical reports with the exception of notes.

Onscreen Reports

The report window containing onscreen reports provides many options for customizing and manipulating reports:

- a tool bar
- shortcut menus
- zoom feature
- axis cross hairs

When reports are printed to the screen, they are printed in a window like the one shown below. Each requested report is listed in the Reports window on the tool bar; they are also indicated by selectable tabs across the top of the report header. To view a specific report, select its tab or select the report in the Reports window and click **Show**.



Tool Bar

Reports Contains a list of all requested reports.

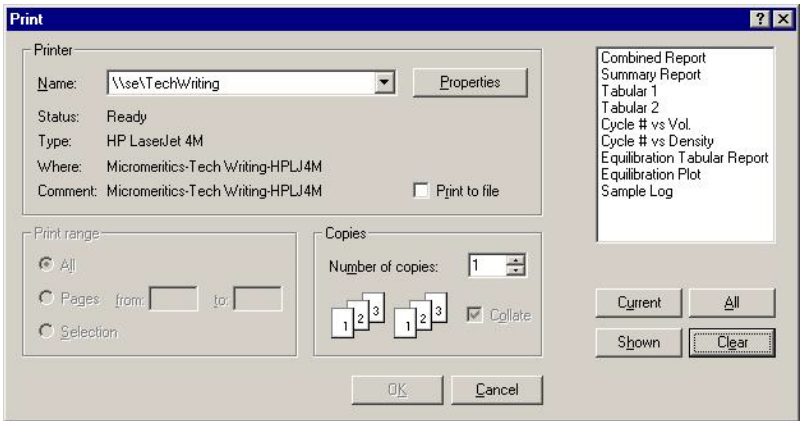
Show Shows the selected report in the report window. If the report has been hidden, it and its associated tab will become visible.

Delete Deletes the selected report. A deletion confirmation dialog is displayed since this function cannot be undone. The deleted report(s) will have to be regenerated if deleted in error.

Hide Hides (removes) the selected report from the report window. The report's associated tab is also removed.

Open Allows you to open a previously saved report file.

Print Displays a print dialog so that you can choose an appropriate printer for report output. A list of available reports is displayed in the window on the right side of the dialog.



For convenience in selecting which reports to print, push buttons are provided beneath the report window. Or, you can make your selection by clicking on the desired reports.

Current selects the report displayed in the report window.

Shown selects only the shown reports; any nonhighlighted reports indicate they are hidden. You can still select hidden reports from this window to print.

All selects all reports, including those that may have been hidden.

Clear clears all selections.

Save

Saves all reports of the currently open file in a report format using the same name as the sample file, only with an **rep** extension. If you wish to specify a name and/or specific reports to save, use the **Save As** push button.

Save As

Saves all or specified reports from the currently open file. The push buttons displayed on this dialog perform in the same manner as the print dialog (explained above).

Reports can be saved in three different formats:

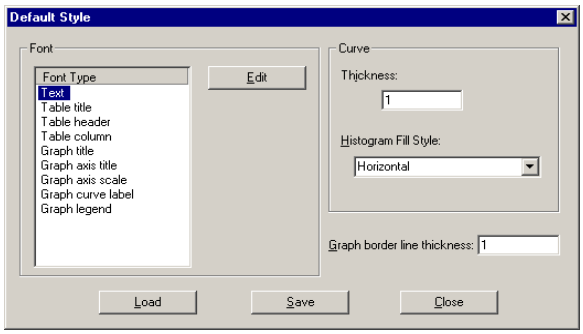
Report system (*.rep): Saved in a format which allows you to reopen the file using the push button on the Report window tool bar.

Spreadsheet (*.xls): Saved in a format which can be imported into most spreadsheet programs.

Ascii Text (*.txt): Saved in ASCII text which can be imported into programs accepting this type of file.

Default Style

Displays the Default Style dialog so that you can specify default parameters for report fonts and curve properties.



Font

Contains a list of report elements for which the font can be edited. Simply highlight the desired element and click **Edit**; a font dialog is displayed, enabling you to specify the desired font and attributes.

Curve

The items in this group box enable you to specify a thickness for report curves. Histograms are not applicable for AccuPyc data.

Graph border line thickness	Enables you to specify a thickness for the border of the graph.
Load	Loads the last saved defaults.
Save	Saves the changes as the defaults. If you do not click **Save**, the changes will apply to the current report set only. The next reports will revert to the defaults.
Close	Closes the Default Style dialog and applies the changes. If you clicked **Save**, the changes become the defaults. If you did not click **Save**, the changes apply only to the current report set.

Close Closes the report window.

Shortcut Menus

Shortcut menus are accessed when you right-click on the tabular or graphical portion of a report.

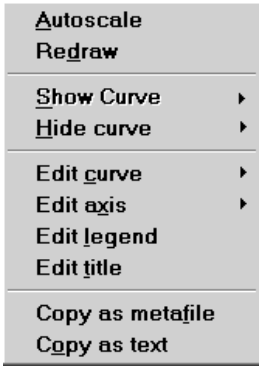
Tabular Reports

Resize column Displays a dialog so that you can specify the width of the selected column (in inches).

Rename column Displays a dialog so that you can edit the name of the selected column. Use **Ctrl + Enter** to insert line feeds.

Move column	Allows you to move the location of the selected column to the left or to the right.
Align column	Enables you to right-align, left-align, or center the data in the selected column.
Hide column	Displays a list of all columns, enabling you to select the one you wish to hide.
Show column	Displays a list of all hidden columns, enabling you to select the one you wish to have shown again.
Column font	Displays a Font dialog, allowing you to change font attributes for the tabular data in the current report.
Header font	Displays a Font dialog, allowing you to change font attributes for column headers in the current report.
Edit title	Allows you to edit the table title and font.
Copy table as text	Enables you to copy the entire table (column headers and data) and then insert it into another program. Columns are tab-delimited, allowing easy alignment.

Graphs



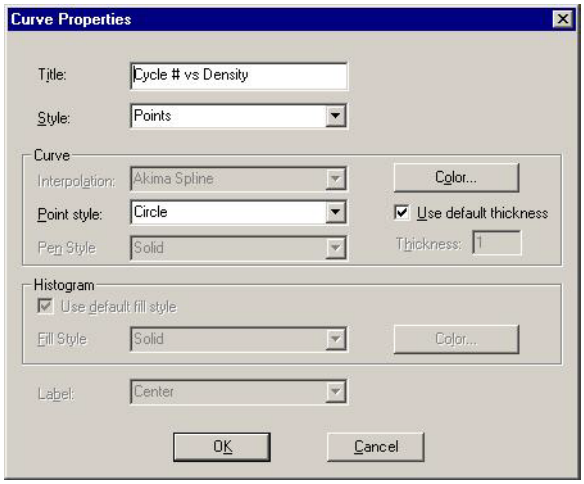
Autoscale Autoscales all axes of the graph. This function is useful for returning to a full view after having zoomed in.

Redraw Sets axis boundaries to its original view. You can also use this function to remove cross-hairs.

Show curve Shows any curve(s) that has been hidden. This option is disabled (greyed) if no curves have been hidden.

Hide curve Hides (removes from view) any unwanted curve(s).

Edit curve Displays the Curve Properties dialog, allowing you to edit curve properties.



Title Displays the title of the curve you are editing.

Style

Drop-down list containing styles in which collected data can be displayed.

Choices: Curve, Histogram, Points, Curve and Points

Curve group box

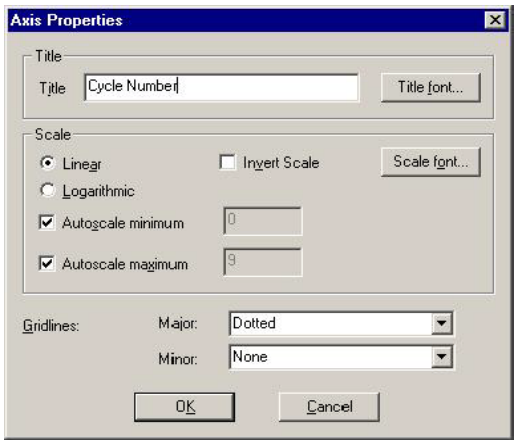
Contains options for curves and points. You can edit the curve interpolation, the style of curve and/or points, as well as the pen color. The options in this group box are disabled if Histogram is chosen in the **Style** drop-down list.

Histogram group box

Allows you to specify the type of fill as well as the color if Histogram is chosen as the style for collected data.

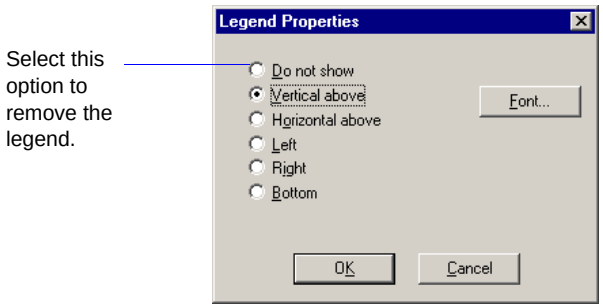
Edit axis

Displays the Axis Properties dialog, allowing you to edit axis properties.



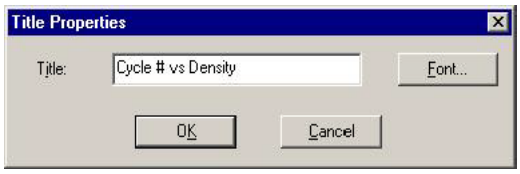
Edit legend

Displays the Legend Properties dialog, allowing you to edit the placement of the legend.



Edit title

Displays the Title Properties dialog, allowing you to edit the current graph's title and font.



Copy as metafile

Copies the graph and places it on the clipboard, allowing you to paste it into other applications accepting Windows metafiles.

Copy as text

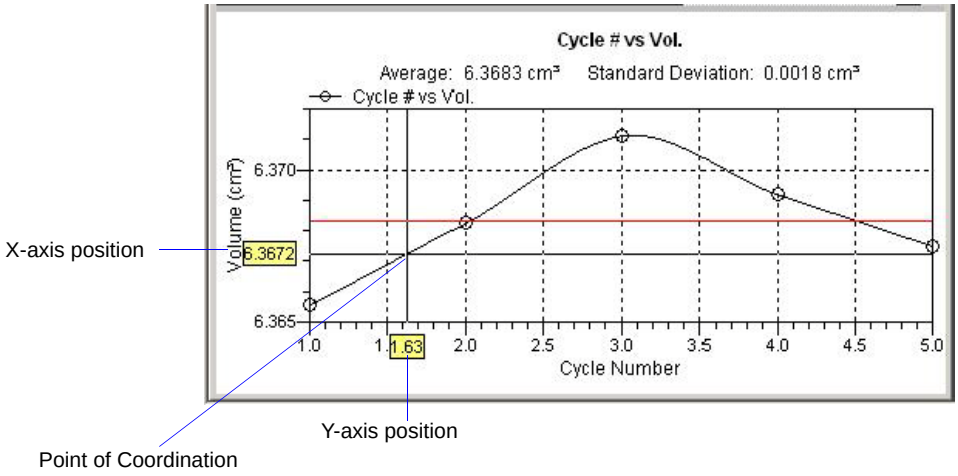
Copies the data used to generate the graph as a series of tab-delimited columns of text.

Zoom Feature

A zoom feature is included with the report system so that you can zoom in to examine fine details. To use this feature, simply hold down the left mouse button and drag the mouse cursor (drawing a box) across the area you wish to view; then release the button. The enlarged area immediately fills the graph area. Right-click in the graph area and choose **Redraw** or **Auto-scale** from the shortcut menu to return to the normal view.

Axis Cross Hair

A cross-hair function is available so that you can view axis coordinates. To use this feature, simply left-click in the desired area of the graph.



Right-click in the graph area and choose **Redraw** or **Autoscale** form the shortcut menu to remove cross-hair lines and return to the normal view. Alternatively, you can click outside of the graph area.

Report Examples

The remainder of this section contains samples of some of the reports which may be generated by the AccuPyc Windows program. Most of the reports can be varied through entries on the report options screens.

Density and Volume Tabular Report

micromeritics®

AccuPyc II 1340 V1.00 Unit 2 Serial #: 107 Page 2

Sample: 000-024 Garnet Standard
Operator: HH
Submitter: S/N 108
Bar Code:
File: C:\1340\DATA\000-024.SMP

Analysis Gas: Helium
Reported: 1/24/2007 10:25:18AM
Sample Mass: 10.8526 g
Temperature: 23.91 °C
Number of Purges: 10

Analysis Start: 1/22/2007 2:41:04PM
Analysis End: 1/22/2007 3:11:49PM
Equilib. Rate: 0.005 psig/min
Expansion Volume: 9.2020 cm³
Cell Volume: 11.2480 cm³

Comments: run 2

Density and Volume Report

Cycle#	Volume (cm³)	Volume Deviation (cm³)	Density (g/cm³)	Density Deviation (g/cm³)	Elapsed Time (mm:ss)	Temperature (°C)
1	2.8136	-0.0006	3.8572	0.0009	8:39	23.84
2	2.8125	-0.0017	3.8586	0.0023	10:55	23.88
3	2.8133	-0.0009	3.8576	0.0012	13:15	23.86
4	2.8147	0.0005	3.8557	-0.0006	15:33	23.90
5	2.8161	0.0019	3.8537	-0.0026	17:59	23.94
6	2.8131	-0.0011	3.8579	0.0015	20:17	23.93
7	2.8127	-0.0015	3.8584	0.0021	22:34	23.92
8	2.8158	0.0016	3.8542	-0.0021	24:50	23.93
9	2.8148	0.0006	3.8556	-0.0008	27:09	23.96
10	2.8154	0.0012	3.8547	-0.0017	29:29	23.98

Summary Data	Average	Standard Deviation
Volume:	2.8142 cm³	0.0012 cm³
Density:	3.8564 g/cm³	0.0017 g/cm³

Density vs. Cycle Number Trend Plot

micromeritics®

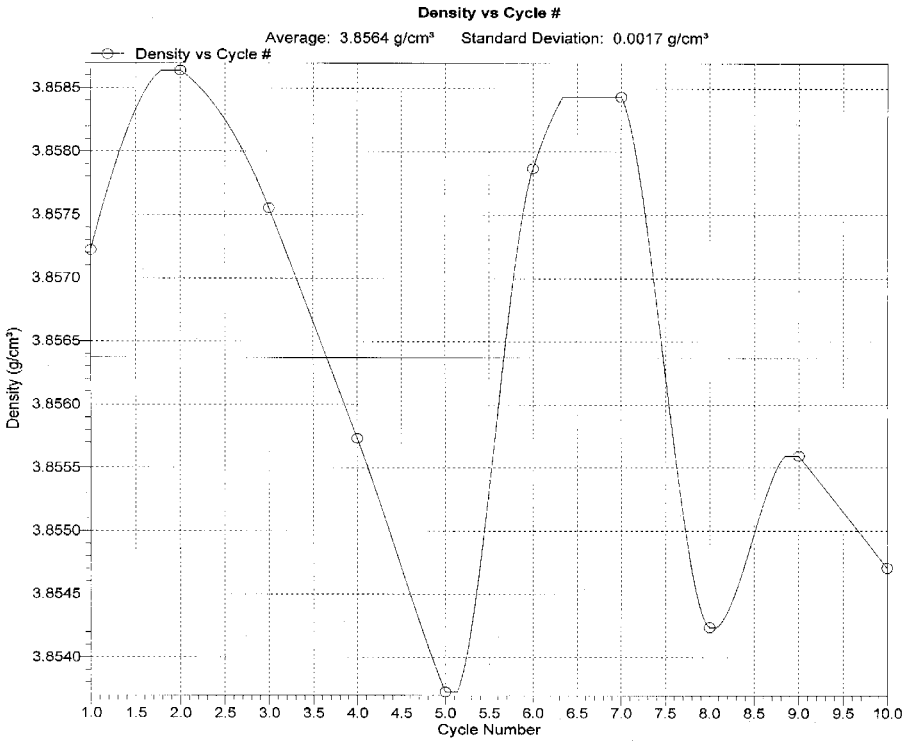
AccuPyc II 1340 V1.00 Unit 2 Serial #: 107 Page 3

Sample: 000-024 Garnet Standard
Operator: HH
Submitter: S/N 108
Bar Code:
File: C:\1340\DATA\000-024.SMP

Analysis Gas: Helium
Reported: 1/24/2007 10:25:18AM
Sample Mass: 10.8526 g
Temperature: 23.91 °C
Number of Purges: 10

Analysis Start: 1/22/2007 2:41:04PM
Analysis End: 1/22/2007 3:11:49PM
Equilib. Rate: 0.005 psig/min
Expansion Volume: 9.2020 cm³
Cell Volume: 11.2480 cm³

Comments: run 2



Summary Report

micromeritics®

AccuPyc II 1340 V1.00 Unit 2 Serial #: 107 Page 1

Sample: 000-024 Garnet Standard
Operator: HH
Submitter: S/N 108
Bar Code:
File: C:\1340\DATA\000-024.SMP

Analysis Gas: Helium
Reported: 1/24/2007 10:25:18AM
Sample Mass: 10.8526 g
Temperature: 23.91 °C
Number of Purges: 10

Analysis Start: 1/22/2007 2:41:04PM
Analysis End: 1/22/2007 3:11:49PM
Equilib. Rate: 0.005 psig/min
Expansion Volume: 9.2020 cm³
Cell Volume: 11.2480 cm³

Comments: run 2

Summary Report

Sample Volume
Average: 2.8142 cm³
Standard Deviation: 0.0012 cm³

Sample Density
Average: 3.8564 g/cm³
Standard Deviation: 0.0017 g/cm³

8. OPTIONS MENU

The Options menu contains options which allow you to configure the system to your laboratory's requirements. With the options on this menu, you can:

- Choose between basic, advanced, or restricted mode
- Edit program defaults
- Specify data presentation modes
- Specify a directory for predefined parameter files

Description

Listed below are brief descriptions of the options contained on the Options menu. Detailed descriptions follow this section.

Option Presentation — Allows you to display the sample file dialog in Advanced, Basic, or Restricted format. Page **8-2**.

Sample Defaults — Allows you to specify defaults for the parameters contained in the sample information and parameter files. Page **8-5**.

Units — Allows you to choose the types of units to use for measurement, pressure, and temperature. Page **8-12**.

Graph Grid Lines — Enables you to choose the types of grid lines to display for the X- and Y-axes. Page **8-13**.

Parameter Files Directory — Allows you to specify a location for the predefined parameter files used by the Basic and Restricted formats. Page **8-14**.

Option Presentation

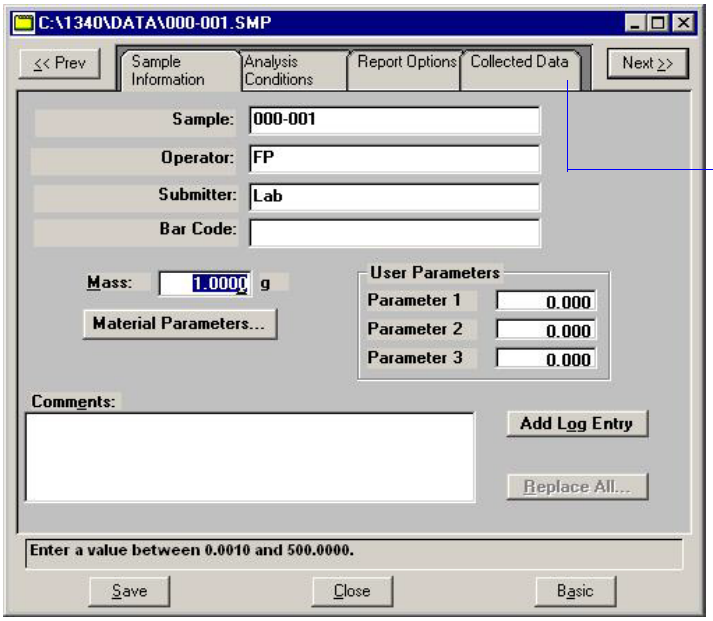
The sample editing dialogs for the AccuPyc Windows program may be presented in three different formats: Advanced, Basic, or Restricted.

Each format displays sample information and menu options differently.

- **Advanced**: displays all parts of the sample information file in a tabbed dialog, allowing easy access to all parameters. Use this format to edit parameter files or create customized sample files.
- **Basic**: displays all parameters of the sample file in a single dialog. Use this format to create sample files using previously created parameter files. The Basic format also allows you to switch to the Advanced format to view or edit file parameters.
- **Restricted**: displays in the same manner as the Basic format. This format also is used to create sample files using previously created parameter files. However, you cannot switch to the Advanced format to edit parameters. You must also use a password for entering and exiting this format.

Advanced

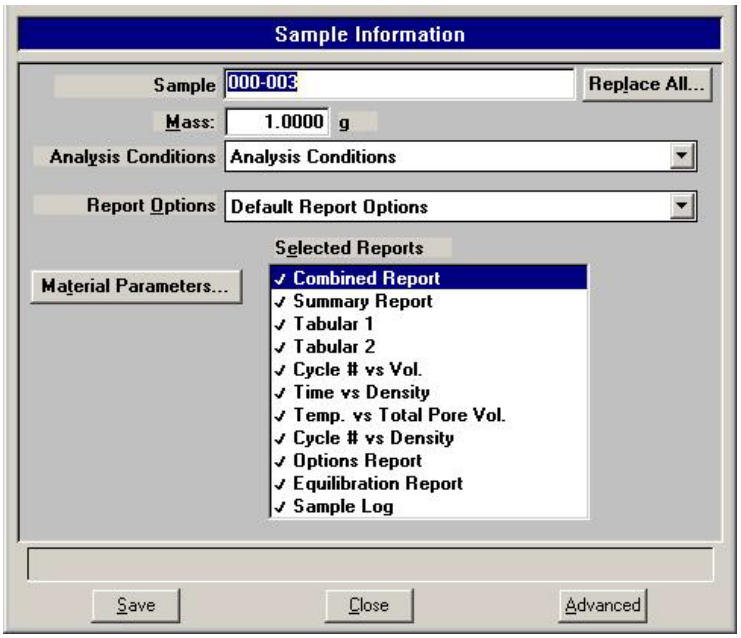
The **Advanced** format presents all parts of the sample information file in a tabbed dialog. You simply click the tab to access the parameters, or you can use **Next** and **Prev**. The sample editor for the Advanced format displays in this manner.



The Advanced format is used to create customized sample files — easily and quickly. You can also switch to the Basic format, if desired, by clicking **Basic**. Refer to **Advanced**, page **5-5** for a detailed description of this dialog.**Advanced**, page **8-2**

Basic

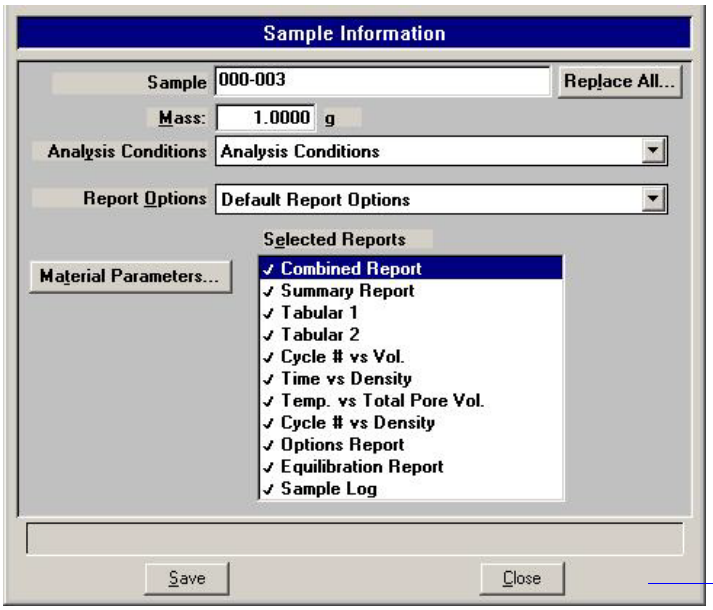
The **Basic** format presents the sample information file and its parameter files in a single dialog. The sample editor for the Basic format display in this manner.



The Basic format is used to create sample information files using previously defined parameter files. You can easily switch to Advanced format, if desired, by clicking **Advanced**. Refer to **Basic**, page **5-9** for a detailed description of this dialog.

Restricted

The **Restricted** format is identical to the Basic format, except that certain menu options are disabled, and you cannot switch to the Advanced format. The sample editor for the Restricted format displays in this manner.



This format is password-protected and is typically used in laboratories where analysis conditions must remain constant.

When you select Restricted, a dialog requesting a password is displayed:

Any password (up to 31 characters) can be used to enable the Restricted format. The same password, however, must be used to exit the Restricted format. For example, if you enter “password” to enable the Restricted format, then you must use “password” to exit. If you forget the password, open the system INI file and navigate to the **Private** section. The current password will be shown immediately following “OptionPresentationPassword.” Make a note of the password, exit the INI file, and enter the password where requested. Do not attempt to delete the password in the INI file.

Sample Defaults

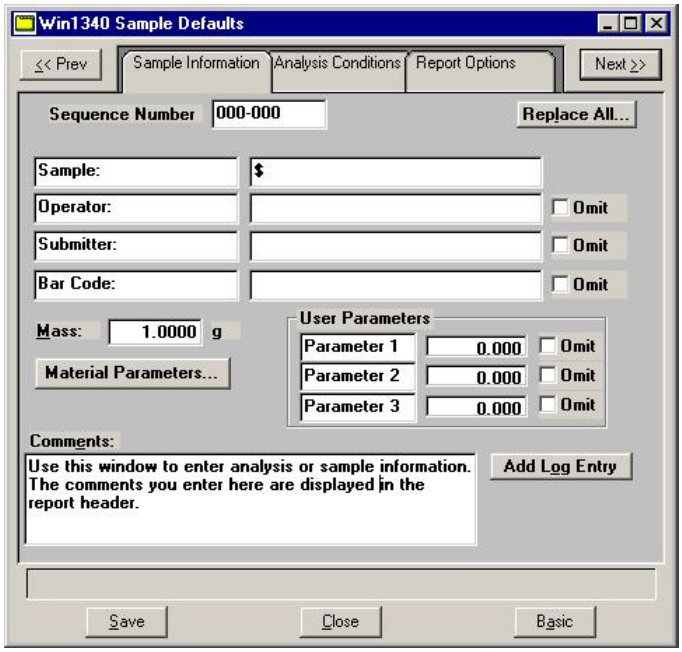
This option allows you to specify default parameters for sample information files. You can specify defaults using the **Advanced** or **Basic** format. Select **Options > Option Presentation** to choose the format you wish to use. You cannot specify defaults using the Restricted format; defaults specified for the Basic format are used for the Restricted format. Alternatively, you can switch between the two formats using the **Advanced / Basic** toggle push button displayed on the lower right side of the dialog.

Advanced

The Advanced Sample Defaults dialog contains tabs for each parameter. The values you specify in the parameter portions (Analysis Conditions and Report Options) of the sample file are saved as the defaults for newly created parameter files.

For example, after specifying defaults for a sample file in the Advanced format:

- Select **File > Open > Sample Information**, then click **Yes** to create the file, and the defaults you specify display for all parameters.
- Select **File > Open > Analysis Conditions**, name and create the file, and the defaults you specify in the Analysis Conditions portion of the Advanced Sample Defaults dialog display in the fields.



Sequence

Allows you to specify a default sequence for the sample file name. The number you specify is sequenced incrementally each time you create a sample file. It is the number that appears in the **File name** field when you select **File > Open > Sample Information**.

- Use numbers, letters, or other printable characters, such as dashes. At least three numbers must be included.
- Use up to eight characters
- The application prohibits using such characters as * or ?

Sample

Allows you to enter an additional identification that provides more information than the sample file name alone.

In the field on the left: edit the prompt for **Sample** if you wish. For example, you may prefer to use **Test** or **Material**. You can use up to 20 characters.

In the field on the right: specify a format for the sample identification. Or, if you prefer, you can leave this file blank and enter identifications as files are created.

- Use numbers, letters, or other printable characters, such as dashes
- Use up to 42 characters (including the $ symbol if used)
- Include the automatically generated file name as part of the identification by using the $ symbol where you want the sequence number to appear.

  For example, if the sequence number is 000-001, enter the sample identification as follows:

  Lab #25 - $

  The resulting sample identification for the first sample information file would be:

  Lab #25 - 000-001

  and the second:

  Lab #25 - 000-002, and so on.

Operator
Submitter

Allow you to enter the name (or other identification) of the operator performing the analysis and the name of the person, department, customer, etc. that submitted the sample for analysis.

The fields on the left can be edited to display something other than **Operator** and **Submitter** if desired. You can use up to 20 characters in each field.

The fields on the right allow you to specify default names or titles, or you can leave these fields blank and enter names when the files are created.

- Include the automatically generated file name (number) by using the symbol $ where you want the sequence number to appear. Refer to the example given above.
- Use up to 42 characters (including the $ symbol)
- Select **Omit** to prevent this item from displaying on the sample file dialog

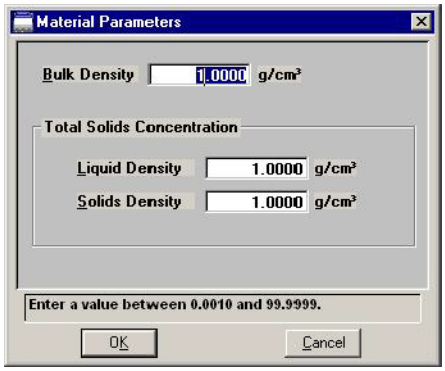
Bar Code

This field is provided for bar code information, and will accept data from a bar code reader.

If you do not use bar code data, you can change this to a label of preference or use this field to enter additional information about the sample. The guidelines for entries in this field are the same as for **Operator/Submitter** above.

Material Parameters

Displays the Material Parameters dialog



Refer to **Material Parameters**, page 5-7 for a description of the fields on this dialog.

Mass

Enter a default value for the sample's mass. Regardless of the value you enter in this field, the value can be edited in the sample file.

User Parameters

The fields in this group box are used primarily for SPC (Statistical Process Control) reporting. They are used to specify characteristics of the sample or its manufacturing process.

Once specified, these parameters display on the sample editor and in the SPC Sample Options dialog (accessed through the SPC Report Options dialog).

These fields can also be used to record analysis conditions or sample information so that it can be printed on the Summary report.

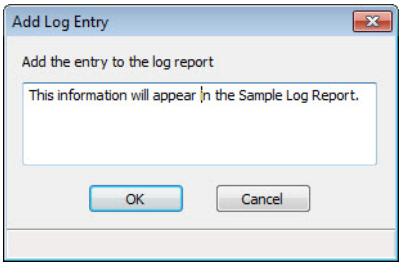
Select **Omit** if you do not wish to use these fields; this will prevent them from displaying on the sample information dialog.

Comments

Allows you to enter comments about the sample or its analysis conditions. Anything you enter in this window is printed in the report header.

Add Log Entry

Displays the Add Log Entry dialog, enabling you to enter comments about the sample or its analysis conditions.



Anything you enter using this option appears in the Sample Log Report; it does not display in the report header.

Replace All

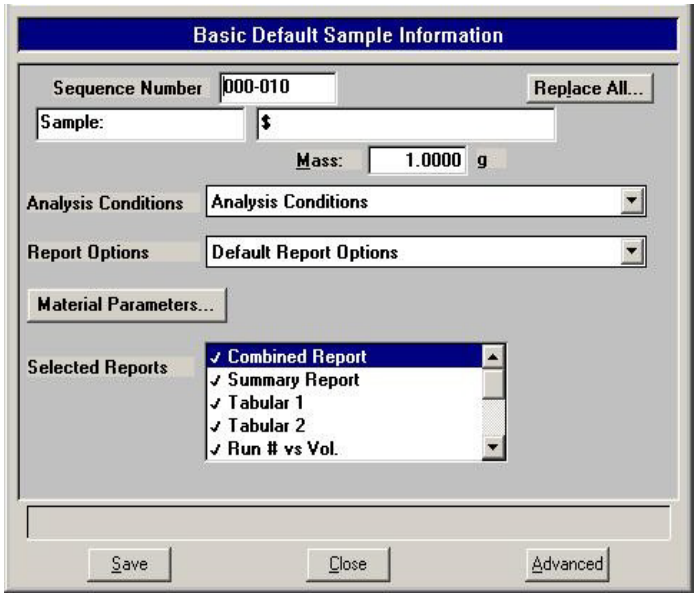
Allows you to replace the contents of all parameter files contained in the current default sample file with those from an existing sample file. For example, you may have an existing sample file that contains most (or all) of the parameters that you wish to use for defaults. You can click this push button, choose the file, and then click **OK**. Values from all parameters of the file you choose are copied into the sample defaults dialog. You can edit the values if needed without affecting the file from which they were copied.

Click on each remaining tab of the Advanced Sample dialog to establish parameter defaults. Refer to the sections indicated below if you need assistance on the fields of the dialogs.

- **Analysis Conditions**, page **5-12**
- **Report Options**, page **5-15**

Basic

When you select **Sample Defaults** while using the Basic format, the Default Basic Sample Information dialog is displayed.



The defaults you specify for the Basic format also serve as the defaults for the Restricted format.

Sequence

Specify a default sequence for the sample file name. The number you specify is sequenced incrementally each time you create a sample file. It is the number that appears in the **File name** field when you select **File > Open > Sample Information**.

- Use numbers, letters, or other printable characters, such as dashes. At least three numbers must be included
- Use up to eight characters
- The application prohibits using such characters as * or ?

Sample

Allows you to enter an additional identification that provides more information than the sample file name alone.

In the field on the left, edit the prompt for Sample if you wish. For example, you may prefer to use **Test** or **Material**. The maximum number of characters is 20.

Sample

(continued)

In the field on the right, specify a format for the sample identification.

- Use numbers, letters, or other printable characters, such as dashes.
- Use up to 42 characters (including the $ symbol if used)
- Include the automatically generated file name as part of the identification by using the $ symbol where you want the sequence number to appear.

  For example, if the sequence number is 000-001, enter the sample identification as follows:

  Lab #25 - $

  The resulting sample identification for the first sample information file would be:

  Lab #25 - 000-001

  and the second:

  Lab #25 - 000-002, and so on.

Mass

Enter a default value for the sample mass. Regardless of the value you enter as the default, it can be edited in the sample information file.

Analysis Conditions
Report Options

Each parameter contains a drop-down list containing predefined parameter files, some of which were included with the software. Choose the file you wish to use as the default.

Replace All

Allows you to replace all parameters of the default sample file you are creating with parameters from an existing sample file. For example, you may have an existing sample file that contains most (or all) of the parameters that you wish to use. You can even change the values in these files (if needed) without affecting the file from which they were copied.

Save

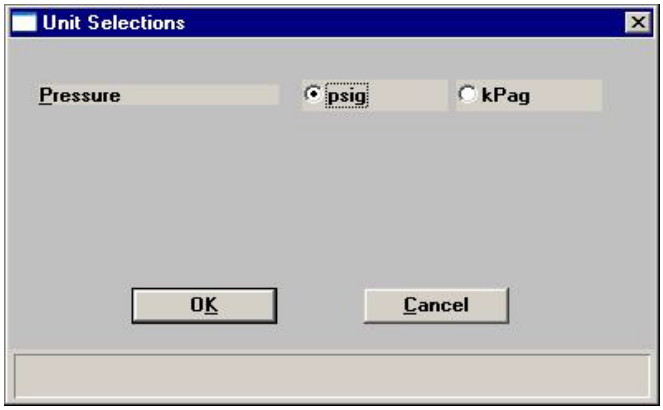
Saves the specified defaults.

Close

Closes the dialog.

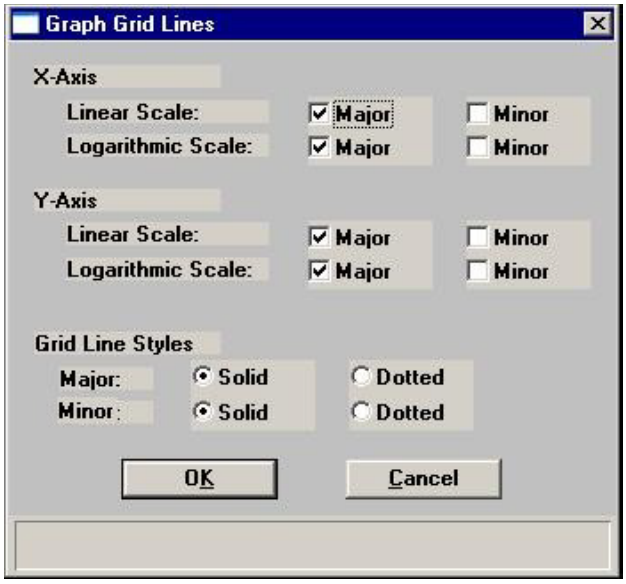
Units

This menu command displays the Units Selections dialog which allows you to choose the manner in which to display units of pressure.



Graph Grid Lines

Graph Grid Lines enables you to choose the type(s) of grid lines to show on your reports; the Graph Grid Lines dialog is displayed.



X-Axis
Y-Axis

Enables you to choose **Major** and/or **Minor** lines to display in printed reports for the Logarithmic and Linear scales.

If you deselect these items (remove the check marks), your report will not display grid lines.

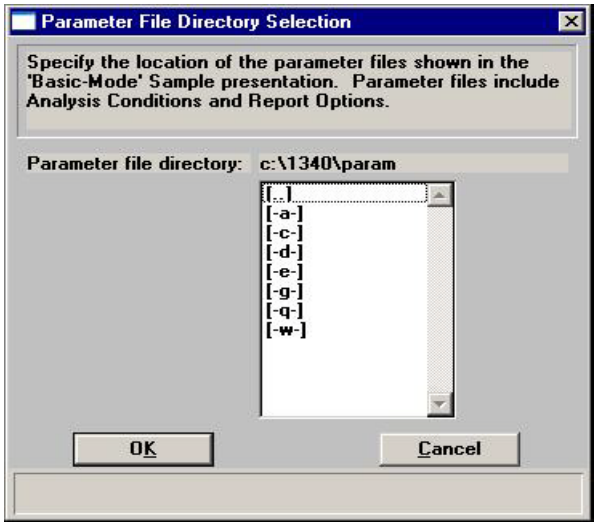
Grid Line Style

Allows you to choose the type of grid line to display when grid lines are shown.

Parameter Files Directory

This option allows you to select the location for the predefined parameter files displayed in the drop-down lists on the Basic and Restricted Sample Information dialogs. The current directory specified for parameter files is displayed above the directory window.

When you select this option, the Parameter File Directory Selection dialog is displayed.



The directory specified here is the one you should use when creating parameter files to be included in the drop-down lists on the Basic and Restricted sample information dialogs. The default directory is **param** and includes several parameter files supplied with the analysis program. If you specify a different directory, these files will not be included in the drop-down lists unless you copy (or move) them to the new directory.

If you wish to continue to use the **param** directory for parameter files, it will display as the default when saving parameter files.

9. TROUBLESHOOTING AND MAINTENANCE

This chapter describes common operational problems and their solutions, and maintenance procedures. If further assistance is needed after following the procedures in this chapter, contact a Micromeritics Service Representative.

Troubleshooting

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

Table 9-1. Common Operational Problems

Problem	Cause	Solution
Power indicator did not illuminate when analyzer was turned on	Power cord not fully inserted at one end or the other.	Insert power plug firmly into outlet socket; insert unit connector firmly into power connector opening.
	No power at outlet	Plug in lamp or small appliance to test outlet. If there is no power, contact electrician.
	Plug prongs bent so that contact not made at outlet.	Wiggle power plug at outlet. If indicator does not illuminate, have electrician adjust prongs or replace outlet or plug.
	Power cord damaged	Have electrician check cord using test meter. Replace if defective.
	Loose internal connection, broken wire, or failure of internal power supply.	Contact a Micromeritics Service Representative for repair or replacement information.
Specified pressure not reached or maintained.	Chamber cap not properly closed.	Close chamber cap by turning fully clockwise.
	Chamber cap contains dust or debris or the O-ring is not properly greased.	Using a lint-free tissue, clean the chamber cap and the rim of the cell chamber. Lightly grease the chamber cap O-ring (refer to **Greasing the Chamber Cap O-ring**, page **9-4**).

Problem	Cause	Solution
Specified pressure not reached or maintained. *(continued)*	The chamber cap O-ring is not properly seated.	Check the chamber cap. Ensure that the O-ring is properly seated and that it contains no scratches or cuts.
	The chamber cap O-ring is cut or scratched.	Replace the O-ring in the chamber cap (refer to **Replacing the Chamber Cap O-Ring.**, page **9-5**).
	Gas leaks in the cell chamber or expansion chamber.	Check the pycnometer for leaks (refer to **Checking the Cell and Expansion Chambers for Leaks**, page **9-7**).
	The helium tank is low on gas, or empty.	Check tank. Minimum recommended pressure is 200 psig.
	The Shut-Off valve on the gas bottle is closed.	Ensure that the valve is open.
	Pressure regulator defect or the pressure is set too low.	Check regulator to be sure it is set properly. Call a Micromeritics Service Representative, if necessary.
	The Zero offset (of pressure transducer) is too low.	Check offset by opening chamber cap. If pressure is negative (displayed on instrument schematic), run a new zero offset.
Helium drained from tank.	Leaks in the gas line connection.	Pressurize the system. Close, then open the gas bottle Shut-Off valve. If the needle on the pressure gauge on the jumps abruptly, a leak in the gas line connections may be indicated. Check all gas line connections (refer to **Checking the Cell and Expansion Chambers for Leaks**, page **9-7**).
	Pycnometer was left in manual mode with all the valves open or the fill valve open and chamber cap off.	Close all valves, then attach a new tank of helium.

Problem	Cause	Solution
Unit will not equilibrate, or results are not reproducible.	Sample outgassing.	Prior to analysis, remove moisture and contaminants from the sample. (Refer to **Preparing and Loading a Sample**, page **4-13**.)
	Pycnometer leaks.	Check cap O-ring for defects. Regrease or replace the O-ring, if necessary.
		Using the instrument schematic with Manual Mode enabled and with the cap installed, open all valves. With helium flowing through the pycnometer, open and close the expansion valve repeatedly for approximately one minute. This will remove lint, which may cause a leak, from the valve seat. Repeat the process for the vent valve with the inlet and expansion valves open.

Maintenance

Greasing the Chamber Cap O-ring

The cell chamber cap contains an O-ring that requires routine maintenance because it is so often exposed. The chamber cap O-ring should be greased at the beginning of each period of use.

1. Turn the chamber cap counterclockwise and lift it from the chamber.
2. Place the chamber cap on a clean surface, with the O-ring side exposed.
3. Place a small amount of Dow Corning High vacuum grease (or equivalent) on your index finger.
4. Move your index finger completely around the O-ring groove to distribute the grease.

5. Replace the chamber cap.

Replacing the Chamber Cap O-Ring.

Fine fibers and particles between the O-ring and its sealing surfaces can cause leaks, as can scratches or cuts in the O-ring or in the metal surfaces. When it is necessary to replace the o-ring, follow these steps.

1. Using a pointed tool, carefully remove the O-ring from its groove in the cap. A small niche is provided at the groove for placement of the tool.

Be careful not to scratch the metal surface of the chamber cap. Scratches could result in an imperfect seal.

2. Clean the groove in the chamber cap using a small brush or lint-free tissue moistened with isopropyl alcohol.

3. Allow the chamber cap to dry thoroughly.

4. Place a small amount of Dow Corning High vacuum grease (or equivalent) on your index finger. Touch your thumb with your index finger to place grease on both fingers.

Apply the grease sparingly; too much grease may alter cell volume, while too little grease results in an imperfect seal and leaks.

5. Grasp the O-ring with the two greased fingers.

6. With the other hand, pull the O-ring through the greased fingers until the entire O-ring is greased.

7. Place the O-ring back into the groove on the cap and, with the greased index finger, gently press it back into position. After the O-ring is fully seated, grease the groove with your index finger without applying additional grease.

8. Replace the chamber cap.

Cleaning the Pycnometer

The exterior casing of the pycnometer may be cleaned using a clean cloth, dampened with isopropyl alcohol (IPA), a mild detergent solution, or a 3% hydrogen peroxide solution.

Do not allow liquid to penetrate the casing of the pycnometer. Doing so could result in damage to the unit.

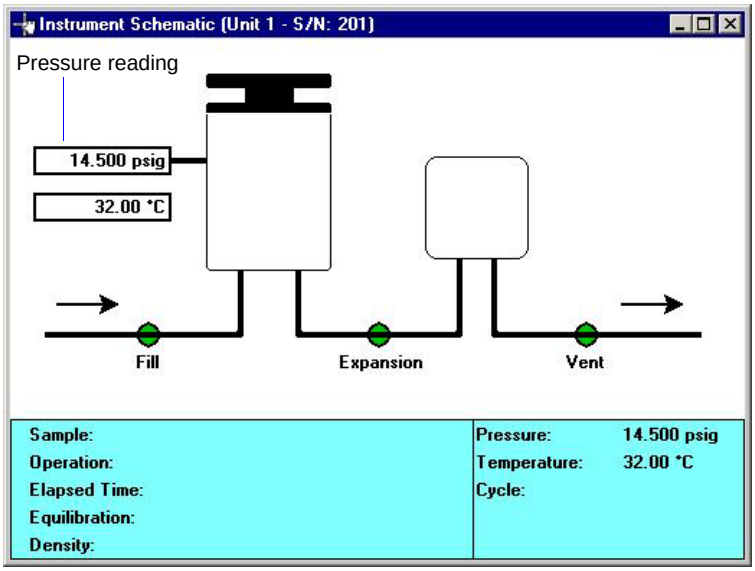
Checking the Cell and Expansion Chambers for Leaks

This procedure should be performed in a temperature-stable environment after the pycnometer has been warmed up for at least two hours. Before performing this procedure, check the chamber cap to ensure that it is not the source of leaks. It should be free from particles, the O-ring should be properly seated, and should not contain excessive grease.

1. Allow the pycnometer to equilibrate thermally in a room having a stable temperature.

2. Select **Unit > Show Instrument Schematic,** then **Unit > Enable Manual Control**; the instrument schematic is displayed.

Remember, the sample chamber displays on the right side if you have a 1-cm^3 unit.



3. If the system has been open, manually purge the system before proceeding as follows (double-click on the valve to change its state or right-click and choose the state):

   a. Open the Expansion valve and close the Vent valve. Valves display yellow when closed and green when open. The schematic shown above indicates that all valves are open.

   b. Open the Fill valve and fill the sample chamber to the desired pressure; the pressure is displayed to the left of the sample chamber.

   c. Close the Fill valve and open the Vent valve.

   d. Repeat steps (a) through (c) two or three times.

   e. Close the Expansion valve.

4. Open the Fill valve.

5. Fill the sample chamber to 19.5 psig (134.4 kPag).

6. Close the Fill valve.

7. Observe the pressure display. After an equilibration period (about 20 to 30 seconds), the pressure should not vary more than 0.005 psig/min (0.034 kPag/min).

   - If the pressure does not vary more than 0.005 psig/min (0.034 kPag/min), proceed to step 8.

   - If the pressure varies more than 0.005 psig/min (0.034 kPag/min), temperature instability or a leak may be indicated. Vent the system, then repeat steps 4 through 7 several times to verify that a leak is indicated. If a leak is indicated, call a Micromeritics Service Representative.

8. Close the Vent valve, then open the Expansion valve and the Fill valve.

9. Fill the chambers to 19.5 psig (134.4 kPag).

10. Close the Fill valve.

11. Observe the pressure display. After an equilibration period (about 20 to 30 seconds), the pressure should not vary more than 0.005 psig/min.

    If the pressure varies more than 0.005 psig/min (0.034 kPag/min), temperature instability or a leak may be indicated. Vent the system, then repeat steps 8 through 11 several times to verify that a leak is indicated. If a leak is indicated, call a Micromeritics Service Representative.

10. ORDERING INFORMATION

The AccuPyc 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 in this chapter to place your order:

Part Number	Item and Description
134-00000-00	AccuPyc II 1340, 10-cm^3 capacity
134-00001-00	AccuPyc II 1340, 1-cm^3 capacity
134-00002-00	AccuPyc II 1340, 100-cm^3 capacity
134-00010-00	AccuPyc II 1340TC, 10-cm^3 capacity
134-00020-00	AccuPyc II 1340TC, 100-cm^3 capacity
134-00030-00	AccuPyc II 1340 Glove Box, 10-cm^3 capacity
134-00031-00	AccuPyc II 1340 Glove Box, 1-cm^3 capacity
134-00032-00	AccuPyc II 1340 Glove Box, 100-cm^3 capacity
134-00033-00	AccuPyc II 1340 Glove Box, 350-cm^3 capacity
134-00005-20	Control Module, no sample compartment
134-00040-00	Analysis module, 10-cm^3 capacity
134-00041-00	Analysis module, 1-cm^3 capacity
134-00042-00	Analysis module, 100-cm^3 capacity
134-00043-00	Analysis module, 350-cm^3 capacity
134-00044-00	Analysis module, temperature control, 10-cm^3 capacity
134-00045-00	Analysis module, temperature control, 100-cm^3 capacity
133-25805-00	Sample cup, 10-cm^3 capacity
133-25805-02	Sample cup, 10-cm^3 capacity, stainless steel
133-25855-02	Sample cup, 1-cm^3 capacity
133-25845-00	Sample cup, 100-cm^3 capacity
133-25845-02	Sample cup, 350-cm^3 capacity

Part Number	Item and Description
133-25862-00	Filtered cup assembly, 10 cm^3; used to constrain powdered samples
133-25863-00	Filtered cup assembly, 100 cm^3; used to constrain powdered samples
004-25575-00	Chamber cap O-ring, 10 cm^3
004-25637-00	Chamber cap O-ring, 1 cm^3
004-25577-00	Chamber cap O-ring, 100 cm^3
004-25689-00	Chamber cap O-ring, 350 cm^3
133-34900-00	Calibration Standard Kit, 10-cm^3; contains two calibration standards and one sample cup
133-34901-00	Calibration Standard Kit, 1-cm^3; contains one calibration standard and one sample cup
133-34902-00	Calibration Standard Kit, 100-cm^3; contains one calibration standard and one 100-cm^3 sample cup
133-34903-00	Calibration Standard Kit, 350-cm^3; contains three calibration standards and one sample cup
004-25549-00	Reducer, 1/8-in. tube x 1/4-in. tube
004-62230-58	Gas regulator, 30 psig, CGA 580
290-25846-00	Gas inlet line assembly
008-16045-00	High Vacuum grease, Dow Corning
003-40054-00	AC/DC power supply, external
003-60101-00	Power cord
003-60101-05	Power cord, Schuko, for European countries
003-60623-01	Cable, 25 ft; for connecting Control module to Glove box unit
003-60623-00	Cable, 2 ft; for connecting analysis modules
003-63801-00	Ethernet cable, cross-over
133-33604-00	MultiVolume Kit, for 100-cm^3 pycnometer; includes 10- and 35-cm^3 inserts and appropriate sample cups
133-33605-00	MultiVolume Kit, for 10-cm^3 pycnometer; includes 1- and 3.5-cm^3 inserts and appropriate sample cups
134-33006-00	MultiVolume Kit, for 1-cm^3 pycnometer; includes a 0.1-cm^3 insert/ sample cup combination

Part Number	Item and Description
134-33020-00	Multigas Manifold; enables you to connect multiple gases to the analysis unit
134-42802-00	Operator's manual, for AccuPyc Windows
134-33004-00	Current version of AccuPyc Windows software and operator's manual
134-33005-00	FoamPyc option; includes software and operator's manual
134-34007-00	Power Adapter

A. ERROR MESSAGES

Error messages for the AccuPyc program are listed numerically. If the **Action** response instructs you to contact your service representative, record the error message and make backup copies of any files involved in the operation.

2200 and 2400 Series

2201- Cannot execute report subsystem.

Cause: Start Report failed to execute the report subsystem (which is a separate process).

Action: Restart the computer. If the problem persists, reinstall the application (this will not affect any of your sample files). If the problem continues, contact a Micromeritics service representative.

2401- FATAL ERROR: (error message).

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2430- Error accessing file (file name), error code = (number).

Cause A: A computer or network problem occurred.

Action A: Check the performance of your computer devices or network.

Cause B: A software error occurred when the file was accessed.

Action B: Contact your service representative.

2431- Error writing file (file name), error code = (number).

Cause: The hard disk does not have enough space left to perform the operation.

Action: Copy files not used regularly from the hard disk to a diskette, CD, or network directory, delete them from the hard disk, and then try the operation again.

2432- Invalid response from MMI 'FILE_READ' request.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2433- New entries have been found in this directory. Refresh the directory information?

Cause: Several files (sample information or parameter files) have been added to this directory by some function other than the AccuPyc program.

Action: Select **Yes** to update the directory information with data from each new file. This operation may take a minute.

Select **No** if you do not want to spend the time updating the directory information. This option may be feasible if a large number of files have been copied into the directory and you know the name of the file you wish to access.

2434- File (file name) — Subset # (number) wrote wrong amount of data.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2436- Path specification (path name) is invalid.

Cause: You entered an invalid path name and/or extension.

Action: Type a valid path name (including the proper extension) and press **Enter**.

2437- File (file name) does not exist.

Cause: You entered a file specification that does not exist.

Action: Enter an existing file specification or select a file name from the list box.

2439- Could not register file.
2440- Subset not found.
2441- Seek within file failed.
2442- Bad header in subset file.
2443- Subset owner denied access.
2444- Not a valid file format.
2445- Subset wrote the wrong amount of data.
2446- Error reading data.
2447- Error writing data.

Cause: An unexpected error occurred when you tried to access a data file.

Action: Contact your service representative.

2448- File directory (path name) is invalid. Resetting to the installation directory.

Cause: A working directory specified in the .INI file is invalid. The directory may have been deleted or moved to a different location.

Action: The installation directory will be substituted. The next time you open a file, use the **Directories** list to move to the correct directory.

2449- This field does not contain a valid file specification.

Cause: You entered an invalid file name.

Action: See the description of file naming conventions in your Windows manual and re-enter the name.

2450- Sample Defaults may not be edited while this operation is in progress. Do you wish to save and close the Sample Defaults edit session?

Cause: You are in the process of initiating an automatic analysis (an analysis in which sample files are created using the defaults) while editing the defaults.

Action: Finish your edit session of the defaults and close the dialog. Then restart the automatic analysis.

2452- Attempt to write MICATTR.DIR in read only mode. (file name)
2453- Attempt to append MICATTR.DIR in read only mode. (file name)

Cause: The Read-Only attribute is turned on in the application's MICATTR.DIR file (this file exists in each folder containing sample or parameter files).

Action: Use Windows Explorer to access the folder containing the MICATTR.DIR file and disable the Read-Only option.

2454- Too many selections for a print-to-file operation. Only the first (number) selections will be processed. Please reselect the remainder.

2455- Too many selections for an export-to-file operation. Only the first (number) selections will be processed. Please reselect the remainder.

Cause: You selected too many files for this operation.

Action: Select only the number of files specified in the message.

2456- Insufficient file handles available. Application cannot continue.

Cause: You have more than 50 files open at the same time.

Action: Refer to the manual for your operating system and set the limit for open files to 50 or greater.

2458- An instrument is performing a critical operation. Wait a few moments before exiting the application.

Cause: You attempted to exit the application while the analyzer is performing a critical operation. This operation must be completed before the application can be stopped.

Action: Wait a few minutes before attempting to exit the application again.

2459- An instrument is busy. A delay in restarting this application could result in loss of new data. Continue with program Exit?

Cause: You attempted to exit the application while the analyzer was performing an operation.

Action: Rather than exiting the application you may choose to minimize it.

2460- Fatal Communications error on (unit nn).

Cause: Repeated attempts to maintain communication with the analyzer have failed.

Action: Check the communications cable connecting the analyzer to the computer. Confirm that the analyzer is turned on and that the status light is not blinking.

If these checks are okay, exit the analysis program and then restart the application. If this error persists, contact your service representative.

2461- No instruments are in operation. This application will unconditionally terminate.

Cause: At least one analyzer must be active for the application to operate. The initialization of the analyzers configured with the Set Up program has failed. The application stops.

Action A: Usually this message is preceded by another message giving the reason for the analyzer's failure to initialize. See the instructions for that message.

Action B: Check the cable connection between the analyzer and the computer. Verify that the analyzer has the power switch in the ON position and that the light on the front panel is illuminated. If the application continues to fail in its attempts to initialize the analyzer, contact your service representative.

2477- (Unit n; Serial nn) did not properly initialize.

Cause: The software was unable to initialize the analyzer.

Action A: Run the Set Up program and ensure that a valid port is specified; if not, specify a valid one when prompted.

Action B: Reinstall the software, then restart application.

Action C: Contact your Micromeritics service representative if you continue to get this message.

2480- File (file name) cannot be analyzed. It is currently being edited.

Cause: You attempted an analysis using a sample file that is being edited.

Action: Save the changes and close the dialog box.

2481- Error accessing the sample information file (file name).

Cause A: You attempted to open a file that is already open, possibly minimized.

Action A: View the minimized icons, locate and maximize the file.

Cause B: A computer or network problem occurred.

Action B: Check the performance of your computer devices or network.

Cause C: A software error occurred when the file was accessed.

Action C: Contact your service representative.

2482- File cannot be opened for writing. It is already in use.

Cause: You are attempting to open a file that is currently being used (either by this application or another).

Action: Locate the application using the file (in the Micromeritics application, use the Windows menu item to get a list of all windows, one of which may contain this file).

2483- An analysis cannot be performed on (file name). It is open for editing and contains errors.

Cause: You attempted to use a sample file containing errors that is currently open.

Action: Go to the window containing the file, correct the errors, and save it.

2484- The edit session for (file name) must be saved before the analysis. Save changes and continue with the analysis.

Cause: You attempted an analysis using a sample file that contains unsaved changes.

Action: Select **Yes** to save the changes and continue with the analysis.

Select **No** to abort the analysis and return to the sample file.

2488- File (file name) cannot be opened for editing. It is already in use.

Cause: The file you specified is being used in another edit operation.

Action: Check the Windows list to locate the other edit session.

2489- File (file name) cannot be opened for writing. It is already in use.

Cause: The file you specified in a **Save As** operation is already open for edit.

Action: Select a different file for the **Save As** operation.

2490- No '.INI' file present. Application will terminate.

Cause: The ASCII (.INI) file containing initialization and system options information cannot be found. The .INI file may have become corrupted. The application cannot operate without this file.

Action: Use the Set Up CD to uninstall the AccuPyc program. When you uninstall the program, only application files are deleted; data files remain intact.

After the uninstall operation is complete, reinstall the program.

2492- This field's entry is invalid.

Cause: The highlighted field contains an invalid entry.

Action: Check the entry and correct the error.

2493- An entry is required for this field.

Cause: This field requires a valid entry for you to proceed.

Action: Enter or select an appropriate value.

2494- Value is out of the valid range.
2495- Value is out of the valid range. Enter a value between (value) and (value).

Cause: The value you entered in the highlighted field is outside the valid range of values.

Action: Check the entry and enter or select an appropriate value.

2496- Invalid number.

Cause: The number you entered in the highlighted field is invalid.

Action: Check the entry and enter or select a valid number.

2497- This field contains an invalid character.

Cause: You entered an invalid character in the highlighted field.

Action: Check the entry and enter valid characters.

2499- Sequence number must contain at least 3 digits.

Cause: You tried to enter a sequence number that did not contain at least three digits.

Action: Enter a sequence number that contains at least three digits.

2500 Series

2500- All sample file names that can be created using the sequence number pattern already exist. You may want to modify the next sequence number.

Cause: No more sample information files can be created using the currently entered file name sequence number.

Action: Select **Options** > **Sample Defaults** from the Main Menu and enter a new sequence number.

2502- Error writing to file (name) during print. Error code: (number).

Cause: An error occurred in the file being written to during a print operation.

Action: Ensure that there is sufficient space on the drive containing the file.

2504- Cannot create output file for sample (sample name).

Cause: Insufficient space may be available on the hard disk.

Action: Ensure that sufficient space is available. Contact your service representative if you continue to receive this error message.

2505- Error Logger cannot be initialized! Error code (number). Program will exit.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative.

2506- (sample file) Output device (name) is not installed. Printing cannot be accomplished.

Cause: The selected output device is not installed in Windows.

Action: Install the device using the **Control Panel** > **Printers** operation.

2508- (sample file) Overlay file (name) was not found. It will not be included in the reports.

Cause: The specified overlay file could not be found.

Action: Ensure that the file specified as an overlay does exist.

2509- (sample file) Error opening file (name): (error). Reports cannot be produced.

Cause: An error occurred while the program was opening a file necessary to the report operation.

Action: Use the name given in the error message to investigate. Contact your service representative if you continue to receive this error message.

2510- (sample file) Error parsing reports from file (name). Reports cannot be produced.

Cause A: One or more data entry fields in the sample file may contain an invalid character (such as a single quote or double quotes).

Action A: Review the data entry fields (for example, the Sample field) and remove the invalid character.

Cause B: The system was unable to create the usual temporary files during the report, possibly due to insufficient disk space.

Action B: Check the space available on the hard disk.

Cause C: An internal processing error occurred.

Action C: Contact your service representative.

2511- Print job (name) has been cancelled due to insufficient disk space. Delete unnecessary files and restart the report.

Cause: The disk drive does not have enough space for the temporary file required by the Windows Print Manager. Therefore, printing of the requested report has been canceled.

Action: Delete unnecessary files from the disk. You will require at least five megabytes of free space for normal operation.

2512- Print job (name) has been cancelled.

Cause: The requested print job was canceled at your request.

Action: None required.

2513- Unable to read the calibration file (file name).

Cause: You selected an invalid calibration file or one that cannot be read.

Action: Be sure the media containing the calibration file has no problems.

2514- Unable to write the calibration file (file name).

Cause: An attempt to Save calibration data has failed due to possible media problems.

Action A: Be sure the media you want to Save the file to has no problems.

Action B: Choose an alternate media to Save the calibration data.

2515- Warning: Changing the calibration information will affect the performance of the instrument. Only qualified service personnel should do this. Do you wish to proceed?

Cause: You have started the process of performing a calibration operation.

Action: Calibration operations should only be done by, or under the direction of, qualified service personnel.

2521- Unable to program controller.

Cause: A hardware malfunction has occurred.

Action: Contact your local Micromeritics service representative.

2522- Invalid controller application file.

Cause: The application's control file has been corrupted or deleted.

Action: Reinstall the analysis program.

2523- Programming the controller failed.
2524- CRC check failed on programming controller.
2525- Unknown error programming controller.
2526- Controller download was not successful.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2532- The instrument contains a different software version. Do you want to reset it?

Cause: The application has discovered a different version of software operating in the analyzer.

Action: If there are no analyzers other than the AccuPyc connected to the computer, select **Yes** and allow the updated software to load.

2533- Analyzer initialization failed.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2534- Error opening file (name) for printing. Error code: (number).

Cause: An error occurred in the selected file for print output.

Action: Ensure that sufficient space is available on the drive containing the file.

2547- The instrument is busy. Exiting the application will result in the termination of the analysis. Continue with program exit? (Yes, No)

Cause: You attempted to exit the application while an analysis is in progress.

Action: If you are not concerned with cancellation of the analysis, click **Yes** to continue the exit; otherwise select **No** and allow the analysis to finish.

2549- Error accessing online manual file (name).

Cause: You were unable to open the online manual.

Action: Exit the application and reinstall the software. The manual and/or reader may have been accidentally deleted. Reinstalling the software will reinstall the manual and reader.

6000 Series

6000- An error occurred while loading the application control information. Data entry cannot be performed.

Cause: The files necessary for the application to start could not be read.

Action: Exit the application and reinstall the software. If you continue to receive this message, contact your Micromeritics service representative.

6001- Unable to establish the TCP connection with the instrument.

Cause: A communications problem between the computer and the analyzer has occurred.

Action A: Check the cable connection between the computer and the analyzer.

Action B: Select **Unit [n] > Unit configuration** and verify that the TCP/IP configuration for the computer and the analyzer are correct.

Action C: Exit the application, and turn off the analyzer. Then turn on the analyzer and restart the application. If the problem persists, contact your local Micromeritics representative.

6002- Configured serial number does not match instrument.

Cause: You entered the incorrect serial number when you installed the software.

Action: Exit the application. Access the Set Up program and remove the incorrect analyzer. Then use the **Add an Analyzer** option on the Set Up program to add the correct one. Be sure to use the serial number on the controlling unit.

If you continue to receive this message, contact your Micromeritics service representative.

6003- The instrument Unit n S/N nnn is not calibrated.

Cause: Calibration data for the selected unit was not found.

Action: Select **Unit > Calibration**, and the appropriate item on the Calibration menu to perform a calibration, or load a saved calibration.

6100 Series

6111- File (file name) cannot be analyzed. It is currently being edited.

Cause: You selected a file that is still open in an editing window.

This message is an information-only message and displays when you click **No** to message 6114.

Action: Click **OK** to close the error message dialog. Then, (1) continue editing the file, save and close it; or (2) click **Browse** and choose a different file.

6112- File (file name) cannot be opened. It is currently being setup for an analysis.

Cause: You attempted to open and edit a file that is currently being used in an analysis.

Action: Select a different file.

6113- An analysis cannot be performed on (file name). It is open for editing and contains errors.

Cause: You attempted to start an analysis using a file that contains errors and is open for editing.

Action A: Finish editing the file, save, and close it, or choose a different file. Then restart the analysis.

6114- The edit session for (file name) must be saved before the analysis. Save changes and proceed with the analysis?

Cause: You attempted to start an analysis using a file that contains unsaved changes and is still open.

Action: Click **Yes** to save the changes and proceed with the analysis.

Click **No** to cancel the analysis and (1) continue editing the file, save and close it; or (2) click **Browse** and choose a different file.

6120- Unable to read the calibration file.

Cause: The calibration file selected for loading is not valid or cannot be read.

Action: Confirm the media containing the alleged calibration file has no problems.

6121- Unable to write the calibration file (file name).

Cause: An attempt to Save calibration data has failed due to possible media problems

Action A: Confirm the media containing the alleged calibration file has no problems.

Action B: Choose an alternate media to Save the calibration data.

6122- File contains calibration data for a different unit (S/N: nnn).

Cause: You loaded a calibration file that was created for a different unit.

Action: Load a file for the current unit, or select **Unit > Calibration** and the appropriate item on the Calibration menu to perform a calibration.

6123- File contains calibration data for a different unit (S/N: nnn).

Cause: You loaded a calibration file that was created for a different unit.

Action: Load a file for the current unit, or select **Unit > Calibration** and the appropriate item on the Calibration menu to perform a calibration.

6126- The cell and expansion volumes must be positive. Enter positive values and recalibrate.

Cause: According to the calibration data, the cell volume or expansion volume for the selected insert is zero or a negative value.

Action: Perform the following steps:

1. Select **Set Up > Calibration Data**.
2. In the **Cell volume** field, enter the volume of the sample cell (or insert).
3. In the **Expansion volume** field, enter half of the sample cell volume.
4. Perform a volume calibration.

6160- Device in recognizable state. Analysis canceled.

Cause: You exited the application during an analysis and when you restarted the application, the analysis had been canceled.

Action: None required. The data collected up to the point of cancellation will be saved in the sample file.

6161- The sample file (file name) is already present in the sequence.

Cause: You attempted to insert a file into the Sample File list that is already there.

Action: None required; the same file cannot be inserted multiple times in the list.

6162- The sequence list is full.

Cause: You attempted to add another file to the Sample File list for sequenced analyses, and the list already contains eight entries.

Action A: Run the sequence analysis with the current list and include the desired file in the next sequence analysis.

Action B: Remove one of the files from the list, then add the desired file.

6163- The sample file has an invalid status and cannot be used for analysis.

Cause: You selected a sample file with a status other than **No Analysis**.

Action: Select a sample file that has not been used in an analysis.

6164- FoamPyc analyses cannot be done on a 1cm^3 unit.

Cause: You attempted to perform an analysis on a 1-cm^3 unit using a sample file that had a FoamPyc method chosen as the type of analysis. FoamPyc analyses cannot be performed on the 1-cm^3 unit.

Action A: Click **Browse** and select a different sample file; one that has the **Standard Method** selected.

Action B: Close the analysis dialog, open the sample file, and select **Standard Method**. Then restart the analysis.

6165- Failure to fill sample cup.

Cause: There was insufficient pressure to allow filling within five minutes during an analysis.

Action: Increase the regulator pressure or, if there is insufficient helium in the tank, obtain a new tank of helium.

6166- Pressure overrange.

Cause A: A pressure overrange occurred during an analysis because the regulator pressure is set too high.

Action A: Adjust the pressure so that it is equal to the higher of the two fill pressures specified in the analysis parameters plus 2.0 psig.

Cause B: A pressure overrange occurred during an analysis because an error occurred in the pressure measurement electronics.

Action B: Call a Micromeritics Service Representative.

6167- Pressure underrange.

Cause: A pressure underrange occurred during an analysis because an error occurred in the pressure measurement electronics.

Action: Call a Micromeritics Service Representative.

6168- Pressure failed to equilibrate.

Cause A: The sample being analyzed failed to equilibrate in 1000 seconds.

Action A: Check the system carefully for leaks as described in **Checking the Cell and Expansion Chambers for Leaks** in Chapter 9. Make sure the sample is properly prepared before performing an analysis.

Cause B: Sample (foams, organics, etc.) absorbs helium slowly.

Action B: Set the equilibration rate to progressively higher values until reasonable equilibration times (15 sec to 120 sec) are achieved.

6169- The instrument lost power during analysis.

Cause: A power failure occurred and when power resumed, the automatic operation was canceled.

Action: Restart the automatic operation if desired.

6170- The measured volume is < 10% of the cell volume. Results may be inaccurate.

Cause: There was not enough sample placed in the sample cup to give an accurate reading.

Action: Rerun the sample using enough material to occupy the maximum amount of the nominal cell chamber volume.

6171- Valve failed to respond.

Cause: The instrument valves failed to operate.

Action: Contact your service represntative.

6172- The entered calibration volume is < 10% of the cell volume. The resulting calibration may be inaccurate.

Cause A: You entered a value for the calibration standard that was less than 10% of the nominal cell chamber volume. Resulting data may be inaccurate.

Action A: Be sure you enter the value recorded on the Calibration Standard case.

Cause B: You used an inappropriate calibration standard for the nominal cell chamber.

Action B: Use a calibration standard of sufficient size (calibration standards are available from Micromeritics). The calibration standard should occupy at least 10% of the nominal cell chamber volume and the more nearly filled the cell is, the better the calibration.

6200 Series

6200- At least one report item must be selected. Press Cancel if you do not want a report.

Cause: You failed to select reports in the **Selected Reports** list window. No output could be produced.

Action: Ensure that at least one report is selected for the sample and re-submit the sample for reporting, or click **Cancel**.

6201- No data available in (file name) for reporting.

Cause: You requested a report for a file that does not contain collected data.

Action: Use the file in an analysis before requesting reports.

6202- Total solids concentration is invalid; liquid density is greater than or equal to solids density.

Cause: You requested a report on a file containing invalid densities for Total Solids Concentration.

Action A: Specify appropriate densities for liquid and solids.

Action B: Do not request that total solids concentration be reported.

B. CALCULATIONS

This appendix contains the calculations used in reports available in the AccuPyc program.

Calibration

Volume calibration uses the ultraprecise method of separate adjustments for the offset and scale factor.

Volume Offset

$$V_{cel} = V_{celprev} - V_{sampempty}$$

$-V_{sampempty}$ is reported as the offset in volume calibration reports.

Volume scale

$$V_{cel} = V_{celprev}\left(\frac{V_{calib}}{V_{sampball}}\right)$$

$$V_{exp} = V_{expprev}\left(\frac{V_{calib}}{V_{sampball}}\right)$$

$\left(\frac{V_{calib}}{V_{sampball}}\right)$ is reported as the scale factor in volume calibration reports.

where

V_{cel} = sample chamber volume
$V_{celprev}$ = previously stored cell volume
$V_{sampempty}$ = average V_{samp} from volume offset calibration analysis (no calibration ball)
V_{calib} = calibration ball volume
$V_{sampball}$ = average V_{samp} from volume scale calibration analysis (with calibration ball)
V_{exp} = expansion chamber volume
$V_{expprev}$ = previously stored expansion volume

Analysis

10-, 100-, and 350-cm³ Units

$$V_{samp} = V_{cel} - \frac{V_{exp}}{\frac{P_1}{P_2} - 1}$$

$$D_{samp} = \frac{M_{samp}}{V_{samp}}$$

1-cm³ Units

$$V_{samp} = V_{cel} - V_{exp} \times \left(\frac{P_1}{P_2} - 1\right)$$

$$D_{samp} = \frac{M_{samp}}{V_{samp}}$$

where

V_{cel}	=	sample chamber volume
V_{exp}	=	expansion chamber volume
V_{samp}	=	sample volume
M_{samp}	=	sample mass
D_{samp}	=	sample density
P_1	=	gauge pressure after fill
P_2	=	gauge pressure after expansion

Run Precision

Run precision requires at least five runs. Run precision criterion is met when the sample volumes calculated for the four most recent previous runs fall within the specified error band for the current run's sample volume. The error band is a specified percentage of the nominal volume of the sample chamber (1, 10, 100, or 350 cm^3).

$V_{samp}[0]$ to $V_{samp}[4]$ are the five most recent sample volumes, $V_{samp}[4]$ being the most recent.

$$\text{ErrBand} = PctFullScale \times \frac{V_{nominal}}{100}$$

where

$V_{nominal}$ = nominal sample cell volume

If $(|V_{samp}[i] - V_{samp}[4]| \leq \text{ErrBand})$ for i = 0 to 3, run precision is achieved.

Total Pore Volume

$$\text{TotalPoreVol} = \frac{D_{samp} - D_{bulk}}{D_{samp} \times D_{bulk}}$$

where

D_{bulk} = entered bulk density

Total Solids Concentration

$$\text{WeightPctSolids} = 1 - \frac{D_{liq}}{D_{samp}} \times \frac{D_{sol}}{D_{sol} - D_{liq}} \times 100$$

where

D_{liq} = entered liquid density
D_{sol} = entered solid density

SPC Report Variables

Regression Chart

The line of best fit for the Regression Chart is calculated by the usual least squares method. If there is only a single point, or all N points have the same x-value, there can be no line of best fit in the standard form.

$$XAve = \frac{\sum x_i}{N}$$

$$YAve = \frac{\sum y_i}{N}$$

$$Slope = \frac{\sum (x_i - XAve)(y_i - YAve)}{\sum (x_i - XAve)^2}$$

$$YIntercept = YAve - \text{Slope} \cdot \text{XAve}$$

The coefficient of correlation for this line also is calculated in the usual way*.

$$\sigma_x = \sqrt{\frac{\sum (x_i - XAve)^2}{N}}$$

$$\sigma_y = \sqrt{\frac{\sum (y_i - YAve)^2}{N}}$$

$$\text{Cov (x,y)} = \frac{\sum (x_i - XAve)(y_i AVe)}{N}$$

$$\text{CorrelationCoef} = \frac{Cov(x, y)}{\sigma_x \sigma_y}$$

*Mathematical Handbook for Scientists and Engineers, G.A., Korn and T.M. Korn, McGraw Hill, Sec. 18.4 (1968).

Control Chart

$$Mean = \frac{\Sigma y_i}{N}$$

$$StdDev = \sqrt{\frac{\Sigma (y_i - Mean)^2}{N-1}}$$

$$CoefVar = \frac{StdDev}{Mean}$$

$$PlusNSig = Mean + n \cdot STdDev$$

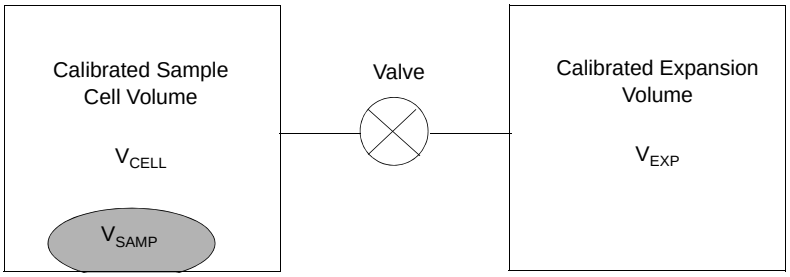
$$MinusNSig = Mean - n \cdot StdDev$$

C. THEORY

This appendix provides theoretical information on the analysis function for the AccuPyc.

10-, 100-, and 350-cm³ Units

The AccuPyc is a gas displacement pycnometer which measures the volume of solid objects of irregular or regular shape whether powdered or in one piece. A greatly simplified diagram of the instrument is shown below.



Assume that both V_{CELL} and V_{EXP} are at ambient pressure P_a, are at ambient temperature T_a, and that the valve is then closed. V_{CELL} is then charged to an elevated pressure P_1. The mass balance equation across the sample cell, V_{CELL}, is

$$P_1 (V_{CELL} - V_{SAMP}) = n_C R T_a \quad (1)$$

where

n_C = the number of moles of gas in the sample cell
R = the gas constant
T_a = the ambient temperature

The mass equation for the expansion volume is

$$P_a V_{EXP} = n_E R T_a \quad (2)$$

where

P_a = ambient pressure
n_E = the number of moles of gas in the expansion volume

When the valve is opened, the pressure falls to an intermediate value, P_2, and the mass balance equation becomes

$$P_2 (V_{CELL} - V_{SAMP} + V_{EXP}) = n_c R T_a + n_E R T_a \quad (3)$$

Substituting from equations (1) and (2) into (3):

$$P_2\ (V_{CELL} - V_{SAMP} + V_{EXP}) = P_1\ (V_{CELL} - V_{SAMP}) + P_a V_{EXP} \quad (4)$$

or

$$(P_2 - P_1)(V_{CELL} - V_{SAMP}) = (P_a - P_2)V_{EXP} \quad (5)$$

then

$$V_{CELL} - V_{SAMP} = \frac{P_a - P_2}{P_2 - P_1}\ V_{EXP} \quad (6)$$

Adding and subtracting P_a in the denominator and rearranging gives

$$-V_{SAMP} = -V_{CELL} + \frac{P_a - P_2}{P_2 - P_a - P_1 + P_a}\ V_{EXP} \quad (7)$$

Dividing by (P_a - P_2) in both the numerator and denominator

$$V_{SAMP} = V_{CELL} - \frac{V_{EXP}}{-1 - \left(\frac{P_1 - P_a}{P_a - P_2}\right)} \quad (8)$$

or

$$V_{SAMP} = V_{CELL} - \frac{V_{EXP}}{\left(\frac{P_1 - P_a}{P_2 - P_a}\right) - 1} \quad (9)$$

Since P_1, P_2, and P_a are expressed in equations (1) through (9) as absolute pressures and equation (9) is arranged so that P_a is subtracted from both P_1 and P_2 before use, new P_{1g} and P_{2g} may be redefined as gauge pressures

$$P_{1g} = P_1 - P_a \quad (10)$$

$$P_{2g} = P_2 - P_a \quad (11)$$

and equation (9) rewritten as

$$V_{SAMP} = V_{CELL} - \frac{V_{EXP}}{\frac{P_{1g}}{P_{2g}} - 1} \quad (12)$$

Equation (12) then becomes the working equation for the pycnometer. Calibration procedures are provided to determine V_{CELL} and V_{EXP} and the pressures are measured by a gauge pressure transducer. Provisions are made for conveniently charging and discharging gases at controlled rates, for optimizing the relative sizes of the sample chambers and expansion volumes, and for cleansing the samples of vapors.

1-cm³ Unit

The 1-cm³ pycnometer operates by filling the expansion chamber while the sample cell remains at ambient pressure. After P_1 is equilibrated, the expansion valve opens to allow gas to expand into the sample chamber and P_2 is equilibrated.

For the 1-cm³ pycnometer, equation (1) becomes

$$P_1 V_{EXP} = n_E R T_a$$

and equation (2) becomes

$$P_a(V_{CELL} - V_{SAMP}) = n_C R T_a$$

A derivation similar to that above yields the working equation for the 1-cm³ pycnometer.

$$V_{SAMP} = V_{CELL} - V_{EXP}\left(\frac{P_{1g}}{P_{2g}} - 1\right)$$

D. ETHERNET PORT CONFIGURATION

Your computer and analyzer communicate by means of an ethernet connection. This appendix contains instructions for ensuring that the ethernet connection operates properly.

The sample screens shown in this appendix are Microsoft operating system screens, which may be subject to change. The screens are included for reference purposes only.

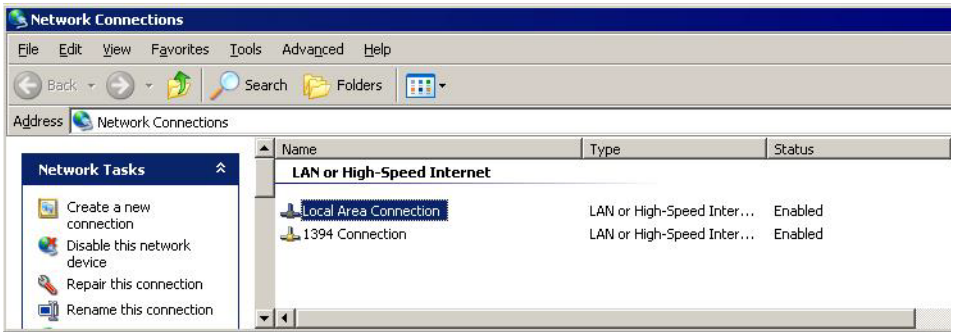
Configuring the Ethernet Port

This section contains instructions for configuring an ethernet port in either Microsoft® Windows XP Professional or Windows Vista. The instructions do not apply to any other operating system.

Depending on your desktop settings, you may have to access the dialogs in this procedure in a different manner. Refer to your Windows help system if you need assistance.

Windows XP Professional

1. Select **Start > Settings > Network Connections** from the Status bar at the bottom of the screen; the Network Connections dialog is displayed.

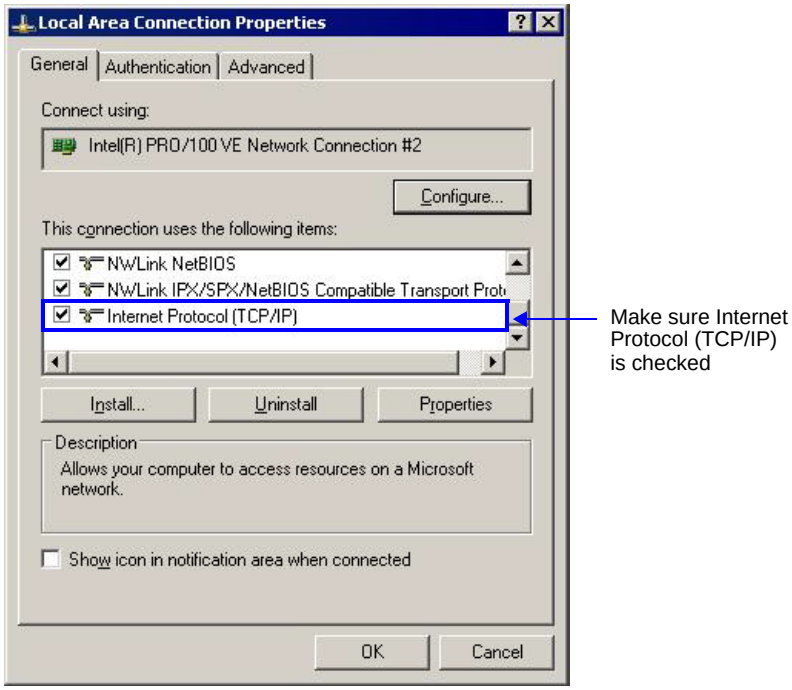


2. Double-click the appropriate Local Area Connection, which is actually the ethernet port; the Local Area Connection Status dialog is displayed.

If no Local area connections are displayed, Windows did not detect an ethernet port. Contact your system administrator.

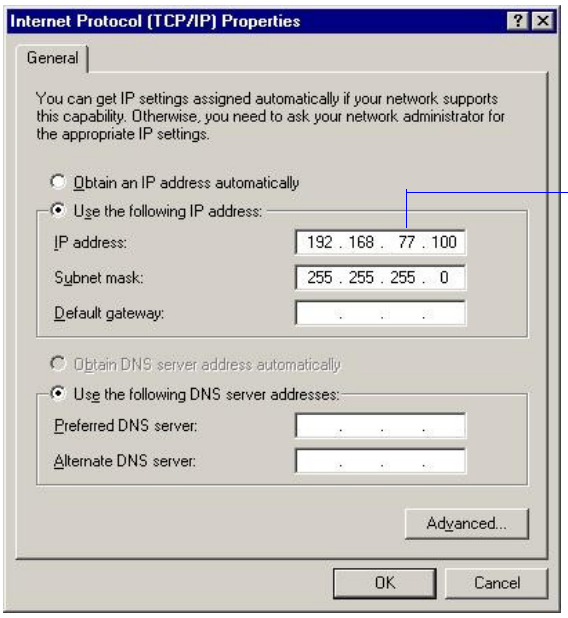
3. Click **Properties**; the Local Area Connection Properties dialog is displayed.

4. Scroll to **Internet Protocol (TCP/IP)** and make sure a check mark appears in the box to the left of the item. If it does not, click on the box to insert a check mark.



5. Select **Internet Protocol (TCP/IP)** to highlight it, then click **Properties**; the Internet Protocol dialog is displayed.

6. Click **Use the following IP address**, then enter the following in the **IP address** fields: **192 168 77 100**.



7. The following numbers should display in the **Subnet mask** field: **255.255.255.0.** If these numbers are not displayed, enter them.

8. Leave all other fields in the dialog blank.

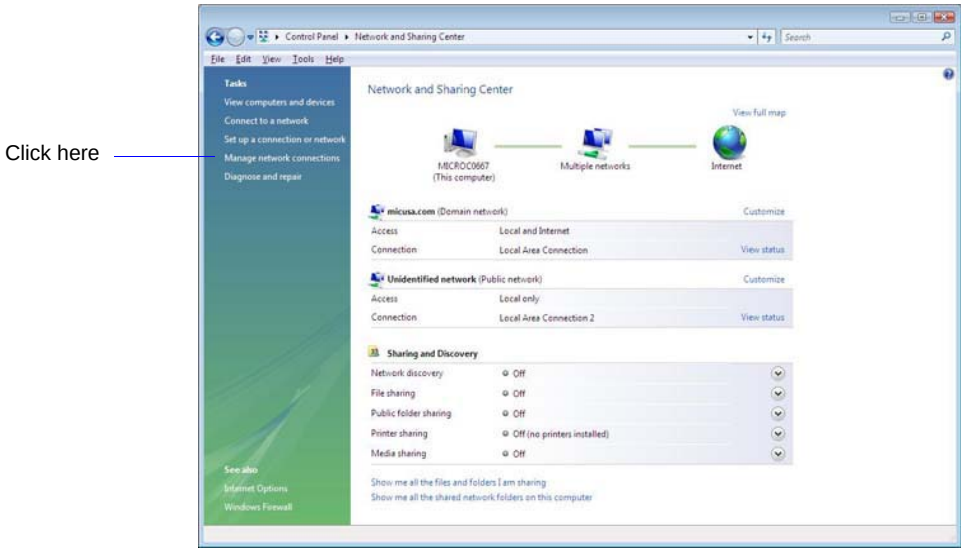
9. Click **OK** to return to the Local Area Connection Properties dialog, then **OK** on this dialog to return to the Local Area Connection Status dialog.

10. Click **Close** to close the Local Area Connection Status dialog.

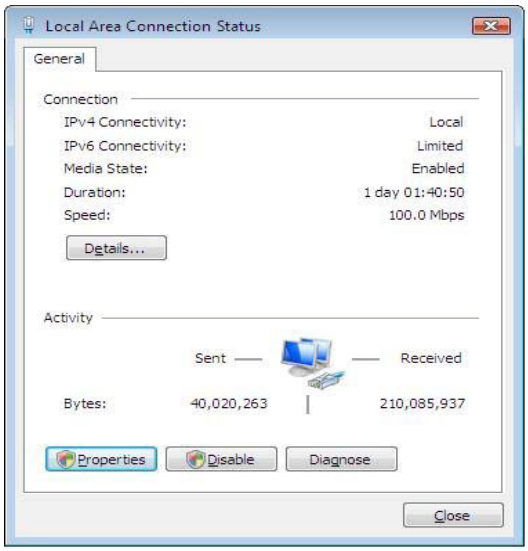
Windows Vista

Depending on your desktop settings, you may have to access the dialogs in this procedure in a different manner. Refer to your Windows help system if you need assistance.

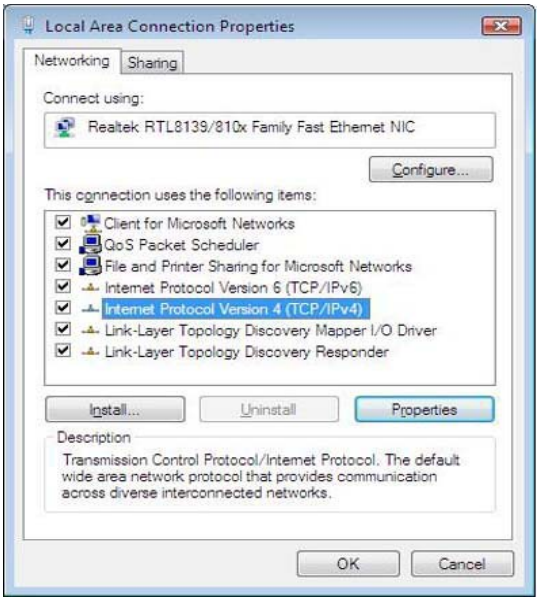
1. Select the **Windows icon** from the Status bar at the bottom of the screen, then select **Control Panel**.
2. Double-click on **Network and Sharing Center**; a dialog similar to this one is displayed.



3. Click **Manage network connection** from the **Tasks** list on the left side of the window, then click **Local Area Connection** for your analyzer on the dialog that displays. You should see a dialog similar to this one.

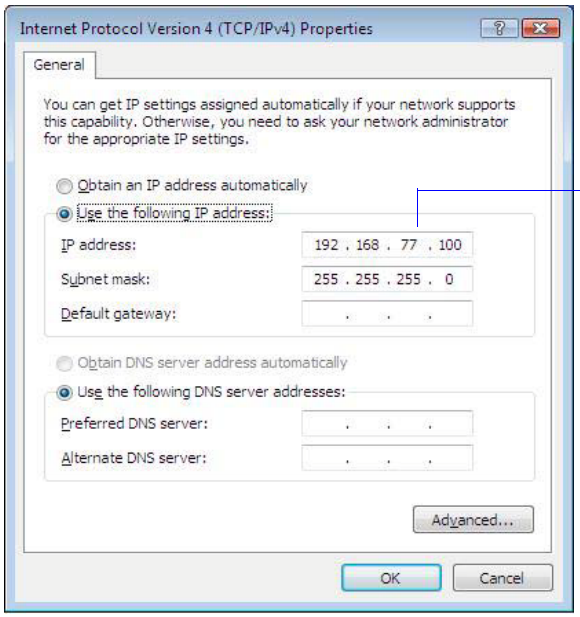


4. Click **Properties**; the Local Area Connection Properties dialog is displayed.



5. Highlight **Internet Protocol Version 4**, then click **Properties**; the Internet Protocol Version 4 Properties dialog is displayed.

6. Click **Use the following IP address**, then enter the following in the **IP address** field: **192 168 77 100**. Use the right arrow key to advance to the fourth field.



7. The following numbers should display in the **Subnet mask** field: **255.255.255.0.** If these numbers are not displayed, enter them.

8. Leave all other fields in the dialog blank.

9. Click **OK** to close the Internet Protocol Version 4 dialog.

10. Then click **OK** or the **X** in the upper right-hand corner of the remaining dialogs and windows to close them.

Configuring the Firewall Setting

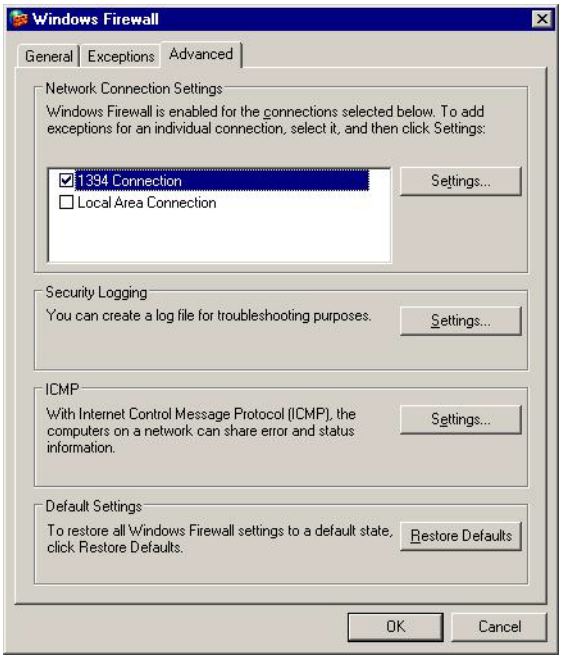
An ethernet firewall typically is enabled by default for the Windows XP and Windows Vista operating systems. Windows operating systems prior to these versions did not have firewalls. To prevent an initialization failure when running the Micromeritics software, you must turn off the firewall option between your computer and the analyzer. You must also do this for any third-party firewalls you may have installed (refer to the firewall software manual or contact your system administrator for instructions).

Depending on your desktop settings, you may have to access the dialogs in this procedure in a different manner. Refer to your Windows help system if you need assistance.

Windows XP Professional

Perform the following steps to disable the ethernet firewall for the instrument connection:

1. Select **Start > Settings > Control Panel** from the **Status** bar at the bottom of the screen; the Control Panel window is displayed.
2. Double-click the **Windows Firewall** icon; the Windows Firewall dialog is displayed.
3. Click the **Advanced** tab; a list of network connections is displayed.

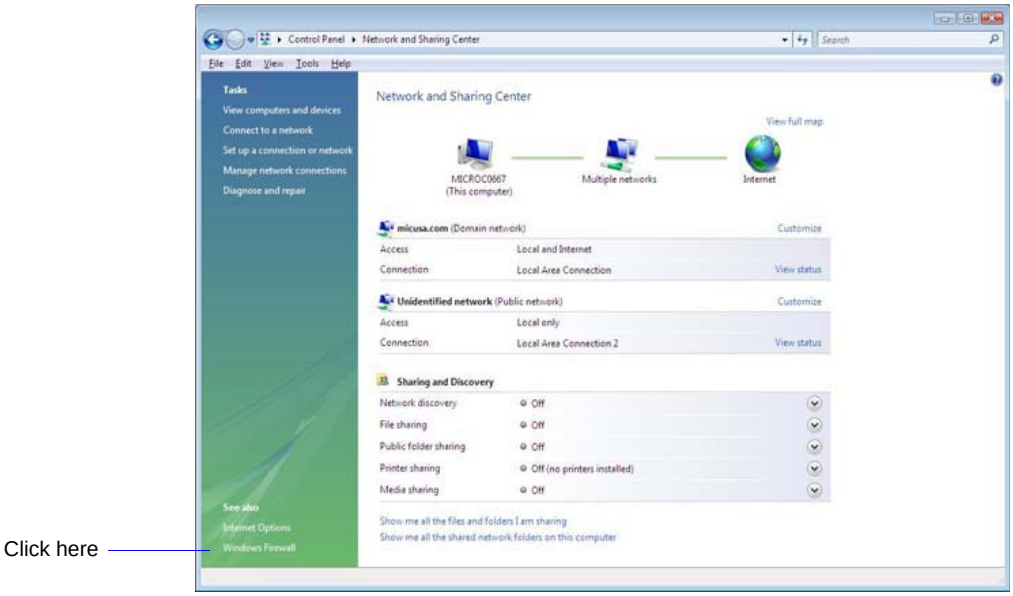


4. Click the check box next to the connection assigned to your analyzer to clear the check mark, then click **OK**.

Windows Vista

1. Select the **Windows** icon from the **Status** bar at the bottom of the screen, then select **Control Panel**.

2. Double-click on **Network and Sharing Center**.

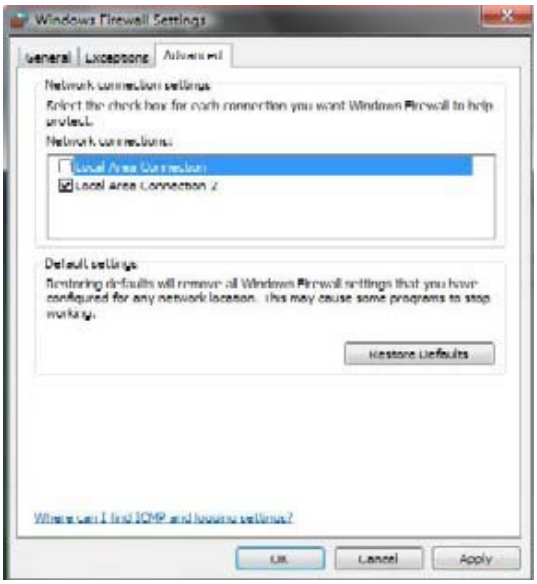


3. Double-click **Windows Firewall**; the Windows Firewall dialog is displayed.

Note that the **Windows Firewall** statement is highlighted with green, indicating the Firewall is turned on.

4. Click **Change Settings**; a dialog requesting permission to continue is displayed. Click **Continue**; the Windows Firewall Settings dialog is displayed.

5. Click the **Advanced** tab, then **OK**; a list of network connections is displayed.



6. Click the check box next to the connection assigned to your analyzer to clear the check mark, then click **Apply.** Click **OK** to close the dialog.

7. Click the **X** in the upper right-hand corner of the remaining associated windows to close them.

E. MULTIPLE ANALYSIS MODULES

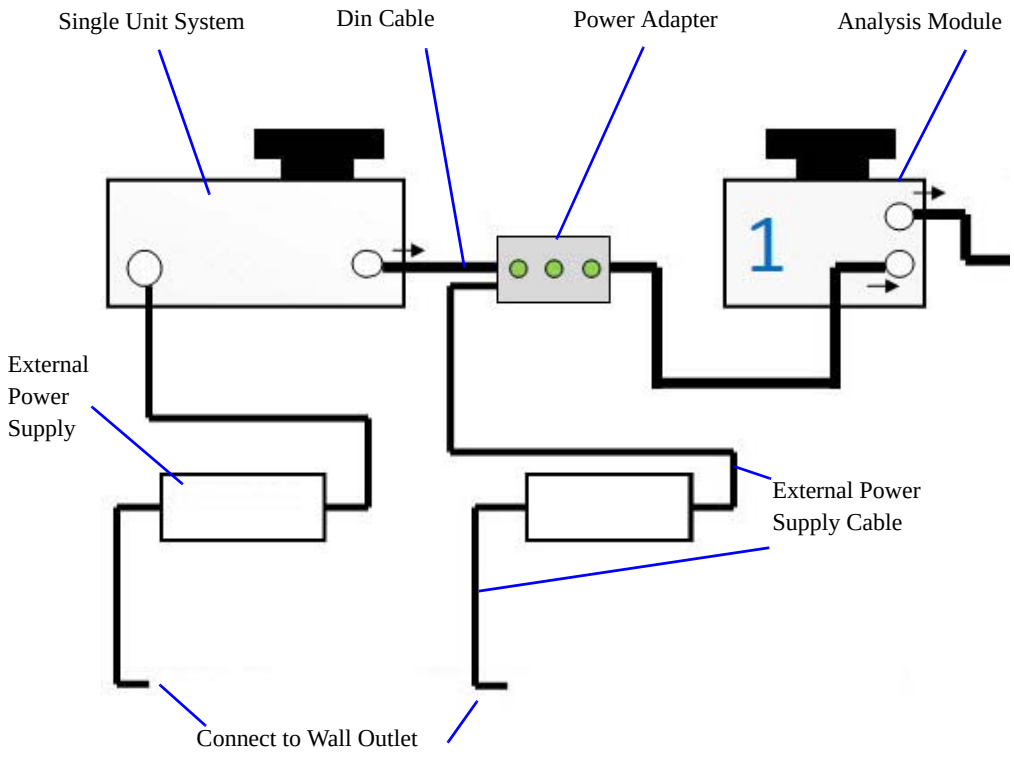
This Appendix provides information on attaching multiple analysis modules to a control module. You can have up to six analysis modules for one control module. In most cases, a control module also contains an analysis module in a single unit. Some systems are available only as a control module and analysis module (two units); for example, the 350-cm^3 system and the Glove Box system.

Connecting Modules to a Single Unit System

Additional analysis modules enable you to increase productivity and/or provide means for analyzing different size samples concurrently. For example, you may wish to attach an additional 10-cm^3 analysis module to an existing 10-cm^3 system, or a 100-cm^3 analysis module to an existing 10-cm^3 system.

To attach an additional analysis module to an existing single-unit system (controller and analysis modules combined):

Attach an Analysis module to a Control module as follows:



1. Place the On/Off switch on the rear panel of the analyzer in the Off (O) position.

If you have the Windows version of the AccuPyc, exit the application before turning off the analyzer.

2. Connect one external power supply cable to the back of the single unit system and another external power supply cable to each power adapter to be used to connect the analysis modules.

3. Connect a power cable to each external power supply.

4. Attach one end of the din cable (provided in the analysis module accessories kit) to the connector labeled **Module Connection** on the rear panel of the single-unit system.

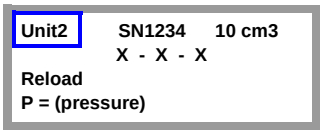
5. Attach the other end of the din cable to the separate power adapter.

6. Attach the hardwired power adapter cable to the lower connector labeled **Module Connection** on the rear panel of the analysis module. Be sure to use the lower connector on the analysis module; the upper connector is for attaching another analysis module.

7. Plug the external power supply cables into electrical wall outlets.

8. Place the On/Off switch on the rear panel of the analyzer in the On (|) position.

9. Press **Alt + CHOICE + 2** to access the second Analysis module; **Unit2** should display in the upper left corner of the display:



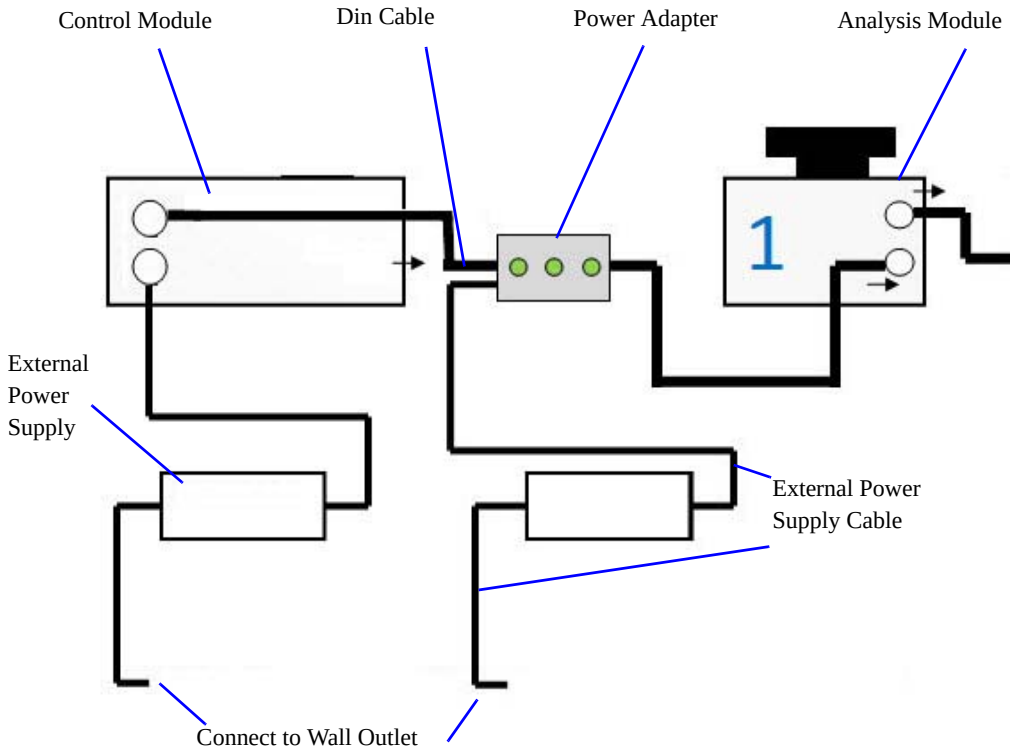
If you have the Windows version of the AccuPyc, Unit menus are added to the menu bar for each analysis module you attach.

10. Calibrate the Analysis module using the Calibration Kit shipped with the module. Refer to **Calibrating the Pycnometer** in Chapter 2 for step-by-step instructions.

Connecting One or More Analysis Modules to a Controller

Some models of the AccuPyc require a Control module and an Analysis module as separate units. For example, the Glove box system and the 350-cm^3 system. A Control module contains a keypad and a display, but does not contain a sample compartment.

Attach an Analysis module to a Control module as follows:



1. Place the On/Off switch on the rear panel of the analyzer in the Off (O) position.

If you have the Windows version of the AccuPyc, exit the application before turning off the analyzer.

2. Locate the power adapter (in the analysis module kit) and connect external power supply cable to each power adapter to be used to connect the analysis modules below the din connector on the power adapter.

3. Connect a power cable to each external power supply.

4. Attach one end of the din cable (provided in the control module accessories kit) to the connector labeled **Module Connection** on the rear panel of the single-unit system.

5. Attach the other end of the din cable to the separate power adapter.

6. Attach the hardwired power adapter cable to the lower connector labeled **Module Connection** on the rear panel of the analysis module. Be sure to use the lower connector on the analysis module; the upper connector is for attaching another analysis module.

7. Plug the external power supply cables into electrical wall outlets.

8. Place the On/Off switch on the rear panel of the analyzer in the On (|) position.

9. Calibrate the Analysis module using the Calibration Kit shipped with your system. Refer to **Calibrating the Pycnometer** in Chapter 2 for step-by-step instructions.

F. TEMPERATURE-CONTROLLED ACCUPYC

If you have a temperature-controlled AccuPyc, you must attach a circulating bath (not provided by Micromeritics). This appendix provides information on attaching the bath, but it does not provide operating instructions for the bath (refer to the manufacturer's operator's manual for operating instructions). Basic operating instructions are the same for the temperature-controlled AccuPyc as for other AccuPycs.

Attaching a Circulating Bath

The rear panel of the temperature-controlled AccuPyc contains connections for a circulating bath; all other connections are common to all AccuPycs.

1. Be sure the controlling unit is turned off.

2. Remove the plugs from the ports labeled with arrows; the left port is the "In" port and the right one is the "Out" port.

3. Insert a hose fitting (provided in the accessory kit) into each connector.

4. Cut the piece of 4-ft. tubing (also included in the accessory kit) into two equal pieces; 2 ft each.

5. Install the tubing on the In and Out connectors.

6. Install the other end of the Out tubing to the "Inlet" connection of the bath circulator.

7. Install the other end of the In tubing to the "Outlet" connection of the bath circulator.

8. Set the temperature using the appropriate controls on the bath circulator. Refer to the manufacturer's manual for operating instructions.

9. Return to the appropriate section in the operator's manual to continue installation.

Adding an Analysis Module

Use these instructions when adding an Analysis module to an existing Temperature-controlled unit.

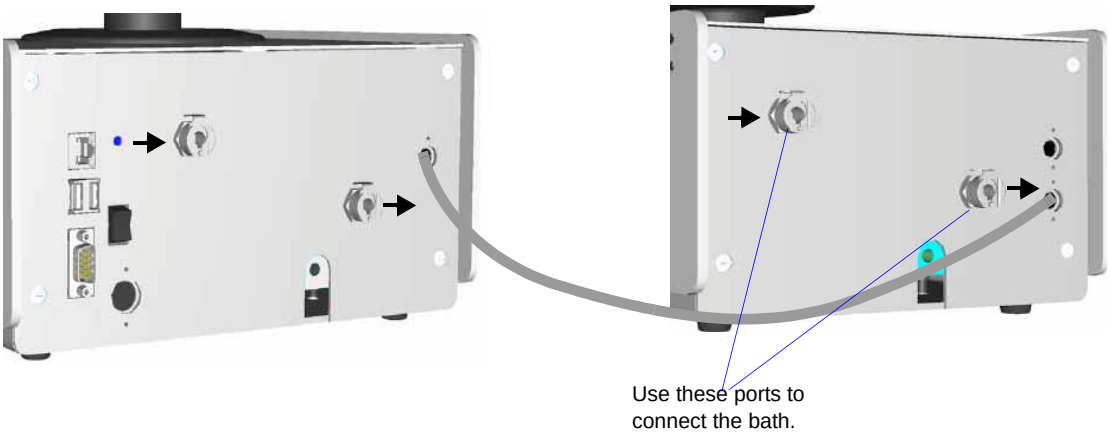
1. Be sure the controlling unit is turned off.

If you have the Windows version of the AccuPyc, exit the application before turning off the analyzer.

2. Connect the circulating bath as instructed in the previous section.

3. Attach one end of the module connector cable (provided in the analysis module accessories kit) to the connector labeled **Module Connection** on the rear panel of the single-unit system.

4. Attach the other end of the module connector cable to the lower connector labeled Module Connector on the rear panel of the analysis module



Be sure to use the lower connector on the analysis module; the upper connector is for attaching another analysis module.

5. Place the On/Off switch on the rear panel of the analyzer in the On (|) position.

6. Calibrate the Analysis module using the Calibration Kit shipped with your system. Refer to **Calibrating the Pycnometer** in Chapter 2 for step-by-step instructions.

G. MULTIVOLUME INSERTS

The MultiVolume Insert option enables you to analyze samples using smaller-sized sample chambers with your AccuPyc. MultiVolume Inserts are available as follows:

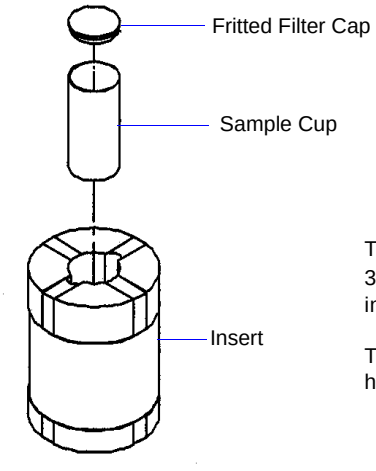
- **AccuPyc 100-cm^3 capacity**; includes 10- and 35-cm^3 inserts with corresponding sample cups and appropriate calibration standards. A fritted filter lid, which prevents the escape of sample particles under rapid gas flow, is included for the 10-cm^3 insert.
- **AccuPyc 10-cm^3 capacity**; includes 1- and 3.5-cm^3 inserts with corresponding sample cups and appropriate calibration standards. Fritted filter lids are included for both inserts.
- **AccuPyc 1-cm^3 capacity**; includes a 0.1-cm^3 insert/sample cup combination.

Refer to **Ordering Information**, page **10-1** for the appropriate part number and ordering information.

Installing and Removing Inserts and Sample Cups

Wear latex gloves when handling inserts and sample cups. Oils from your skin may contaminate the surface and affect analysis results. Refer to Handling System Components, page 2-8 for recommendations on handling system components.

An insert changes the size of the sample chamber and, therefore, requires its own sample cup. All inserts are shipped with appropriate cups, with the exception of the 0.1-cm^3 insert for the 1-cm^3 unit. Because of its size, the sample cup for the 0.1-cm^3 insert is built-in. The appearance of the inserts and cups varies; this example shows a 10-cm^3 cup and insert.



The fritted filter caps for the 1- and 3.5-cm^3 inserts fit on top of the insert.

The cap for the 10-cm^3 insert (shown here) fits on the sample cup.

10-, 3.5-, and 35-cm³ Inserts

Simply remove the chamber cap and place the insert into the sample chamber. The insert should fit snugly in the chamber. Place the appropriate sample cup into the well of the insert.

Do not force the insert or cup into the openings; the instrument, insert, or cup may be damaged.

Be sure to install the fritted filter cap (if used) before closing the sample chamber. A fritted filter cap is used to constrict gas flow, and is included with some inserts. The fritted filter cap for the 10-cm³ insert fits on the top of the sample cup. The fritted filter caps for the 1- and 3.5-cm³ inserts fit on the top of the insert. Fritted filter caps are not available for the 0.1- and 35-cm³ inserts.

1- and 0.1-cm³ Inserts

Special tools are required for installing the 1- and 0.1-cm³ inserts; these tools are included in the appropriate MultiVolume kits.

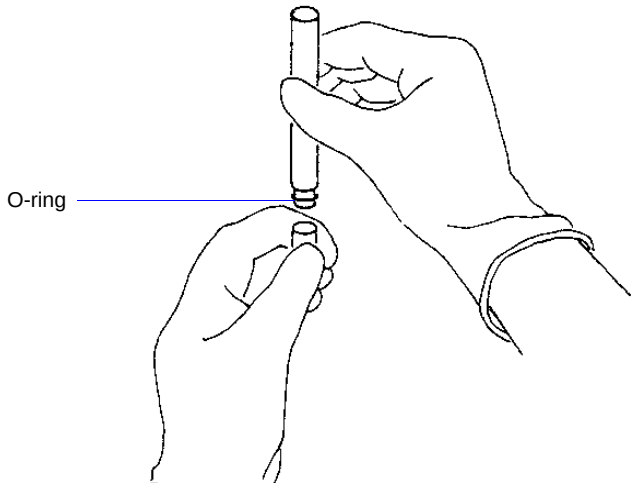
1-cm³ Inserts

Perform the following steps to install the 1-cm³ insert and sample cup:

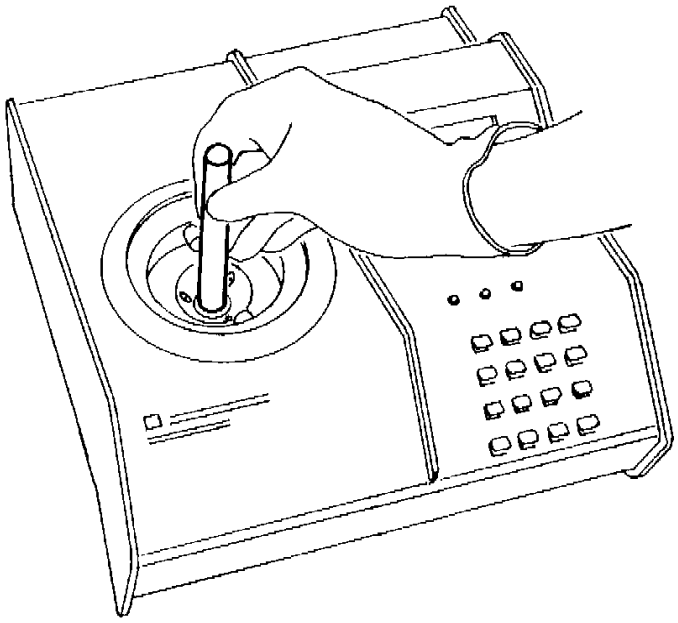
1. Remove the sample chamber cap and place on a clean work surface with the greased side facing upward. The cell chamber cap should be left off the sample chamber a minimal amount of time to prevent contamination from airborne particles.

2. Place the insert into the sample chamber.

3. Use the handling tool to grasp the cup for placement in the insert. After placing the sample into the sample cup, insert the tip of the tool into the cup and press down firmly. The handling tool features an O-ring to grip the inside surface of the sample cup.



4. Place the cup into the insert, then tilt the tool to one side to remove it from the sample cup.



5. If using a fritted filter cap, place it onto the top of the insert.

6. Replace the sample chamber cap.

After the operation is complete, perform the following steps to remove the sample cup and insert:

1. Remove the sample chamber cap and place on a clean work surface with the greased side facing upward.

2. Remove the fritted filter cap (if used).

3. Insert the handling tool into the sample cup so that it is gripped by the O-ring.

4. Lift the sample cup out of the insert.

5. Use your fingers to pull the insert from the sample chamber.

6. Replace the sample chamber cap.

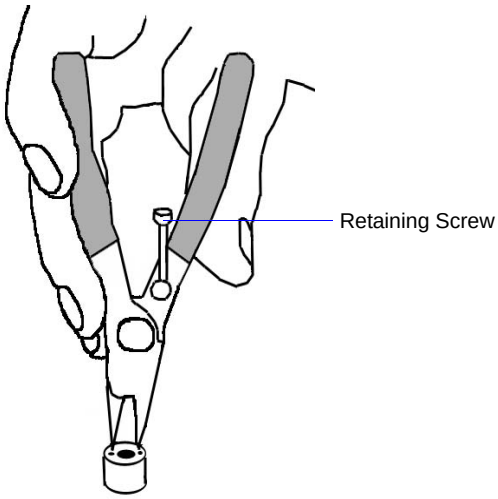
0.1-cm³ Insert

The 0.1-cm³ insert does not have a separate sample cup. Because of its size, the sample cup is built into the insert.

Perform the following steps to install and remove the 0.1-cm³ insert/sample cup:

1. Remove the sample chamber cap and place on a clean work surface with the greased side facing upward. The cell chamber cap should be left off the sample chamber a minimal amount of time to prevent contamination from airborne particles.

2. Insert the tips of the pliers into the two small holes on the upper surface of the insert.



The pliers feature a retaining screw, allowing you to lock the pliers into the proper position after they have been inserted into the holes. This also makes removing the insert easier.

3. Be sure the pliers are securely inserted, then carefully lift the cup and place it into the sample chamber.

4. Replace the chamber cap.

Remove the insert/sample cup:

1. Remove the sample chamber cap and place on a clean work surface with the greased side facing upward.

2. Insert the pliers into the holes on the upper surface of the insert, then carefully lift the cup from the sample chamber.

3. Replace the chamber cap.

Calibrating Inserts

An insert must be calibrated and its operation verified since it essentially becomes a different size sample chamber. Appropriate calibration standards are included in the MultiVolume kits. For example, if you have a 100-cm^3 capacity AccuPyc and plan to use a 10-cm^3 insert, then you must calibrate the sample chamber with the 10-cm^3 insert, cup, and calibration standards.

1-, 10, 3.5- and 3.5-cm^3 Inserts

These inserts are calibrated in the same manner as the sample chamber itself.

1. Remove the sample chamber cap.
2. Place the insert and sample cup into the sample chamber; replace the chamber cap.
3. Calibrate the insert following the steps in **Calibrating the Pycnometer**, page **2-13**.
4. Verify operation following the steps in **Verifying Operation**, page **2-17**.

0.1-cm^3 Insert

Because of the size of the 0.1-cm^3 insert, its calibration is performed in a different manner than other inserts.

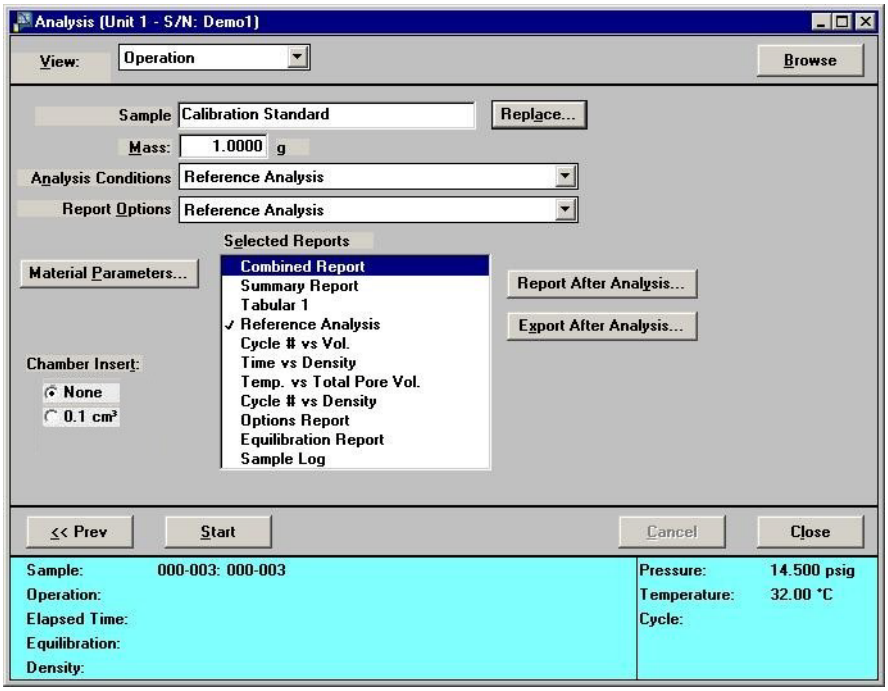
If your 1-cm^3 pycnometer has not been calibrated recently, you should perform a calibration before calibrating the 0.1-cm^3 insert.

1. Remove the sample chamber cap.
2. Place the insert into the sample chamber (the sample cup is built into the insert); replace the chamber cap.

3. Select **Unit > Sample analysis** to perform an analysis on the insert/cup; this step is to obtain the average volume of the insert/cup.

   a. Click **Replace** and choose **refanly.smp** to replace the values of the current file with those from the reference file.

   b. Select **None** for the **Chamber Insert**.



   c. Click **Start** to begin the analysis.

4. After the analysis is complete, click **Close** to close the dialog.

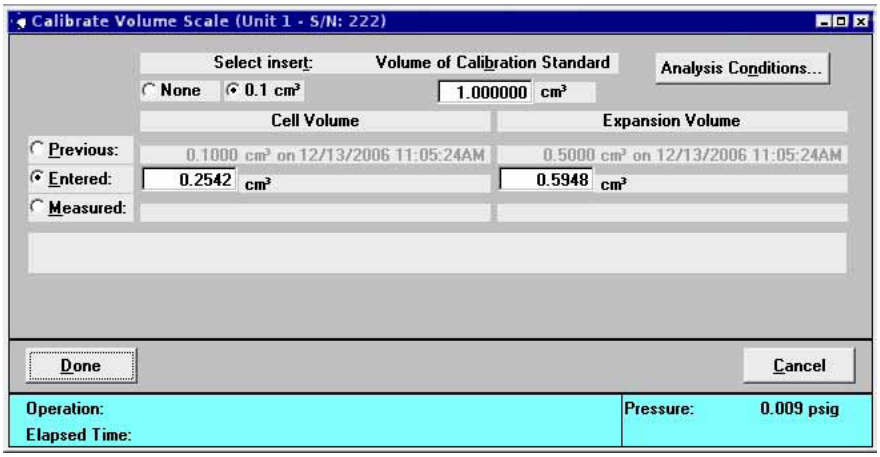
5. Select **Unit > Calibration > Calibrate Volume**; the Calibrate Volume Scale dialog is displayed.

6. Select **None** for the **Chamber Insert**; record the **Cell** and **Expansion** volumes displayed on the **Previous** line.

7. Select **0.1 cm³**, then **Entered** for the type of calibration.

8. Subtract the average volume obtained from the analysis (Step 3) from the Cell Volume recorded in Step 6; enter this value in the **Cell Volume** field (on the left).

   Enter the value you recorded for the Expansion Volume in the **Expansion Volume** field (on the right).



9. Click **Done** to save the values and close the dialog.

The pycnometer is now ready for analyses using the 0.1-cm^3 insert/cup.

H. MULTIGAS OPTION

The Multigas option enables you to use multiple gases with the AccuPyc without having to disconnect and reconnect each time you wish to use a different gas. The Multigas option connects to the gas inlet on the rear panel of the AccuPyc, providing connections for up to four gases.

The Multigas option consists of the following:

- valve assembly and two retaining screws
- gas entrance tubing for connection from the analyzer to the valve assembly
- gas supply tubing for four gases

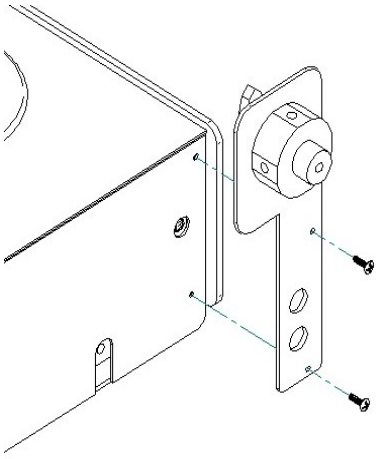
Installing the Multigas Assembly

If you currently have a gas attached to the gas inlet on the rear panel of the analyzer, close the gas bottle valve and remove the inlet tubing from the analyzer before you begin installation. You can reattach the gas to one of the inlet valves on the assembly.

1. Remove the two retaining screws on the right side of the rear panel of the AccuPyc.

2. Position the valve assembly against the rear panel so that the retaining screw holes on the assembly align with those on the rear panel of the analyzer.

3. Attach the valve assembly to the rear panel using the two screws included in the Multigas kit. Do not use the retaining screws you removed from the analyzer (step 1); they are not long enough to hold the assembly in place.



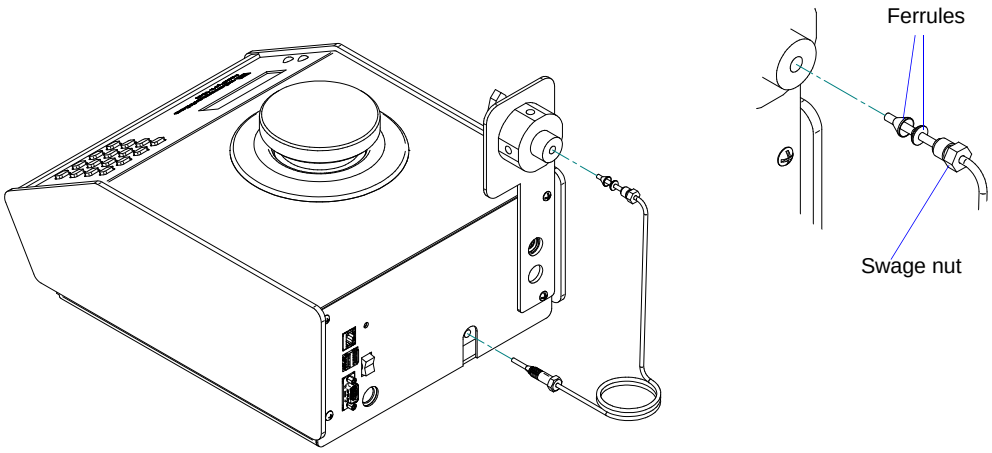
4. Cut and remove the cable ties holding the gas entrance tubing in position; this will allow flexibility for connecting to the analyzer.

5. Remove the protective caps from the ends of the gas entrance tubing, then remove the ferrules from the upper end of the tubing.

6. Remove the nut from the center port and slide it onto the end of the gas entrance tubing, then replace the front and rear ferrules. Be sure the ferrules are oriented as shown below.

7. Insert the tubing into the center port of the Multigas assembly; use the nut to secure the tubing to the assembly.

8. Insert the other end of the tubing into the gas inlet on the rear panel of the analyzer; use the self-contained swage nut to secure the tubing to the inlet.



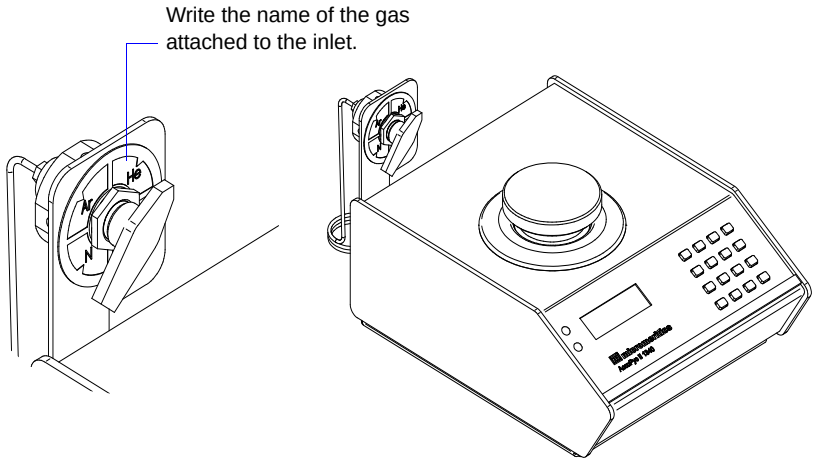
Connecting the Gas Supply

Four pieces of gas supply tubing are supplied, allowing you to connect up to four gases to the assembly.

1. Connect one end of the gas supply tubing to the gas supply (refer to **Rear Panel Connections** if you need assistance).

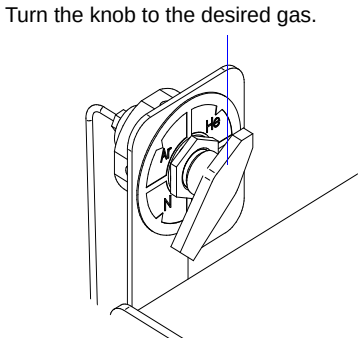
2. Insert the other end of the tubing into one of the valve inlets on the Multigas assembly.

3. The faceplate of the valve assembly contains four sections; one for each gas inlet on the assembly. Write the name of the gas in the applicable section. For example, label the inlet **He** for helium.



Selecting Gases

After you have the gases installed, use the knob to select the desired gas. Be sure to purge the gas lines when you change gases.



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