

ASAP 2050

Extended Pressure Adsorption Analyzer

Service Manual



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TABLE OF CONTENTS

1. GENERAL INFORMATION

Organization of the Manual	1-1
Using This Manual	1-2

2. FUNCTIONAL DESCRIPTION

Overview	2-1
New Product Features	2-1
Cabinetry	2-1
Analysis System	2-1
Degas System	2-2
Software	2-2
Instrument Description	2-3
Front Panel	2-3
Side Panel	2-5
Rear Panel	2-5
Top View	2-6
Instrument Components	2-6
Analysis System	2-7
Analysis System External Components	2-7
Analysis System Internal Components	2-8
Gas Inlet Manifold Assembly	2-8
High Pressure Analysis Assembly	2-9
Analysis Schematic	2-10
Exploded View	2-10
Serviceable Components	2-10
Degas System	2-11
Degas System External Components	2-11
Degas Internal Components	2-12
Degas Schematic	2-13
Exploded View	2-13
Serviceable Components	2-13
Cold Trap Module	2-14
External Components	2-14
Internal Components	2-15
Exploded View	2-15
Serviceable Components	2-15
Elevator Module	2-16
External Components	2-16
Internal Components	2-17
Exploded View	2-17
Serviceable Components	2-17
Vacuum Module	2-18

Vacuum Pump Components	2-19
Serviceable Components	2-19
Power Module	2-20
External Components	2-20
Internal Components	2-21
Exploded View	2-21
Serviceable Components	2-21

3. ANALYSIS SEQUENCE

4. PREINSTALLATION

5. INSTALLATION

6. OPERATOR TRAINING

7. MAINTENANCE DOCUMENTS

8. CALIBRATION PROCEDURE

9. MECHANICAL AND ELECTRICAL DRAWINGS

Mechanical 9-1

Electrical 9-2

10. SERVICE PARTS

11. SOFTWARE

12. OPERATOR'S MANUAL

13. SERVICE TRAINING

1. GENERAL INFORMATION

This service manual contains information and instructions for providing instrument service on the Micromeritics ASAP 2050, and is intended for use by Micromeritics' factory-trained and supported service personnel.

Organization of the Manual

The ASAP 2050 service manual is organized as follows:

- | | |
|------------------|------------------------------------------------------------------------------------------------------------|
| Chapter 1 | GENERAL INFORMATION
Provides general information about the service manual and its contents. |
| Chapter 2 | FUNCTIONAL DESCRIPTION
Provides a functional description of analyzer components. |
| Chapter 3 | ANALYSIS SEQUENCE
Provides a description of the analysis sequence. |
| Chapter 4 | PREINSTALLATION
Provides Preinstallation requirements and checklist. |
| Chapter 5 | INSTALLATION
Provides Installation Instructions. |
| Chapter 6 | OPERATOR TRAINING
Provides a checklist for training operators on the use of the Gemini analyzer. |
| Chapter 7 | MAINTENANCE DOCUMENTS
Provides scheduled maintenance documents. |
| Chapter 8 | CALIBRATION PROCEDURE
Provides a copy of the Factory Calibration Procedure. |

- Chapter 9** **[MECHANICAL AND ELECTRICAL DRAWINGS](#)**
Contains mechanical and electrical drawings.
- Chapter 10** **[SERVICE PARTS](#)**
Contains a list of service replacement parts.
- Chapter 11** **[SOFTWARE](#)**
Contains a demo version of the software?
- Chapter 12** **[OPERATOR'S MANUAL](#)**
Provides links to current versions of the operator manuals.
- Chapter 13** **[SERVICE TRAINING](#)**
Provides a syllabus for training service personnel.

Using This Manual

This manual is most efficiently used from the Micromeritics web site. However, it can be downloaded to a portable media device, such as a CD or a USB stick.

2. FUNCTIONAL DESCRIPTION

Overview

The ASAP 2050 Xtended Pressure Sorption Analyzer is the latest addition to Micromeritics' line of Accelerated Surface Area and Porosimetry (ASAP) instruments. It is intended to meet the needs of customers who need to perform physisorption tests at a high pressure up to 150 psi.

This section describes the systems and components that comprise the ASAP 2050 Xtended Pressure Sorption Analyzer. It includes photographs showing the location of the major systems, modules, and components, as well as functional descriptions.

The ASAP 2050 consists of an analyzer, peripheral equipment used to connect the gas supply, and an analysis program. The analysis program enables users to define analysis conditions and reporting options, view analyses while in progress, and produce reports.

New Product Features

Cabinetry

- The cabinetry is similar to the ASAP 2020 except hardware associated with the Chemisorption option, such as the Chemi exhaust and furnace cooling system, are not on the ASAP 2050.

Analysis System

- The ASAP 2050 does not have a Chemisorption analysis option.
- The valve orifice size has changed to accommodate the extended pressure capabilities of the instrument.
- The transducer operates at pressures from vacuum to 150 psia (10 atmospheres) or approximately 7500 mmHg absolute.
- High-pressure compatible seal frits may be used on the analysis port.

Degas System

- Heating mantles have been adjusted for efficient use with straight-walled sample tubes.
- High-pressure compatible seal frits may be used on the degas port.

Software

- Collecting isotherms from the vacuum up to 150 psia allows for the software's rapid collection of isotherms where adsorption and desorption analyses are required.
- The software has updated capabilities for collecting non-monotonic isotherms rapidly.
- The application software is compatible with the following Microsoft operating systems:
 - Windows Vista
 - Windows XP with Service Pack 2
 - Windows 2000

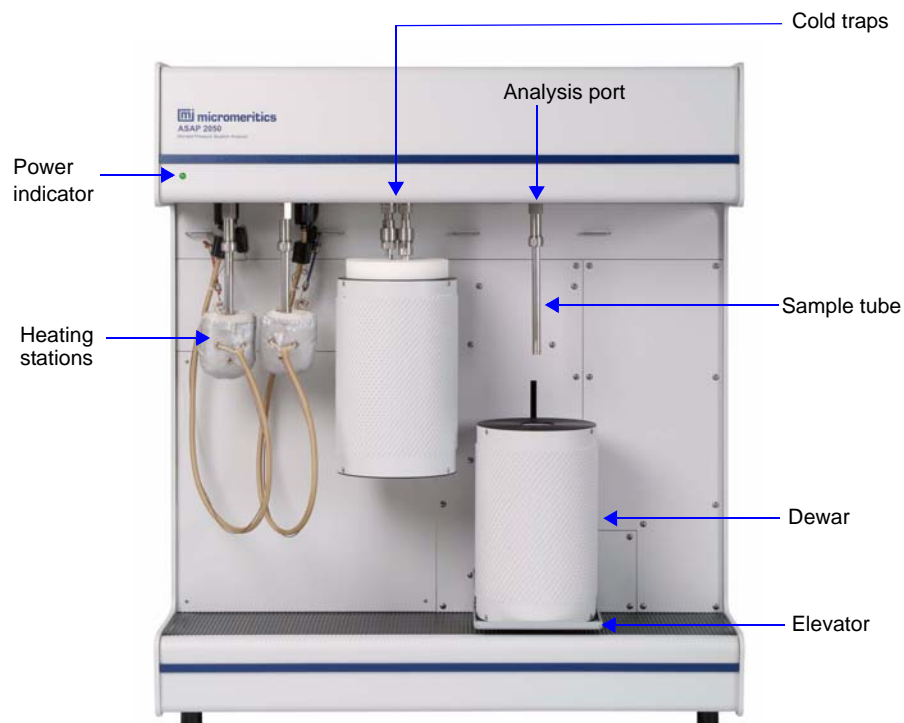
Instrument Description

The ASAP 2050 System performs surface area and porosimetry measurement on a wide variety of materials, using multiple gas sorption techniques.

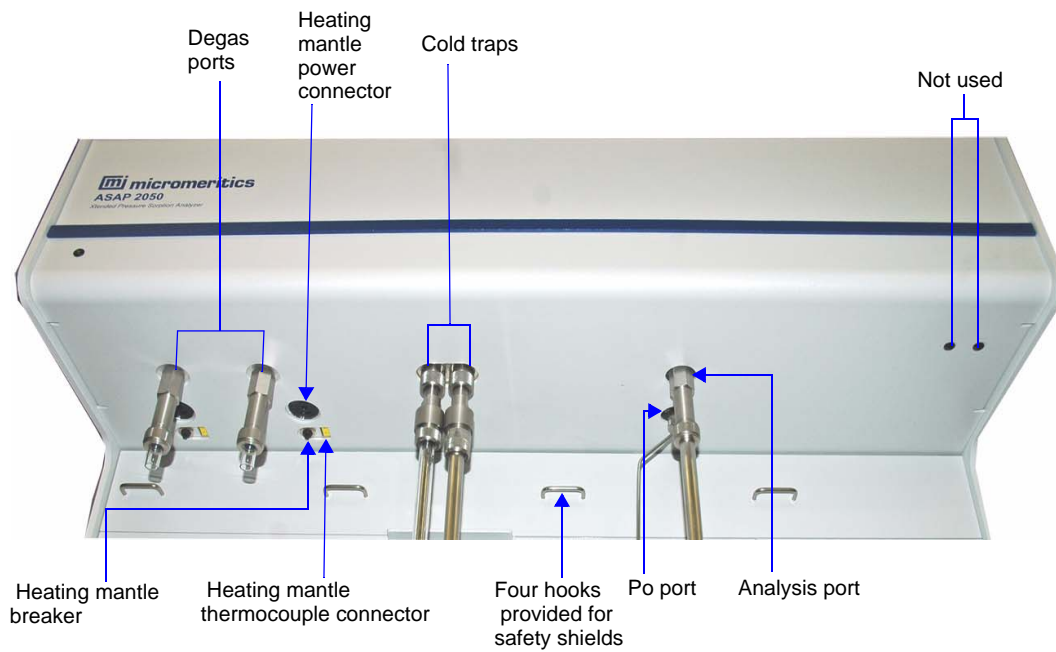
Design features include:

- Two independent vacuum systems: one for sample preparation and one for sample analysis. Having two separate systems, as well as separate preparation ports, allows sample preparation and sample analysis to occur concurrently without interruption. Inline cold traps are located between the vacuum pump and the manifold in both the analysis and degas systems. The sample saturation pressure (P_{sat}) tube is located next to the sample analysis port. Gas inlet ports and cable connections are located conveniently on the side panel of the analyzer for easy access.
- A two-station degas system for fully automated degassing with precisely controlled heating profiles.

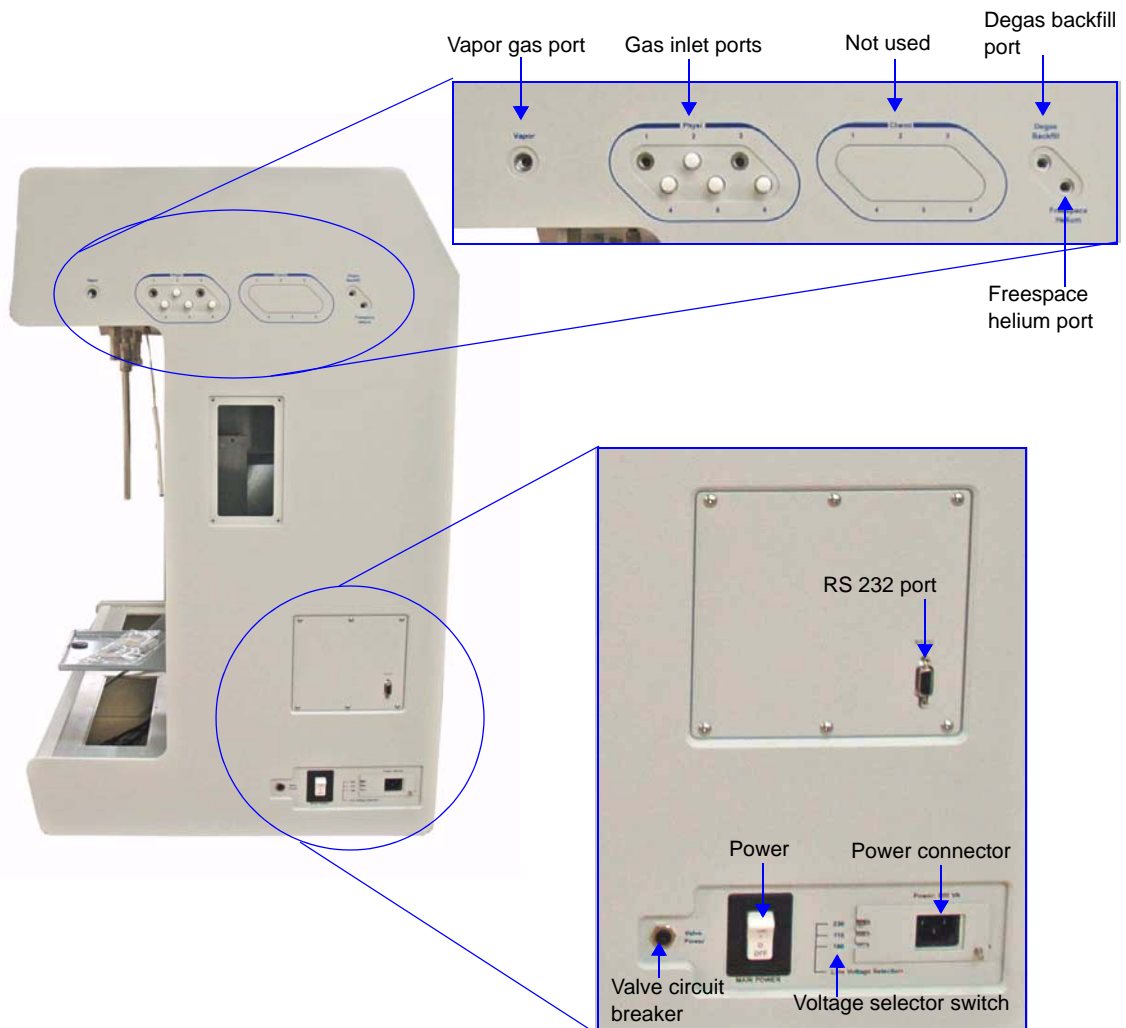
Front Panel



The components listed below are located on the underside of the upper extension of the front panel.



Side Panel



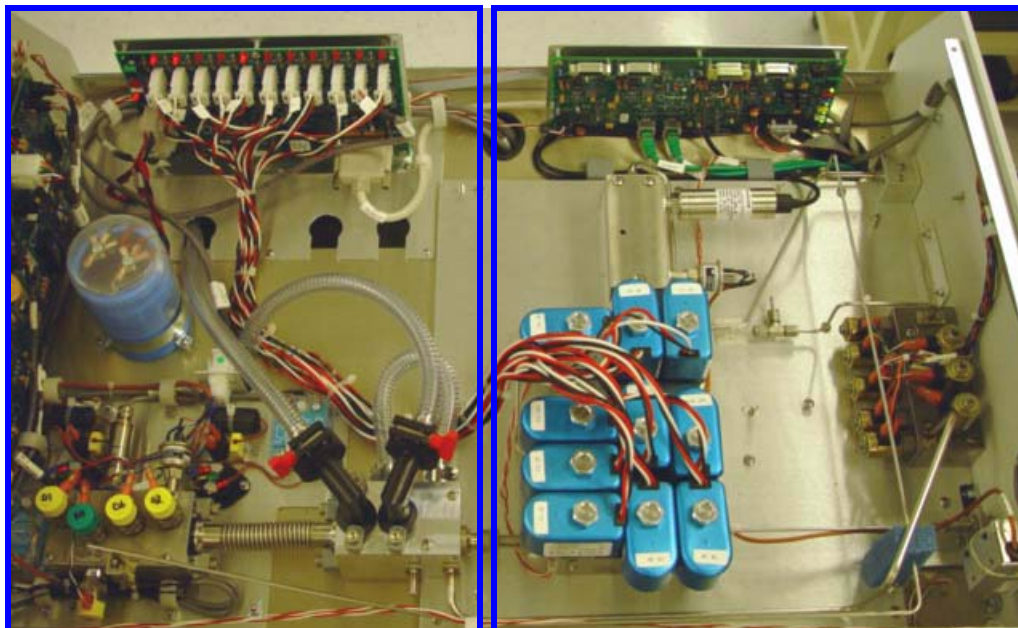
The left side panel (not pictured) remains the same as the 2020 with a smooth surface. The right panel of the 2050 has gas inlets capable of accommodating up to 6 gasses, as well as a degas backfill port for degassing the sample, freespace helium port for measuring free space, and vapor generator inlets. The lower part of the side panel gives access to the main power switch, valve circuit breaker, voltage selector pin, and the RS 232 port. The power switch turns the analyzer on and off. This switch also serves as the main breaker for the analyzer; it switches off automatically in the event of an electrical fault. The valve circuit breaker protects the circuitry for the valves in the event of a failure. The RS 232 port allows for the connection of a computer to the analyzer. The voltage selector switch sets the analyzer to correct an incoming AC line voltage.

Rear Panel

The rear panel of the ASAP 2050 is comprised of two removable panels and an inner cabinet for vacuum pumps. Access to the power module, elevator module, and backplane of the card cage are accessible from the rear of the instrument.

Top View

Analyzer Top Mounting Plate (viewed with top panel removed)



Degas system

Analysis System

Instrument Components

The ASAP 2050 Analyzer is comprised of these major components and modules:

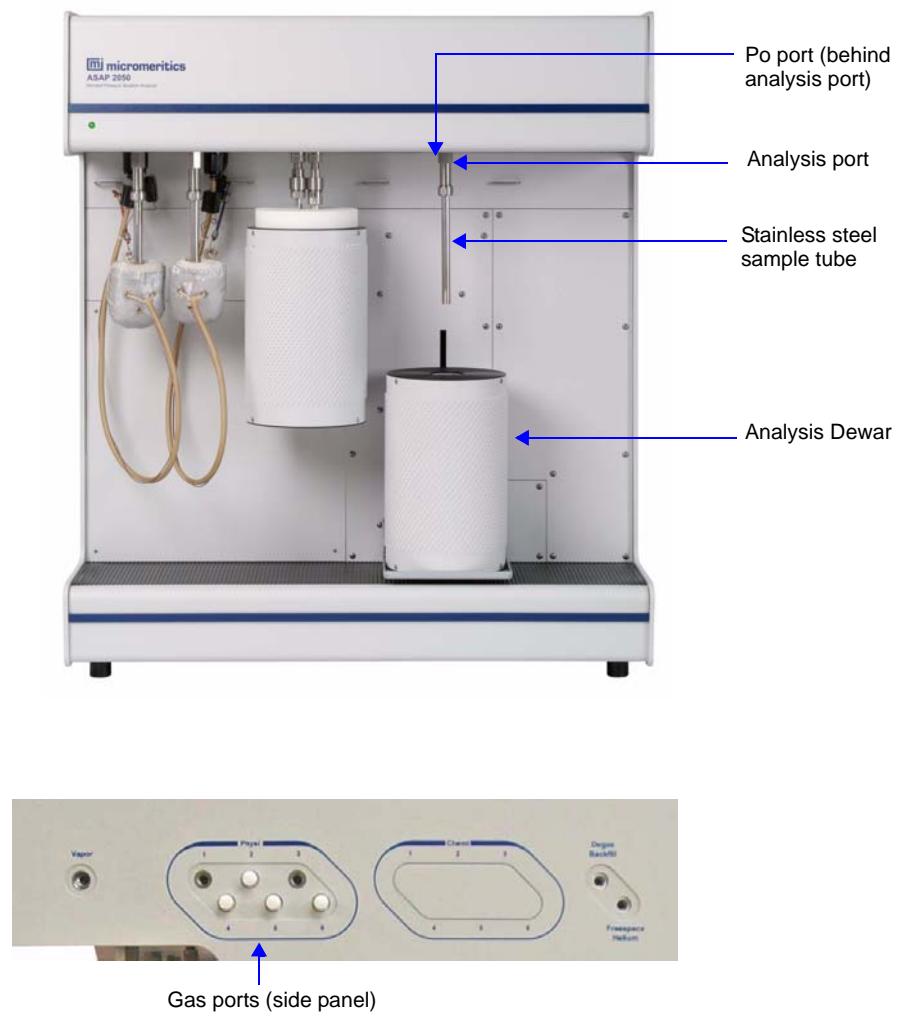
- Analysis System
- Degas System
- Cold Trap Module
- Elevator Module
- Vacuum Module
- Power Module

Analysis System

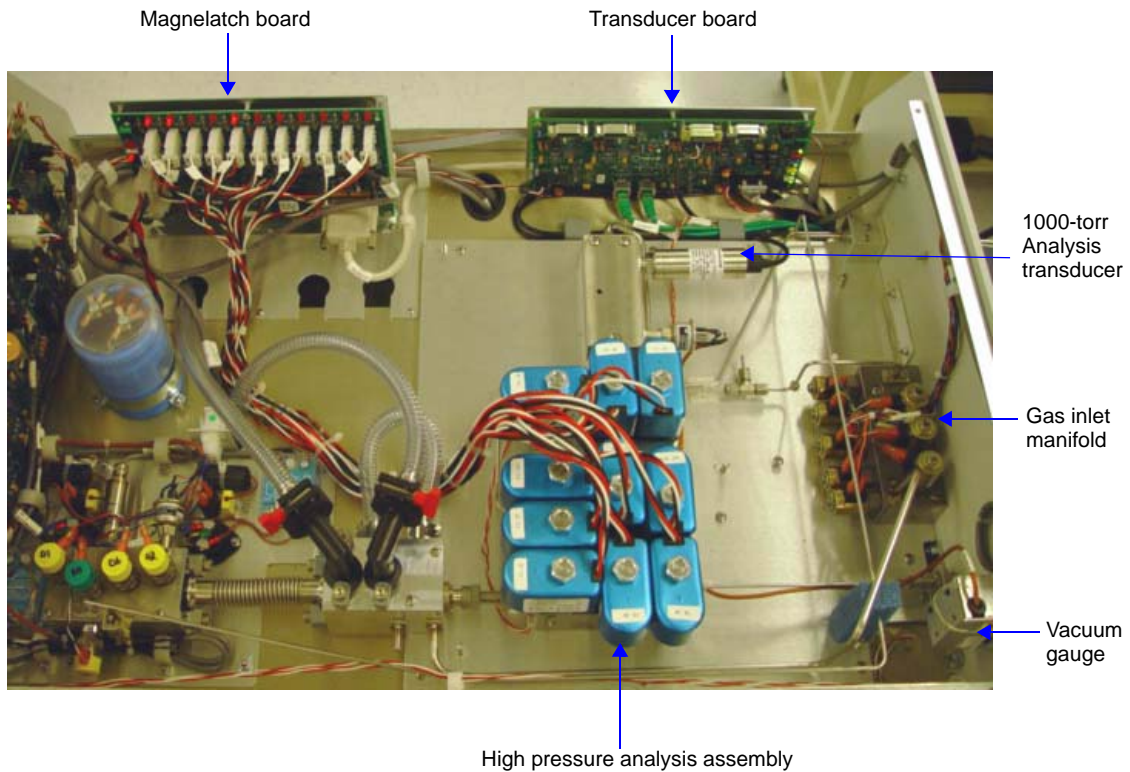
The analysis system consists of:

- The analysis port
- The saturation pressure (Po) port
- A stainless steel sample tube
- A Dewar for analyses
- A manifold and electrical components mounted on the instrument's top plate
- Gas lines from the gas inlet ports to the analysis manifold

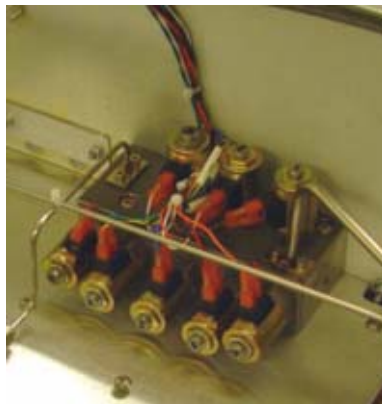
Analysis System External Components



Analysis System Internal Components



Gas Inlet Manifold Assembly



The gas inlet manifold assembly manages the gas intake from the gas supply into the analysis ports of the 2050. Solenoid valves are used to admit and regulate gas into the analysis manifold assembly.

The gas inlet manifold, located on the right wall of the analysis mounting plate, is populated with eight manifold-mounted solenoid valves that operate under computer control or in manual mode.

Valve	Description
P1 through P6	Gas inlet port valves
PS	Supply valve for physisorption gases
PV	Vacuum valve for physisorption gases

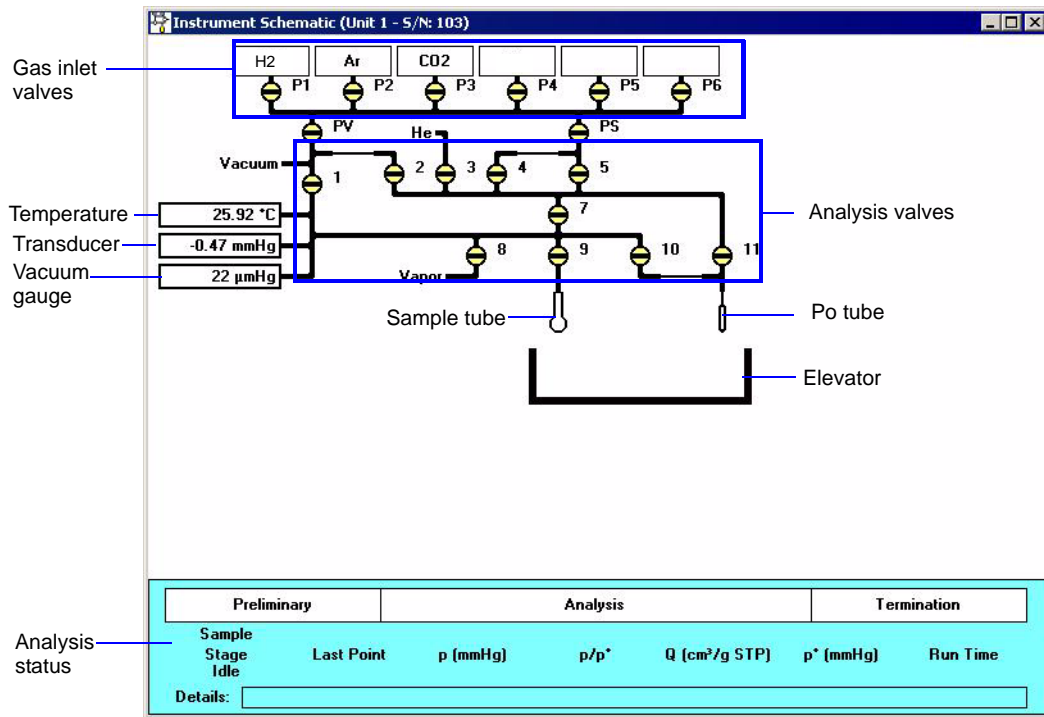
High Pressure Analysis Assembly



The high pressure analysis assembly controls all incoming adsorbate gasses and monitors pressure during the analysis of samples. It is machined from stainless steel and contains ten Magnelatch valves.

Valve	Description
1	Unrestricted vacuum
2	Restricted vacuum
3	Free-space measurement gas (helium)
4	Restricted analysis gas
5	Unrestricted analysis gas
7	Lower manifold isolation
8	Vapor
9	Sample port
10	Restricted Psat tube port
11	Unrestricted Psat tube port

Analysis Schematic



Exploded View

For an exploded view of the analysis manifold, click below.

[Analysis Manifold](#), P/N 205-34011-00

Serviceable Components

Analysis Ports - A filter and O-ring are located in each analysis port. If a filter becomes contaminated, the vacuum gauge may show a reading above 20 µmHg, even after extended pumping through unrestricted valve with analysis or degas ports closed. This filter and its O-ring are replaceable parts.

Magnetlatch and Solenoid Valves - Occasionally, due to wear, some internal valve components must be replaced for the valve to operate properly.

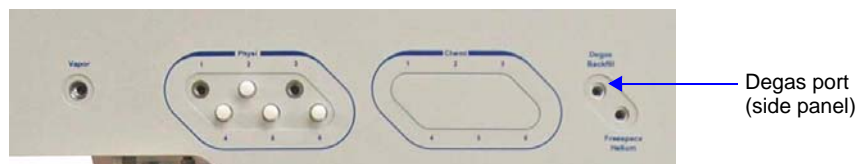
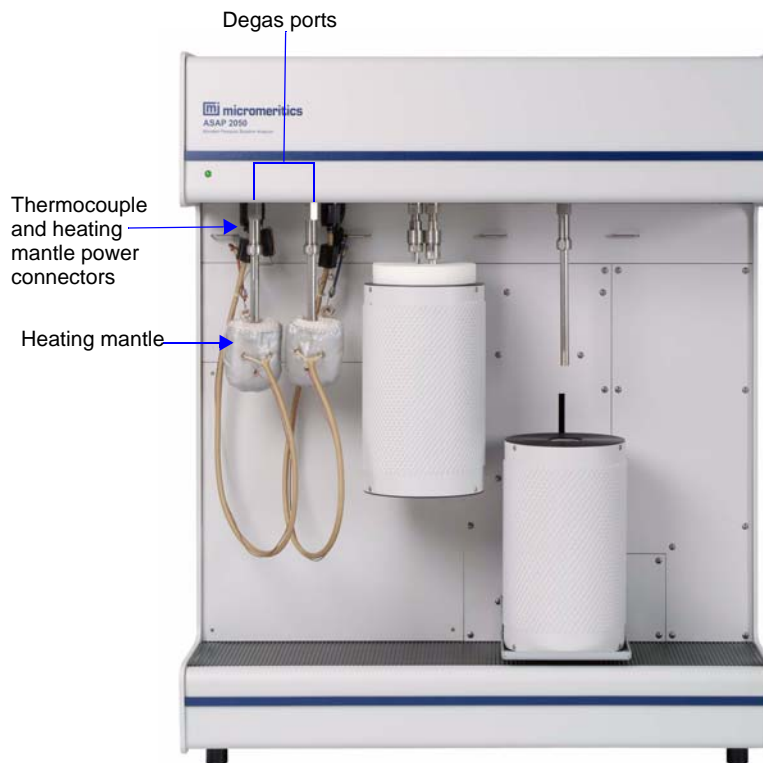
1000-torr transducer - The only serviceable component is the zero offset potentiometer, which may need to be adjusted if recalibration is required.

Degas System

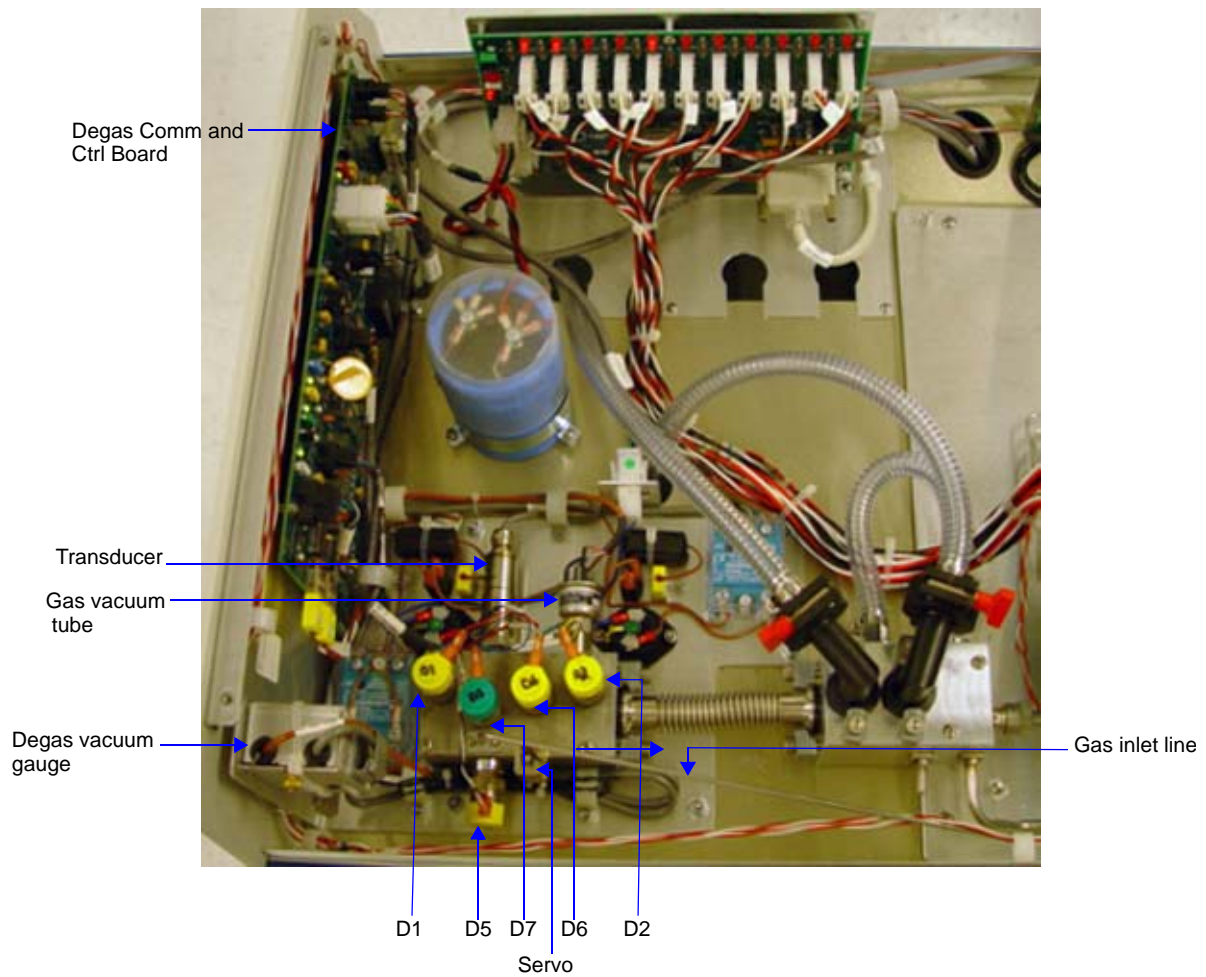
The degas system consists of:

- Two degas ports and connectors for heating mantles and sample thermocouples
- A manifold and electrical components mounted on the instrument's top plate
- Gas lines from the gas inlet ports to the degas manifold

Degas System External Components

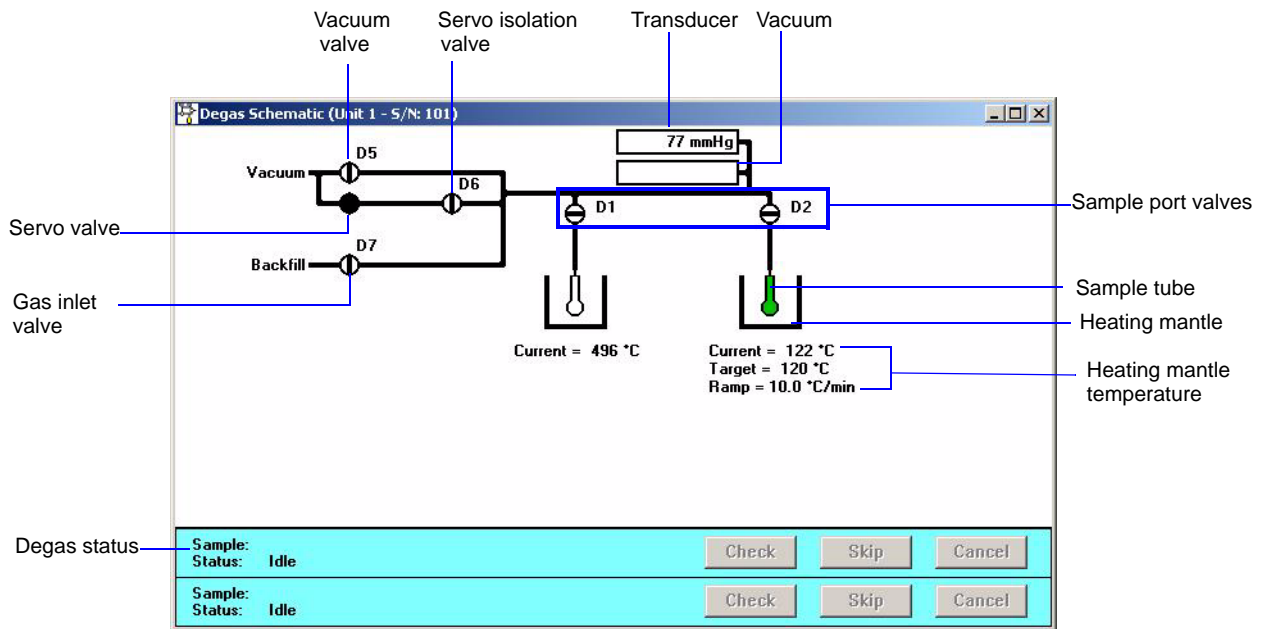


Degas Internal Components



Valve	Description
D1 and D2	Sample port valves
D5	Vacuum valve
D6	Servo isolation valve
D7	Gas inlet port valve

Degas Schematic



Exploded View

For an exploded view of the degas manifold, click below.

[Degas Manifold](#), P/N 202-34030-03

Serviceable Components

Degas ports - A filter and O-ring are located in each degas port. If a filter on the degas port is contaminated, the contaminant may absorb atmospheric gases when the port is not plugged (with either a sample tube or a plug), resulting in extended degassing time for samples on that port. This filter and its O-ring are replaceable parts.

Solenoid Valves - Occasionally, due to wear, some internal valve components must be replaced for the valve to operate properly.

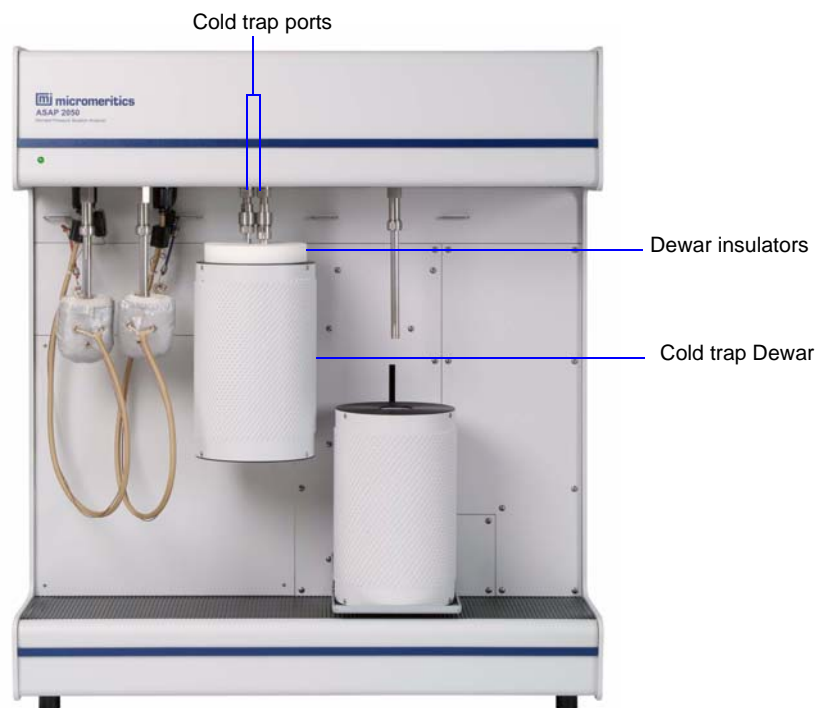
1000-torr transducer - The only serviceable component is the zero offset potentiometer, which may need to be adjusted if recalibration is required.

Cold Trap Module

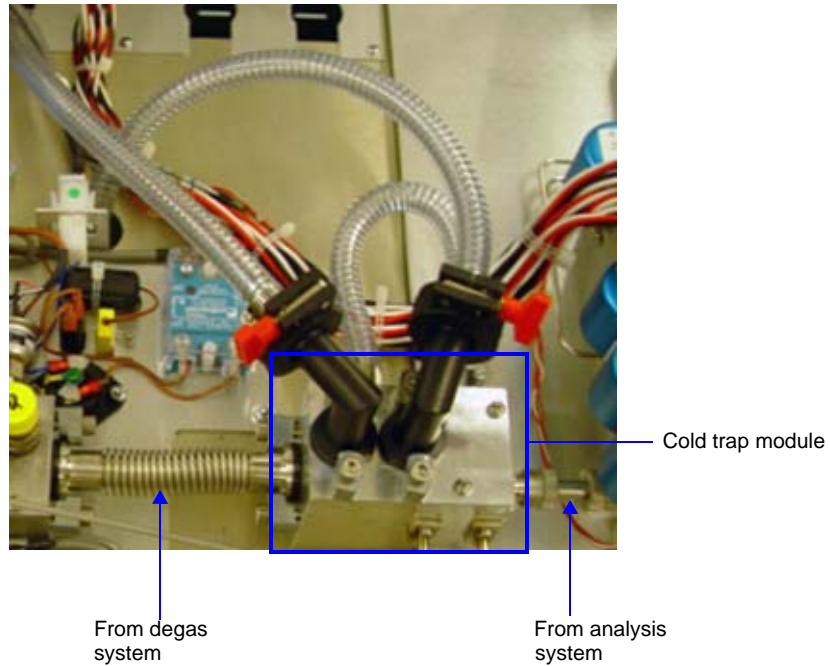
Inline cold traps are located between the vacuum pump and the manifold in both the analysis and degas systems. The cold traps provide a place for moisture or volatiles to condense out of the manifold, preventing contamination of the degas and sample systems.

External Components

The two cold trap tubes are installed on the analyzer's upper front panel. During degas or analysis operations, the cold trap tubes are submerged in the cold trap Dewar, providing a constant temperature profile.



Internal Components



Exploded View

For an exploded view of the cold trap assembly, click below.

[Cold Trap](#), P/N 202-25849-00

Serviceable Components

A cold trap tube may need to be removed and cleaned if oil or particulates accumulate in the trap.

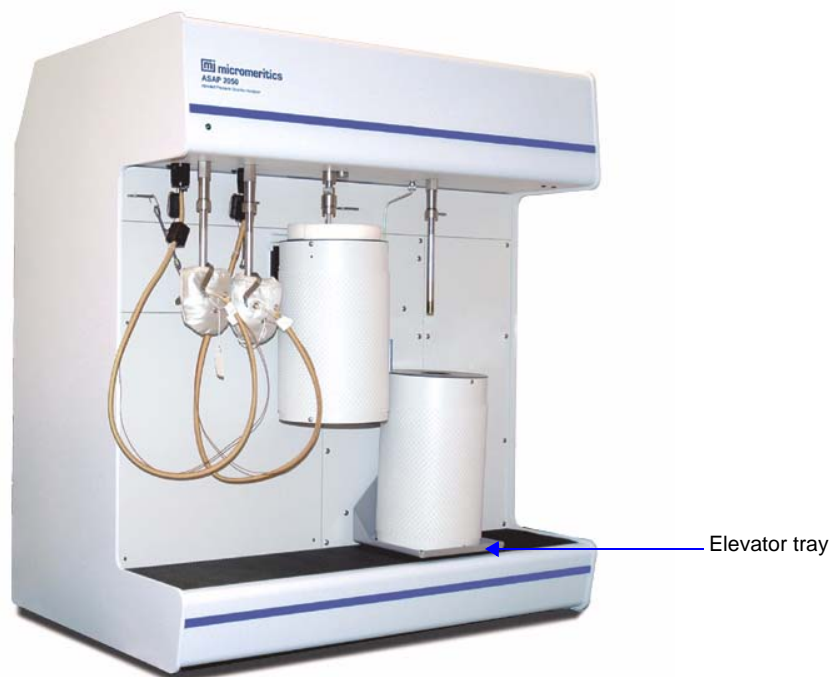
Elevator Module

The elevator module consists of:

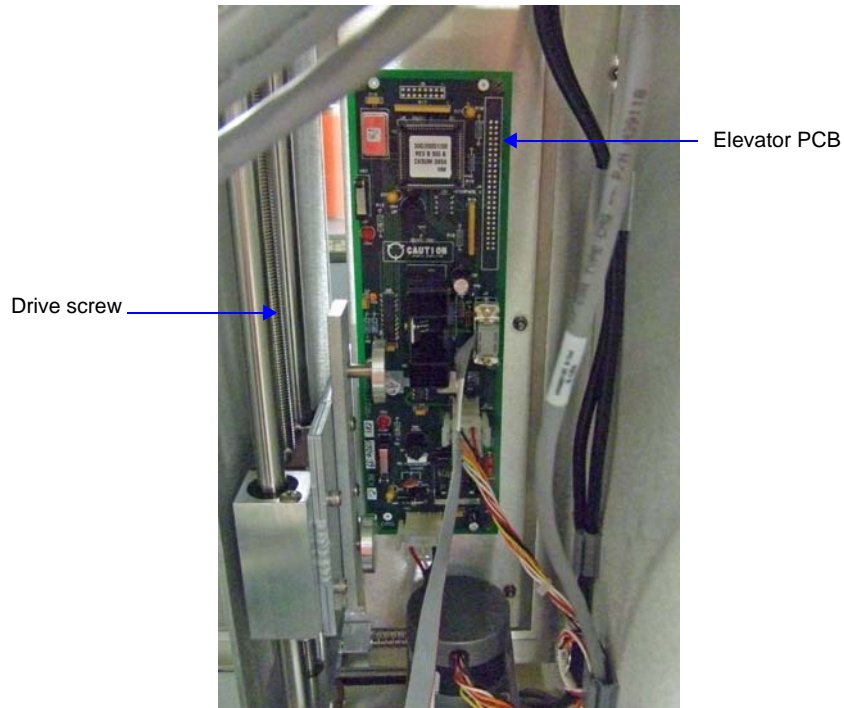
- Elevator Assembly
- Dewar tray
- Elevator PCB
- Elevator drive screw
- Elevator drive motor

External Components

The elevator is located on the front panel of the analyzer. During analyses, it raises and lowers the analysis Dewar automatically. The elevator is represented in the instrument schematic displayed on the computer. When the instrument is operated in manual mode, the elevator can be raised and lowered from the computer screen.



Internal Components



Exploded View

For an exploded view of the elevator assembly, click below.

[Elevator Assembly](#), P/N 300-34005-00

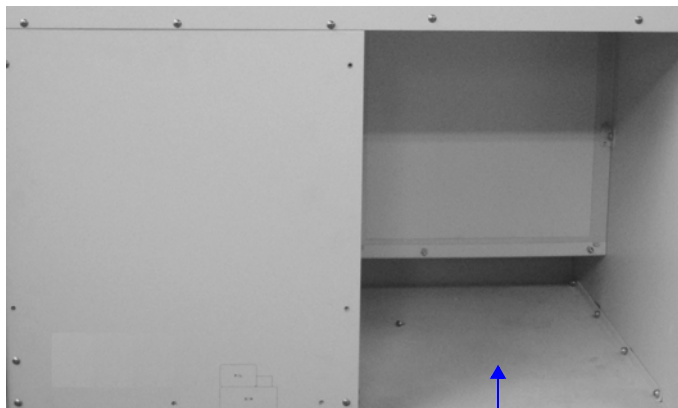
Serviceable Components

The following parts may be replaced:

- Elevator Assembly - 300-34005-00
- Elevator PCB - 300-17705-011
- Elevator drive screw - 300-25856-00
- Elevator drive motor - 510-60829-00

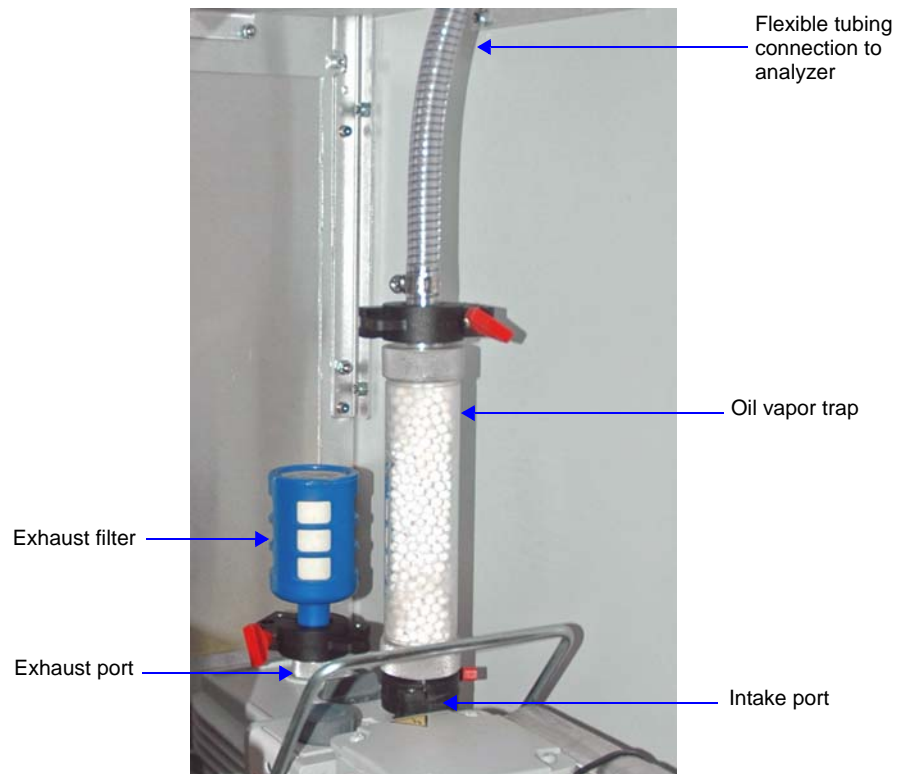
Vacuum Module

The vacuum module is comprised of two low vacuum pumps: one for degas and one for analysis. The pumps are located in cavities inside the instrument and can be accessed by removing the front or rear panels. The vacuum system has no external components.



Pump cavity (rear panel of analyzer)

Vacuum Pump Components



Serviceable Components

- The exhaust filter (P/N 004-27040-00) must be replaced periodically to prevent oil vapor from entering the system.
- The alumina in the oil vapor trap must be replaced when it becomes saturated.
- If a new oil trap is required, an oil vapor trap kit is available: P/N 200-33014-00.
- The vacuum pump oil must be replaced when it becomes contaminated.

Power Module

External Components

The external components of the power module are located on the lower right side panel of the instrument. The components are:

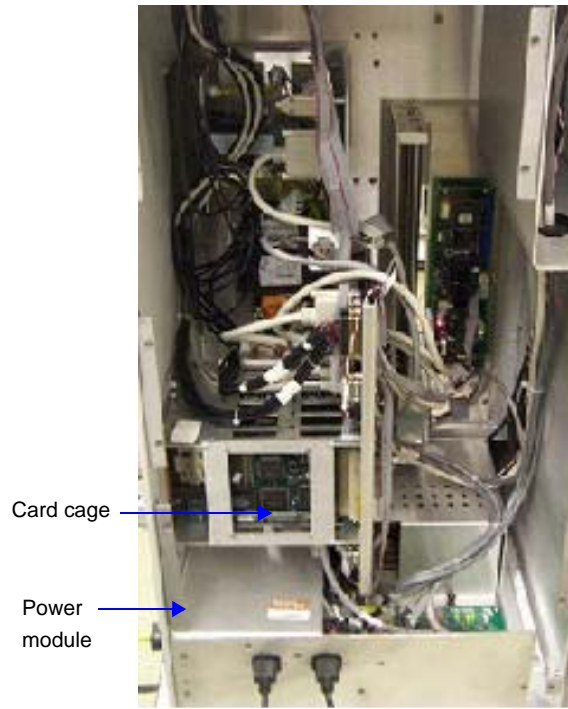
- **Power Connector** - connects the cord from the power source to the analyzer.
- **Voltage Selector Card** - enables voltage selection (110, 115, or 240VAC).
- **On/Off Switch** - turns power to the analyzer on or off.
- **Valve Circuit Breaker**



When power is applied to the instrument, a green indicator, located on the left side of the units upper front panel is illuminated.

Internal Components

The power module is located in the lower left side of the analyzer as you face it from the rear.



Exploded View

For an exploded view of the power module, click below.

[Power Tray, P/N 202-34003-10](#)

Serviceable Components

The following parts may be replaced:

- Quad switching P.S, 003/40051/00, can be replaced.
- Power distribution PCB, 202/17707/011, can be replaced.
- Bridge rectifier, 003/48064/00, can be replaced.

3. ANALYSIS SEQUENCE

NOT AVAILABLE AT THIS TIME.

4. PREINSTALLATION

This chapter contains the Preinstallation Instructions and Checklist for the ASAP 2050. This document helps to ensure that the customer has prepared the laboratory for installation of the instrument and that the supplies, equipment, and personnel are available for installation.

Double-click on the following link to access the preinstallation instructions and checklist.

- [Preinstallation Instructions and Checklist](#), P/N: 205-42870-01.

5. INSTALLATION

Double-click on the following link to access the installation instructions and checklist.

- [ASAP 2050 Installation Instructions and Checklist](#), P/N: 205-42870-04

6. OPERATOR TRAINING

The Operator Training Checklist is used in conjunction with the operator's manual and software to train the person(s) who will be operating the analyzer. Double-click on the following link to access the operator training checklist.

[Operator Training Checklist](#), P/N: 205-42870-03.

7. MAINTENANCE DOCUMENTS

The documents listed below are included in Service PM kits, which may be purchased by the user for proper maintenance of his analyzer. Use of these PM plans also help to prolong the life of the analyzer.

- **Maintenance Schedule**, P/N: 205-42890-00
- **Scheduled Maintenance Instructions and Checklist**, P/N: 205-42892-00
- **As-Found Datasheet**, P/N: 205-42893-00
- **Calibration Certificate**, P/N: 205-42894-00

8. CALIBRATION PROCEDURE

This chapter contains the calibration and test procedure used in Micromeritics' Final Assembly Department. It is provided as a reference so that you will be familiar with the calibration procedures and instrument tests that are performed on the instrument during manufacture.

The methods used at the factory may differ from the methods documented in Chapter 7, Maintenance Documents. Use the established service calibration and test procedure unless otherwise directed by a Micromeritics Service Managers or Service Specialist.

- **Product Calibration Procedure**, P/N: 205-34000-76.

9. MECHANICAL AND ELECTRICAL DRAWINGS

This section contains mechanical and electrical drawings for the ASAP 2050. These drawings show assemblies in great detail. Some parts listed in these prints may be available only as an assembly or in a kit.

Do not provide copies of these drawings to a customer.

Mechanical

Refer to the following table for a list of the mechanical prints. Double-click on the part number to view the print.

Print Number	Description
202-25849-00	Assembly, Dewar Cold Trap
202-25850-00	Assembly, Dewar Analysis
202-34001-00	Assembly, Cabinet
202-34002-00	Assembly, Card Cage
202-34003-10	Assembly, Power Tray
202-34030-02	Assembly, Degas Wiring
202-34030-03	Assembly, Degas Manifold
205-34000-00	Assembly, High Pressure Semi-Final
205-34010-00	Assembly, High Pressure Analysis Module
205-34011-00	Assembly, High Pressure Analysis Manifold
300-34005-00	Assembly, Elevator
950-60816-00	Assembly, Vacuum Transducer

Electrical

Refer to the following table for a list of the electrical drawings. Double-click on the part number to view the print.

Print Number	Description
202-17704-011	PCB, Transducer Hires ADC
202-17704-511	Schematic, Transducer Hires ADC
202-17705-011	PCB, Magnelatch Driver
202-17705-511	Schematic, Magnelatch Driver
202-17706-011	PCB, Transducer Interface VIF
202-17706-511	Schematic, Transducer Interface VIF
202-17707-011	PCB, Power Distribution
202-17707-511	Schematic, Power Distribution
202-17720-011	PCB, Degas Communication Controller
202-17720-511	Schematic, Degas Communication Controller
202-60808-00	Cable, 25 psi Pressure Transducer
202-60809-00	Cable, Transformer Assembly
300-17700-011	PCB, I386EX CPU
300-17700-511	Schematic, I386 CPU
300-17703-011	PCB, Valve Driver & GPIO
300-17703-511	Schematic, Valve Driver & GPIO
300-17705-011	PCB, Elevator Control
300-17705-511	Schematic, Elevator Control
921-17718-01	PCB, thermocouple Amp
921-17718-51	Schematic, Thermocouple Amp

10. SERVICE PARTS

NOT AVAILABLE AT THIS TIME

11. SOFTWARE

To access a demo version of the 2050 software, double-click below.

- [ASAP 2050 software](#)

12. OPERATOR'S MANUAL

To access the 2050 Operator's manual, double-click below.

- [ASAP 2050 Operator's Manual](#), part number: 205-42801-01

13. SERVICE TRAINING

NOT AVAILABLE AT THIS TIME

