AMI-Micro 300 Series

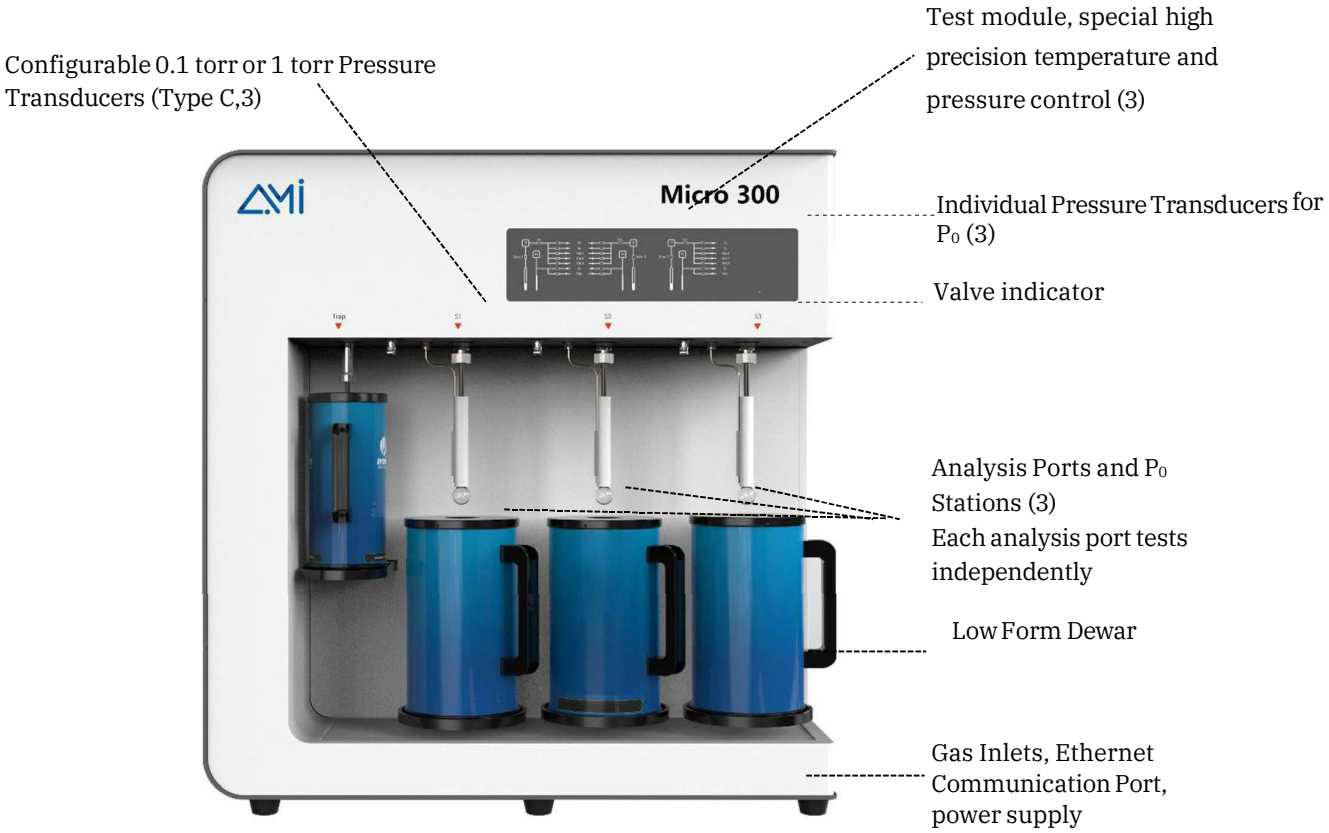
BET Surface Area and Pore Size Analyzer

INTRODUCTION

"Accurate, Accessible, Advanced Gas Sorption"

The **AMI-Micro 300 Series** is a high-precision physisorption instrument designed for specific surface area and pore size analysis of various materials. It is equipped with three independently operating analysis ports, allowing different adsorbate gases to be configured and tested simultaneously. Based on functional capabilities, the series is categorized into three models: A, B, and C (see the specification table for additional details). Each analysis station features a dedicated dosing manifold to optimize analysis time and ensure precise gas dosing.

The Micro 300 B and C models are equipped with a 1 torr or 0.1 torr high-sensitivity pressure transducers and a turbo molecular pump with an ultimate pressure of 10^{-8} Pa, ensuring precise measurements of microporous structures. Furthermore, all three analysis stations support in-situ sample preparation, minimizing the risk of contamination. This instrument is particularly well-suited for the characterization of microporous materials, including MOFs, molecular sieves, catalysts, activated carbon, and other porous substances.



*Instrument Structural Layout of **AMI-Micro 300 Series***

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FEATURES

Module Design for Minimal Dead Volume

The internal gas path design of the instrument adopts a unique integrated metal module design, which not only reduces the internal dead volume space but also lowers the system leakage rate.

Saturated Vapor Pressure P_0

An independent P_0 pressure transducer is configured at 133 kPa for P_0 value testing, enabling real-time P/P_0 measurement for more accurate and reliable test data. Alternatively, an atmospheric pressure input method can be used to determine P_0.

Independent analysis ports

With independent analysis ports, the system employs a unique vacuum control logic that allows each station to operate without disruption, even when using a single mechanical pump or pump group. This enables simultaneous, independent experiments, meeting diverse adsorbent testing needs while ensuring high efficiency.

High-Precision Micropore Distribution Analysis

Utilizes advanced micropore models, including the Horvath-Kawazoe (HK) and Saito-Foley (SF) methods, to accurately determine pore size distribution. Ensures an aperture deviation of less than 0.02 nm, providing precise characterization of microporous materials in gas adsorption studies.

Thermal Stabilization

A core rod in the sample tube reduces dead volume and stabilizes the cold free space coefficient, while an iso-thermal jacket maintains a constant thermal profile along the tube. Additionally, automatic helium correction ensures precise calibration for any powder or particulate material, minimizing temperature- related deviations during analysis.

Customizable Selection of Pressure Transducers

Depending on the model, the **AMI-Micro 300 Series** offers various quantities and types of pressure transducers. Among them, the Micro 300C, equipped with a 1 Torr transducer (selectable 0.1 Torr), enables a partial pressure (P/P_0) of up to 10^{-8} (N_2/77 K) in physical adsorption analysis.

Optimized Manifold Contamination Control

This system features a multi-channel, adjustable, and parallel vacuum design with segmented vacuum control. This setup effectively prevents samples from being drawn up into the analyzer therefore preventing manifold contamination.

Turbo Molecular Pump

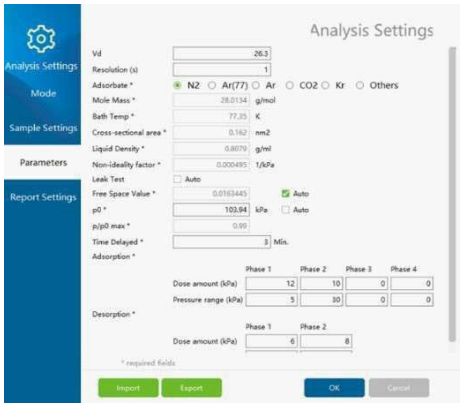
A Turbo Molecular pump is included on the Micro 300B and Micro 300C. Achieving ultimate pressures of 10^{-8} Pa, this system ensures a solid foundation for precise micropore analysis at ultra-low pressures.

In-situ Degassing Ports

Equipped with three in-situ degassing ports, enabling simultaneous degassing and analysis. Each port offers independent temperature control from ambient to 400°C, ensuring precise sample preparation. In-situ degassing enhances microporous material analysis by providing superior efficiency over ex-situ methods.

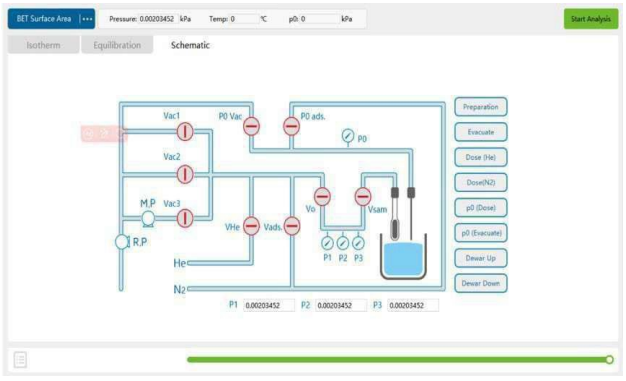
SOFTWARE

PAS Software is an intelligent solution for operation control, data acquisition, calculation, analysis, and report generation on the Windows platform. It communicates with the host via the LAN port and can remotely control multiple instruments simultaneously.



PAS Software adopts a unique intake control method, optimizing pressure in the adsorption and desorption processes through a six-stage setting, which improves testing efficiency

Each adsorption equilibrium process is dynamically displayed on the test interface. Adsorption characteristics of the sample can be easily understood.



Changes in pressure and temperature inside the manifold can be directly observed in the test interface, providing convenience for sample testing and instrument maintenance. Current state of analyzer can be intuitively understood with the indicator light and event bar.

A clear and concise report setting interface, including the following:

- Adsorption and desorption isotherms
- Single-/Multipoint BET surface area
- Langmuir surface area
- STSA-surface area
- pore size distribution according to BJH
- t-plot
- Dubinin-Radushkevich
- Horvath-Kawazoe
- Saito-Foley

TYPICAL ANALYSIS RESULTS

- The specific surface area test results for iron ore powder are shown in the figure below. As a material with an inherently low specific surface area, the repeatability error in the measurements is only 0.0015 m²/g, demonstrating high testing precision.

ID	Pd	Pcd	P/Po	V	R	Time
2	10.57665	6.49165	0.06368	0.05149	1.32095	16:39:04
3	14.47043	10.49325	0.10300	0.05714	2.00944	16:40:34
4	20.49214	15.55271	0.15266	0.06328	2.84716	16:42:08
5	26.25142	20.97835	0.20608	0.06958	3.73044	16:43:45
6	31.09524	26.11512	0.25661	0.07540	4.57787	16:45:24
7	36.24625	31.26206	0.30719	0.08122	5.45905	16:47:06

Slope	Intercept	Vm	C	Cc
16.90313	0.25562	0.05828	67.12578	0.99997

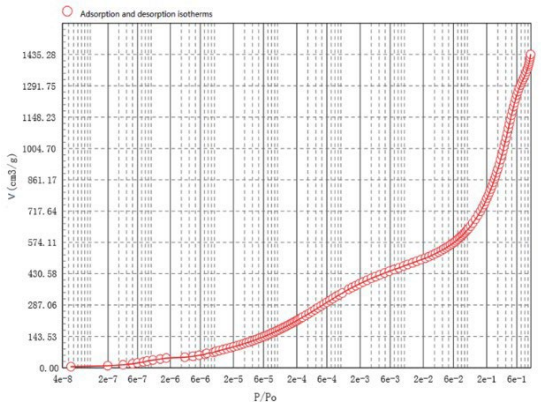
Specific surface area (m2/g): 0.25410

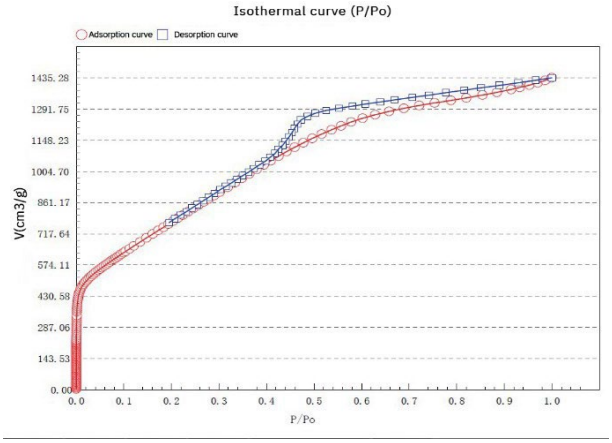
ID	Pd	Pcd	P/Po	V	R	Time
2	11.12797	7.02669	0.06872	0.05193	1.42099	14:21:24
3	15.08480	11.06897	0.10834	0.05767	2.10708	14:22:55
4	21.71276	16.45800	0.16109	0.06420	2.99078	14:24:29
5	27.29098	21.94468	0.21492	0.07083	3.86529	14:26:07
6	32.00053	27.05703	0.26512	0.07653	4.71376	14:27:46
7	37.32853	32.26907	0.31619	0.08262	5.59644	14:29:28

Slope	Intercept	Vm	C	Cc
16.78425	0.27576	0.05862	61.86487	0.99996

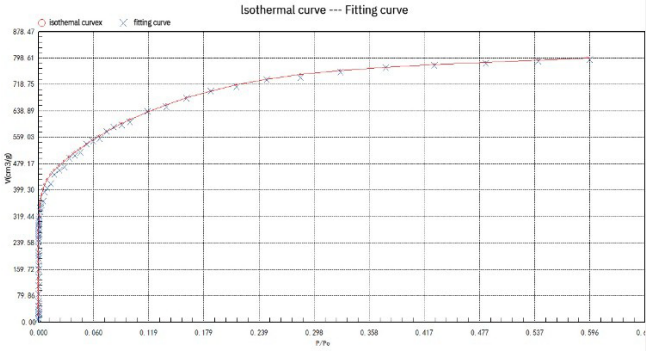
Specific surface area (m2/g): 0.25557

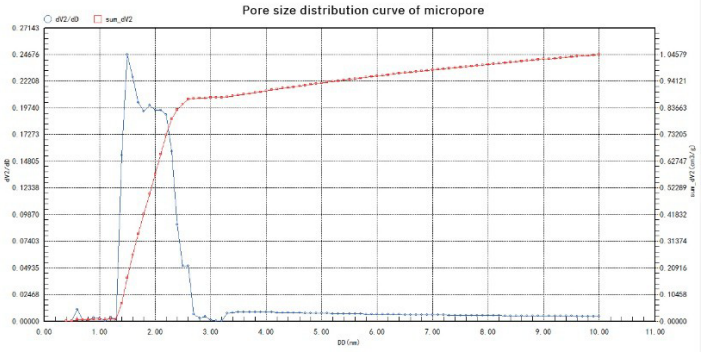
- Adsorption and Desorption Isotherms of typical macro/mesoporous materials - silica





- Analysis of pore size distribution of activated carbon materials by NLDFT.





SPECIFICATIONS

Model		AMI-Micro 300 Series		
Specific Model		300A	300B	300C
Analysis Ports		3	3	3
P_0 Transducer		3	3	3
Analysis Pressure Transducer		3	5	9
Pressure Transducers Configuration	**Port 1**	1000 torr	1000 torr; 1000 torr, 10 torr (Optional); 1000 torr, 10 torr, 1(0.1) torr (Optional);	1000 torr, 10 torr, 1(0.1) torr
	Port 2	1000 torr	1000 torr; 1000 torr, 10 torr (Optional); 1000 torr, 10 torr, 1(0.1) torr (Optional);	1000 torr, 10 torr, 1(0.1) torr
	Port 3	1000 torr	1000 torr; 1000 Torr, 10 torr(Optional)	1000 torr, 10 torr, 1(0.1) torr
Pressure Transducer Accuracy And Resolution		Accuracy: 0.05% F.S., Resolution: 0.0005% F.S.	1000 torr - Accuracy: 0.05% F.S., Resolution: 0.0005% F.S. 10 torr/ 1 torr -Accuracy: 0.2% RDG, Resolution: 0.003% F.S. 0.1 torr -Accuracy: 0.5% RDG, Resolution: 0.003% F.S.	
Pump		1 Mechanical Pump (ultimate vacuum 10^{-1} Pa; minimal 7.5×10^{-4} torr)	1 Mechanical Pump (ultimate vacuum 10^{-1} Pa; minimal 7.5×10^{-4} torr); 1 Turbo Molecular Pump (ultimate vacuum 10^{-8} Pa; minimal 7.5×10^{-11} torr)	
P/P_0 Range		10^{-4} - 0.998	10^{-8} - 0.998	
Specific Surface Area		≥ 0.01 m^2/g, test repeatability: RSD ≤ ±1.0%	N_2: 0.05 m^2/g to upper limit; Kr: 0.0005 m^2/g to upper limit. Test repeatability: RSD ≤ ±1.0%	
Pore Size Range		.35*-500 nm, test repeatability: ≤ ±0.02 nm (*Achieved with CO_2)	0.35-500 nm, test repeatability: ≤ ±0.02 nm	
Pore Volume		≥ 0.0001 cm^3/g		
Degassing Ports		3 in-situ		
Adsorbates		N_2, CO_2, Ar, Kr, H_2, O_2, CO, CH_4, etc.		
Cold Trap		1		
Dimensions and Weight		L 36.0 in (915 mm) × W 22.4 in (570 mm) × H 36.0 in (915 mm), 286 lbs (130 kg)		
Power Requirements		110V or 200-240 VAC, 50/60 Hz, maximum power 300 W		

ABOUT US

Advanced Measurement Instruments (AMI), consisting of Altamira Instruments, Rubolab, ISI, and JWGB, offers a comprehensive portfolio of solutions for all your material characterization needs. As a global and diversified company, we have many years of professional experience, and our mission is to empower scientists and researchers around the world in the field of materials science by providing cutting-edge analytical instruments. We are committed to providing high-quality, user-friendly, cost-effective products and services to ensure that customers get the best solutions in research and industrial applications.

MISSION

At AMI, our mission is to advance the world of materials characterization by providing cutting-edge analytical instruments that empower customers in commercial and research fields.

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