Matrix 1000 Series

Modular Multi-Station Surface Area & Pore Analysis System

INTRODUCTION

"Accurate, Accessible, Advanced Sorption"

The Matrix 1000 is a next-generation gas sorption analyzer platform engineered for laboratories demanding flexible configuration, high throughput, and precision micropore resolution. Each unit supports up to four independently operated analysis stations, giving users the freedom to design the system around their specific applications.

The system is ideal for research centers, QC labs, and advanced materials teams who require reliable, scalable, and high-resolution data for gas adsorption and pore characterization.

Figure 1. ***Matrix 1000*** *with 3 analysis units*

The Matrix 1000 empowers users to:

- Configure mesopore, micropore, or mixed-mode stations in a single unit
- Run simultaneous, independent analyses without cross-interference
- Scale up or specialize based on research demands
- Customize precision sensor packages to match experimental needs
- Expand modularly to a total of **up to 3 connected units (12 stations)** for maximum throughput and flexibility

Key measurement capabilities include BET, Langmuir, BJH, DFT, HK, SF, MP, DR, T-Plot, isotherms, and heat of adsorption.

Surface area can be measured down to 0.01 m²/g (mesopore) and 0.0005 m²/g (micropore), with repeatability ≤1.0% RSD. Pore sizes from 0.35 to 500 nm are resolved with repeatability as fine as 0.02 nm (high-res micropore).

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FEATURES

- **Multi-Station Architecture**
  Run up to four fully independent analysis stations per unit—each with dedicated dosing, pressure control, and data acquisition. Scale up to 12 stations by connecting three Matrix 1000 units. Ideal for high-throughput labs and multi-user environments.

- **Micropore & Mesopore Flexibility**
  Configure any combination of micropore or mesopore analysis stations based on your application needs. High-resolution pressure sensors—down to 0.1 Torr—enable accurate characterization of ultrafine pores, while broader pressure ranges allow robust mesopore and macropore analysis.

- **Harsh Chemistry Option**
  Equipped with a passivation coating and seals upgraded to FFKM for aggressive or corrosive chemistries.

- **Smart Safety & Status System**
  The Matrix 1000 is built for safe, intuitive operation. Each work unit includes multi-color LED indicators for quick visualization of instrument status:
  - **White** – Standby
  - **Orange** – Heating
  - **Green** – Test in Progress
  - **Red** – Alarm Condition

  Real-time monitoring of pressure and temperature ensures that any anomaly automatically triggers an alarm, switches the unit to red warning status, and halts the experiment for safety. A retractable front safety shield protects users from cryogenic splashes during operation.

- **Smart Degassing with Pressure Feedback**
  The Matrix 1000 system continuously monitors vacuum pressure during degassing and compares it to user-defined stabilization thresholds. This intelligent feedback mechanism automatically detects when activation is complete, improving reproducibility and avoiding over- or under-treatment of samples.

- **Advanced Gas Dosing**
  Each analysis station features dedicated dosing and evacuation control for independent test execution. The system supports both pressure-based and volume-based dosing, with user-selectable options for quantitative or constant-pressure dosing. Smart sequencing ensures efficient dosing across multiple stations while avoiding gas cross-talk so that each station can run a different test (i.e. BET, isotherm), but with the same adsorbate.

- **Integrated Degassing Furnace**
  Every Matrix 1000 unit includes one built-in, high-temperature degassing furnace with programmable ramp/soak control and real-time pressure feedback—no external systems required. For high-volume workflows, pair with an external Prep Series degasser for bulk pre-treatment, using the built-in unit for final polishing prior to analysis.

SOFTWARE & RESULTS

The **Matrix 1000** system is powered by the intuitive APAS software platform, designed to streamline multi-station control and deliver high-quality sorption results across a single unit or a full 12-station network.

- **Flexible Multi-Station Workflow**

Configure, launch, and monitor multiple experiments independently from a unified interface, with real-time status indicators for full test visibility.

- **Intelligent Sample Preparation**

Built-in pressure monitoring during degassing ensures consistent activation, with automatic detection of stabilization based on user-defined thresholds.

- **Comprehensive Data Modeling**

Supports BET, Langmuir, BJH, t-Plot, HK, DFT, NLDFT, and other models for accurate surface area and pore size analysis of micro- and mesoporous materials.

- **Visualization & Reporting Tools**

Overlay isotherms, track kinetics, and generate Excel or PDF reports with curves, metadata, and calculation results for easy comparison and documentation.

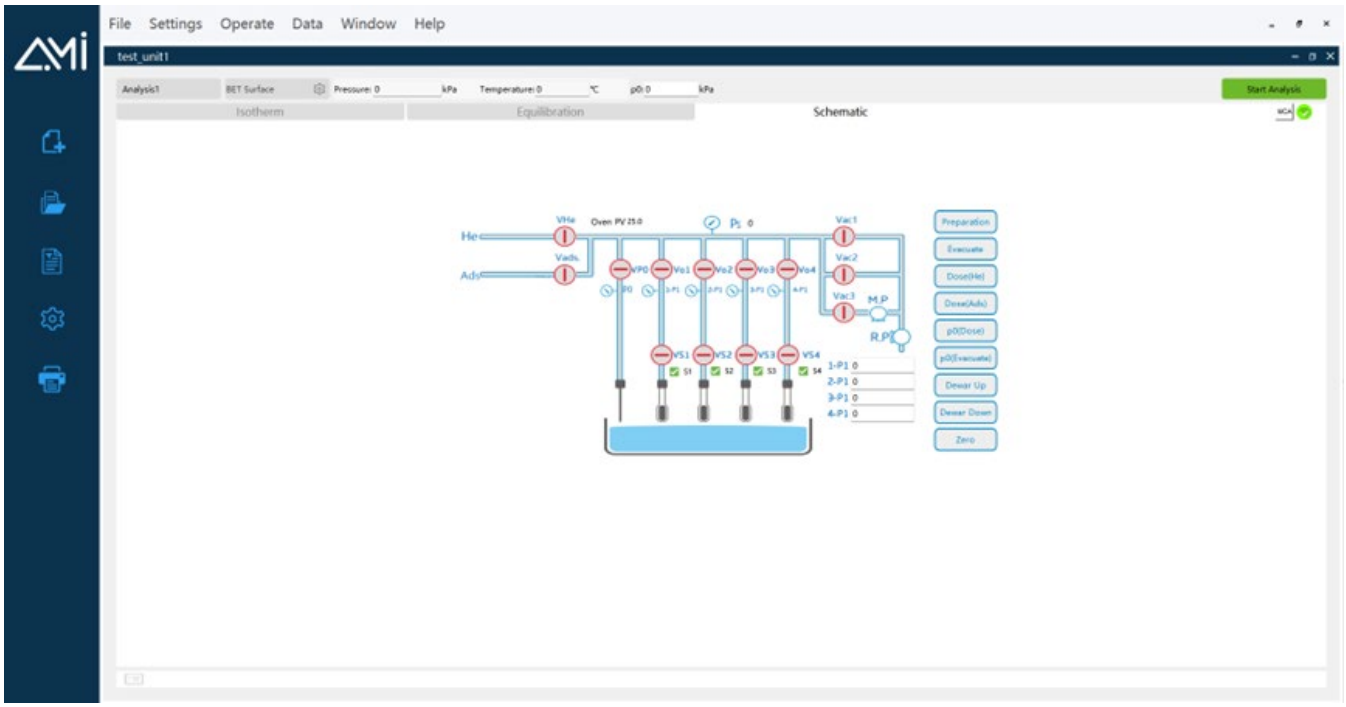

Figure 2: ***Matrix 1000*** *Main Dashboard*

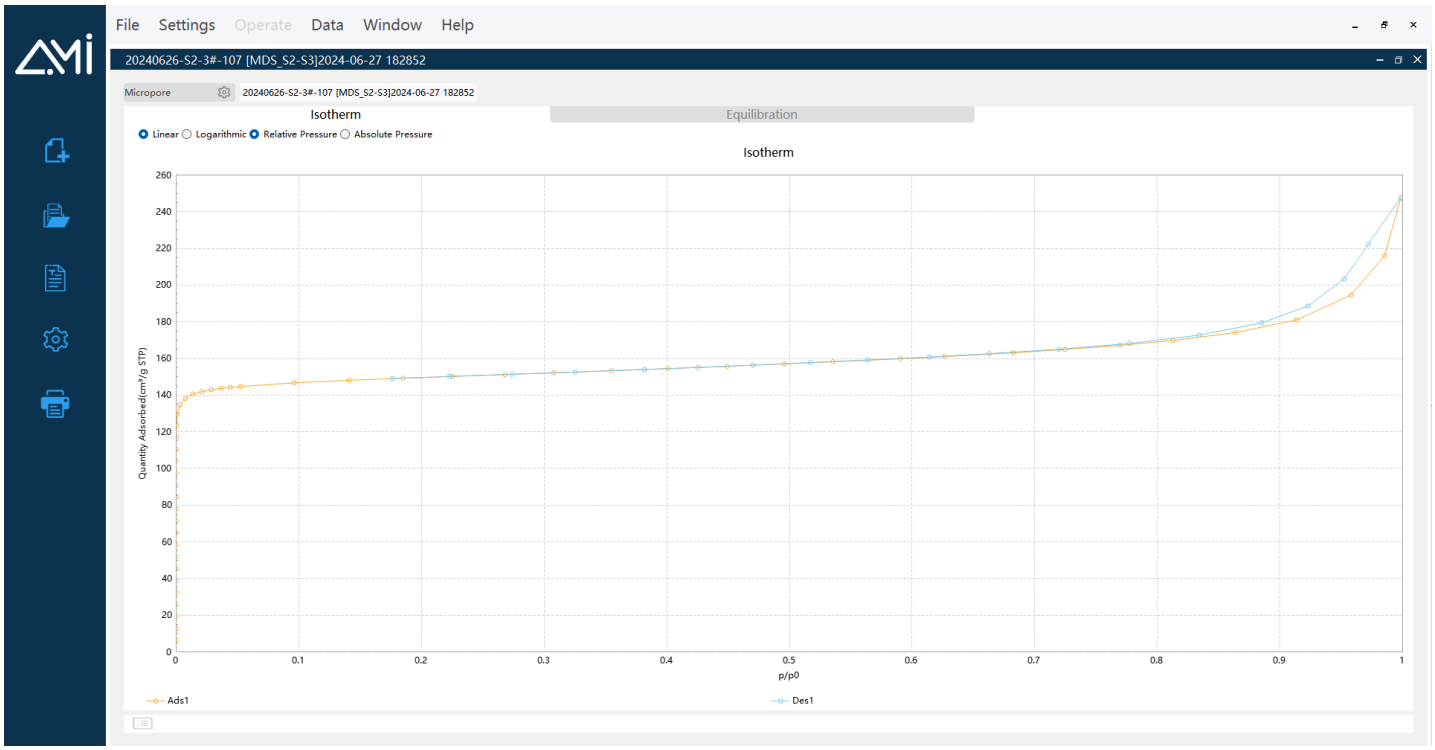

Figure 3: Nitrogen adsorption–desorption isotherm of a BAM-certified zeolite

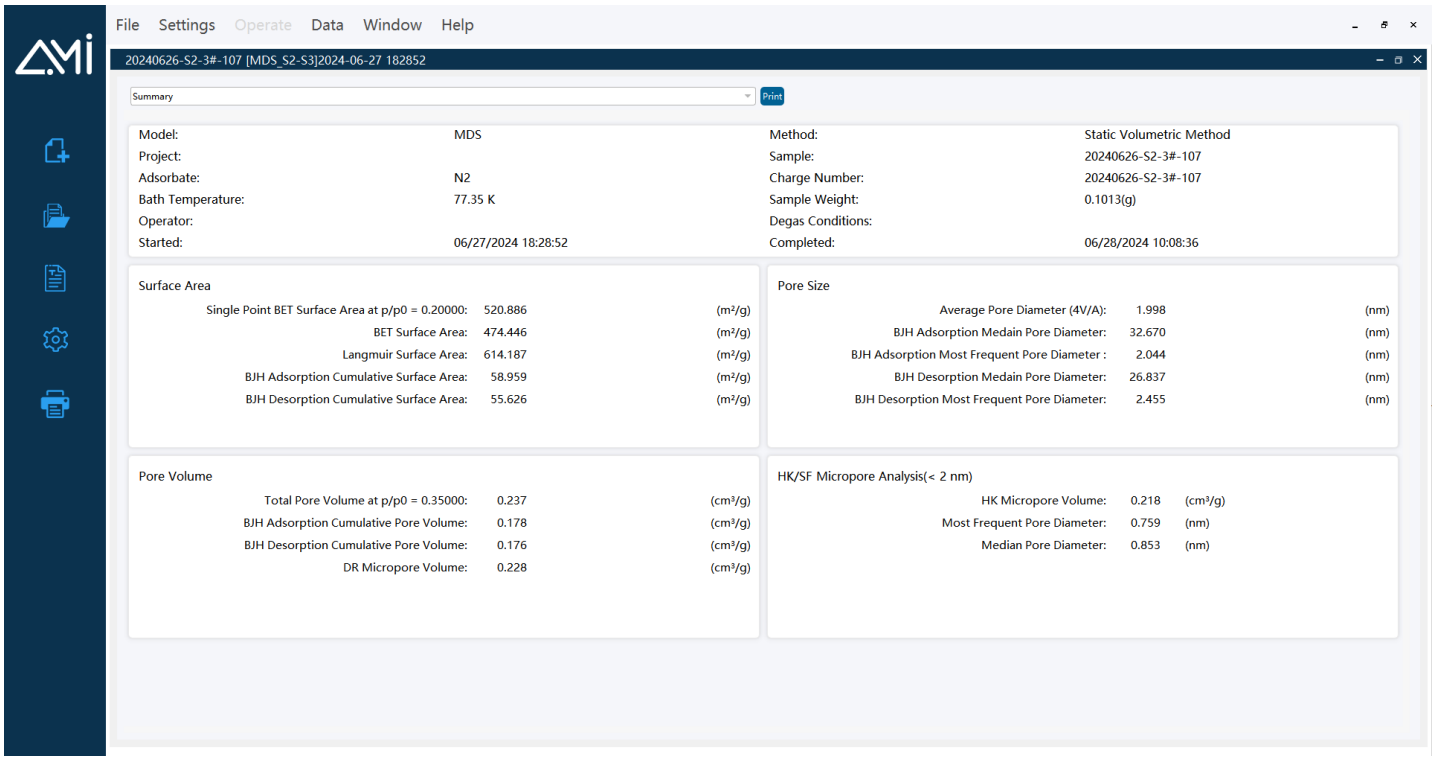

Figure 4: Summary Data Reduction Screen of a BAM-certified Zeolite

STATION CONFIGURATION OPTIONS

Each Matrix 1000 unit includes one dedicated degas furnace and offers flexible station-level sensor configurations. Total sensors listed include Ps, P_0, and degas pressure monitoring sensors.

Configuration	Analysis Transducers	Total Transducers
4x Mesopore	1000 Torr on each station	6
1x Micropore	1000, 10, 1 Torr	5
1x Micropore (High Res)	1000, 10, 0.1 Torr	5
2x Micropore	1000, 10, 1 Torr on each	8
2x Micropore (High Res)	1000, 10, 0.1 Torr on each	8
3x Micropore	1000, 10, 1 Torr on each	11
3x Micropore (High Res)	1000, 10, 0.1 Torr on each	11
4x Micropore	1000, 10, 1 Torr on each	14
4x Micropore (High Res)	1000, 10, 0.1 Torr on each	14
1x Mesopore + 3x Micropore	Meso: 1000 Torr; Micro: 1000, 10, 0.1 Torr	12
2x Mesopore + 2x Micropore	Meso: 1000 Torr; Micro: 1000, 10, 0.1 Torr	10
3x Mesopore + 1x Micropore	Meso: 1000 Torr; Micro: 1000, 10, 0.1 Torr	8

MATRIX 1000 MESO -VS- MICRO

Category	Mesopore	Micropore
Surface Area Range	≥ 0.01 m^2/g (RSD ≤ 1.0%)	≥ 0.0005 m^2/g (RSD ≤ 1.0%) with Krypton
Pore Size Range	0.35–500 nm (using CO2 for micropores)	0.35–500 nm
Cold Trap	Repeatability ≤ 0.2 nm	Repeatability ≤ 0.02 nm
Analysis Pressure Sensors	Option	Included

SPECIFICATIONS

Category	Specification
Model Options	1, 2, or 3 analysis units (up to 12 ports total)
Analysis Ports per Unit	Up to 4
Measurement Capabilities	BET (single and multi-point), Langmuir, BJH, STSA, t-plot, DFT, NLDFT, HK, SF, MP, DR, DA, t-Plot, Isotherms, Heat of Adsorption, Total Pore Volume, Adsorption Kinetics
Pore Volume Resolution	≥ 0.0001 cm^3/g
Pressure Range (P/P_0)	10^{-4} to 0.998 (meso); 10^{-8} to 0.998 (High Res micropore)
P_0 Transducers	1 per unit, 1000 Torr, 0.25% FS
Degassing Ports	In-situ - 4 / 8 / 12 (based on configuration)
Degassing Temp (Max)	400°C ±1°C (active cooling included)
Degassing Ramp Control	Yes – programmable ramp and soak
Degas Pressure Monitoring	Yes – user-defined thresholds
Vacuum System	Mechanical: Ultimate vacuum 10^{-1} Pa; minimal 7.5 x 10-4 torr; Optional Turbo: 10^{-8} Pa; minimal 7.5×10^{-11} torr
Temperature Control	Air bath + valve box; Max 45°C ±0.1°C
Gas Compatibility	N_2, CO_2, Ar, Kr, H_2, O_2, CO, CH_4 (standard: non-corrosive gases) Optional: Harsh Chemistry model with passivation coating and FFKM seals
Vapor Sorption Option	Available
Dewar Capacity	3L
BET Throughput	4 samples/5-point BET <~28 min fully optimized
Dosing & Equilibrium Control	Supports user-defined pressure tables and quick-start templates. Gas is introduced stepwise to target relative pressures, with adsorption equilibrium determined by pressure stability over a fixed time window.
Cold Space Calibration	Automatic
Station Independence	Four workstations per unit; independent test types with same adsorbate. Synchronized start/finish with alternating gas dosing. Independent dosing, vacuum, and control per station.
Software	APAS software with analysis models, leak detection, and vacuum diagnostics
Data Export	Excel, TXT, RAW, PDF; full reprocessing supported
Gas Inlet Ports	2 per unit (Helium and Adsorption Gas); expandable to 18
Power Requirements	220 VAC, 16 A
Dimensions (L × W × H)	27.6 × 27.6 × 41.3 in (70 × 70 × 105 cm)
Weight	242 lbs (110 kg)
Compliance	CE, EMC, RoHS