



High Performance BET Surface Area and Pore Size Analyzer

AMI Micro Series

Test Range of Pore Diameter
0.35-500nm

Range of Specific Surface Area
0.0001 m²/g



Altamira Instruments LLC

Micro Series

High Performance Specific Surface And pore size Analyzer



Single-/Multipoint BET Surface Area

BJH Adsorption and Desorption

Horvath-Kawazoe

Saito-Foley

Material Research

Chemical Engineering

New Energy

Catalytic Technologies

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Test Range
of Pore Diameter
0.35-500nm

Range of
Specific Surface Area
> 0.0001m²/g

Pore Repeated
Deviation
< 0.02nm

Standard Sample
Repeat Accuracy
±1%



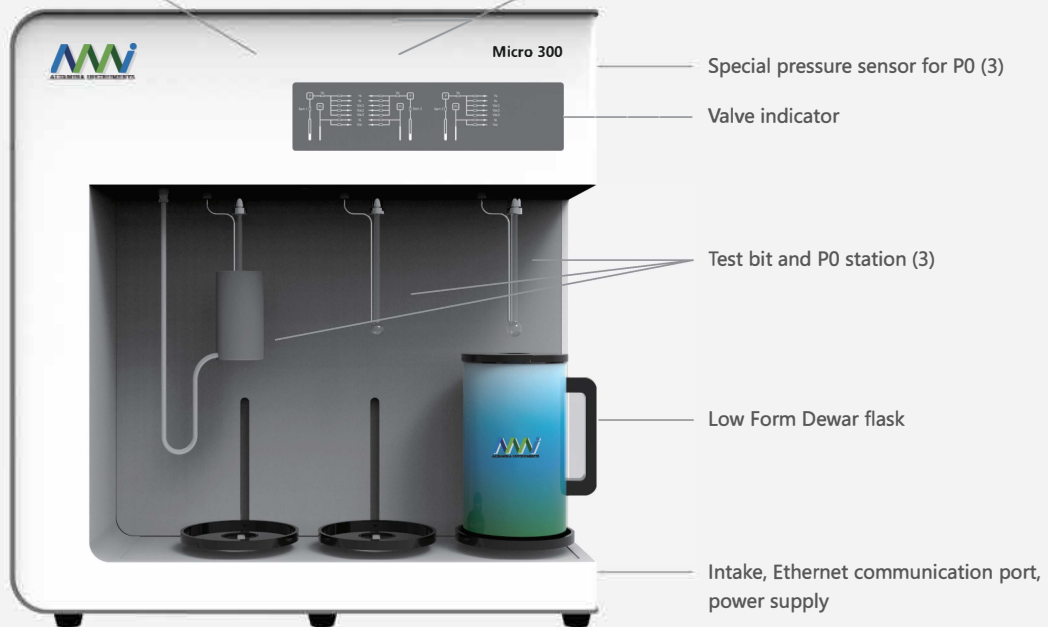
Summary

The AMI Micro Series can accurately produce surface area and pore size results of powder materials. According to the different test functions, this series of instruments are divided into three types, there are A, B, and C and up to 1-, 2-, 3 analysis stations with PO stations. Every analysis station has its own dedicated dosing manifold for optimal analysis duration. The C type is configured with 1 torr or 0.1 torr high-sensitive pressure sensors and turbo molecular pump with ultimate pressure of 10⁻⁸ Pa. The three analysis stations can also be used for in-situ sample preparation to avoid sample contamination. It can effectively take microporous analysis of microporous materials such as molecular sieve, catalyst, activated carbon, and other microporous materials.

Outline

0.1 torr or 1 torr small range pressure sensor (Type C, 3)

Test module, special high precision temperature and pressure control (3)



Example Micro 300 Outline

Features

Test Module

Internal temperature of test module can be controlled through Real-time monitoring, ensuring accuracy of adsorption detection.

Saturated Vapor Pressure P_0

Using independent P_0 pressure sensor for P_0 value by inching test, guarantees the reliability of experimental data. Atmospheric pressure input method to determine P_0 also be selected.

p_0 * kPa Auto
 p/p_0 max *

Vacuum System

It's a multi-channel, adjustable, and parallel vacuum system. Vacuum degree of this system can be controlled in segments.

This design prevents the sample from being pumped into analyzer. Meanwhile, a delicate part was designed for ensuring cleanliness of vacuum system, minimizing dust pollution.

Sample Preparation System

In addition to two pretreatment stations, the other two analysis stations can be used in preparing samples. There is no interference between pretreatment stations and analysis stations.

Degas temperature can be set individually and controlled from ambient to 400 °C.

Micropore Distribution

Accurately apply the HK method, SF method and other micropore analysis model, the aperture deviation of micropore is less than 0.02 nm.

Pressure Sensor

Micro C model with 1 torr (selectable 0.1 torr) makes the partial pressure of P/P_0 up to 10^{-7} - 10^{-8} ($N_2/77K$) in the physical adsorption analysis.



Cold Free Space

Cold free space can be corrected by Helium automatically, ensuring accuracy of test results. This calibration method is suitable for testing of any powder or particle material.

Control of Liquid Nitrogen level

Using High volume (3L) Dewar flasks and working with the seal cover assure a constant thermal profile along the length of sample tubes and P_0 tubes throughout testing process.

Turbo Molecular Pump

Molecular pump is a standard configuration part on the Micro C series. The ultimate pressure is up to 10^{-8} Pa, providing a strong support for micropore analysis in the ultra-low pressure. The smallest micropore diameter can be tested is 0.35 nm.

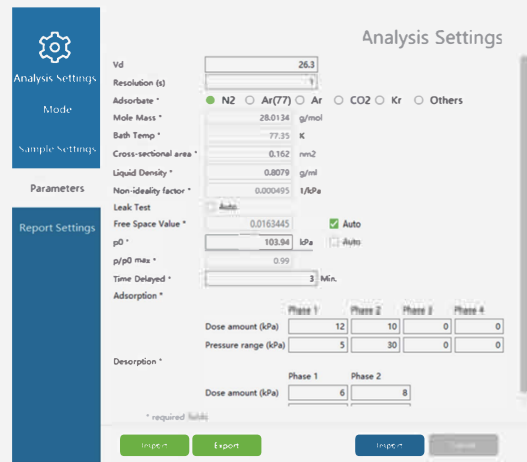
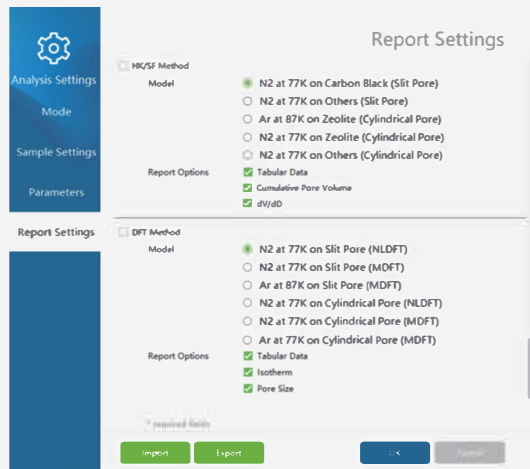
AMI-BK Control and Analysis Software

AMI-BK Software is intelligent software in operation control, data acquisition, calculation and analysis and report generation on the Windows platform. This software can communicate with the host through the LAN port and remotely control many instruments at the same time.

Clear tabular reports include:

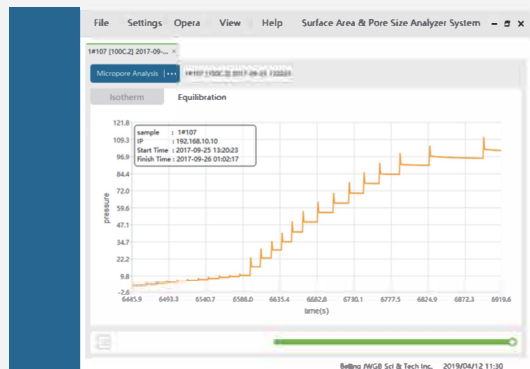
- Adsorption and desorption isotherms
- Single-/Multipoint BET surface area
- Langmuir surface area
- STSA-surface area
- pore size distribution according to BJH
- t-plot
- Dubinin-Radushkevich
- Horvath-Kawazoe
- Saito-Foley

AMI-BK Software adopts a unique intake control method, the pressure in adsorption and desorption process is optimally set in six- stage; this flexible design is helpful for improving test efficiency.



Changes of the pressure and temperature inside the manifold can be observed directly in the test interface which is convenient for sample test and instrument maintenance.

Current state of analyzer can be intuitively understood with the indicator light and event bar. Each adsorption equilibrium process is dynamically displayed on the test interface. Adsorption characteristics of the sample can be easily understood.



Typical analysis examples

BET repeatability is only 0.0015 m² / g in the test of very low surface area powder

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	V _m	C	C _c
16.90313	0.25562	0.05828	67.12578	0.99997

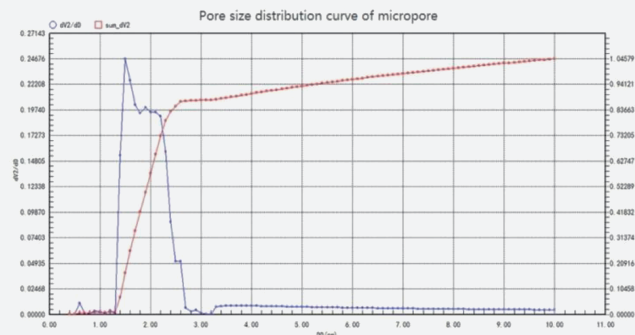
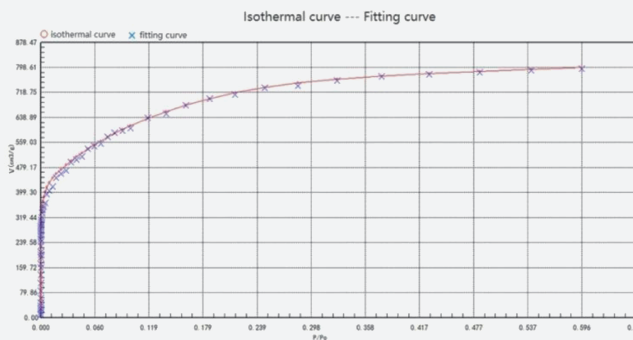
Specific surface area (m²/g) : 0.25410

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

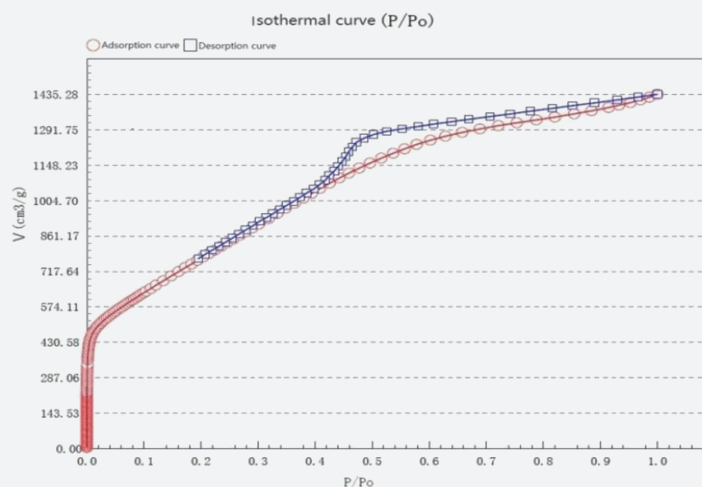
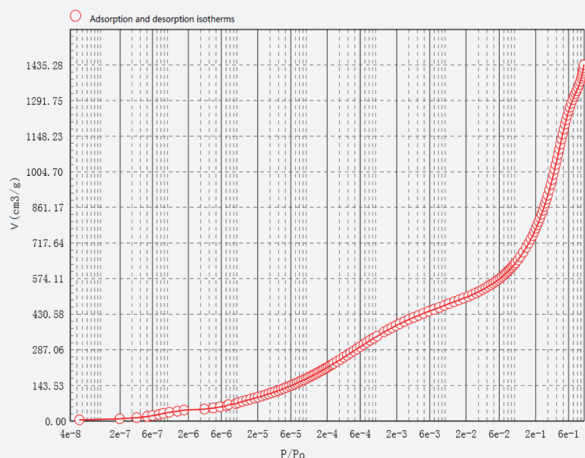
Slope	Intercept	V _m	C	C _c
16.78425	0.27576	0.05862	61.86487	0.99996

Specific surface area (m²/g) : 0.25557

Analysis value of pore size distribution in activated carbon materials as follows:



Microporous analysis Report of carbon materials as below:



Specification

Model	Micro 100A	Micro 100B	Micro 100C
Pressure sensor	1000 Torr for each analysis port	1000 Torr, 10 Torr	1000 Torr, 10 Torr, 1 Torr (0.1 Torr)
Range of relative pressure P/P0	10^{-4} -0.998	10^{-8} -0.998	10^{-8} -0.998
Pore size	2 nm-500 nm; Pore Size Repeatability: ≤ 0.2 nm, enabling accurate analysis of pores larger than 2 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.
Vacuum pump	A two-stage rotary vane mechanical vacuum pump, the ultimate vacuum is $6.7 \cdot 10^{-2}$ Pa	Turbo molecular pump (ultimate vacuum 10^{-8} Pa) and mechanical vacuum pump	Turbo molecular pump (ultimate vacuum 10^{-8} Pa) and mechanical vacuum pump
Specific surface area	> 0.0005 m ² /g, standard sample test repeatability (RSD) $\leq 1.0\%$		
Analysis stations	1		
Analysis ports	0 independent analysis ports		
Minimum pore volume	0.0001 cm ³ /g		
Analysis gases	N ₂ , Ar, Kr, H ₂ , O ₂ , CO ₂ , CO, NH ₃ , CH ₄ , etc.		
Degassing system	2 additional vacuum heating degas station; samples on analysis ports can be degassed independently, option is external independent vacuum degasser		
Volume and weight	L 870 mm × W 570 mm × H 890 mm, 80 kg-90 kg		
Power requirements	200-240 VAC, 50/60 Hz, maximum power 300 W		

Specification

Model	Micro 200A	Micro 200B	Micro 200C
Pressure sensor	1000 Torr for each analysis port	1000 Torr, 10 Torr, 1 Torr (0.1 Torr) for one analysis port; 1000 Torr for another one	1000 Torr, 10 Torr, 1 Torr (0.1 Torr) for each analysis port
Range of relative pressure P/P0	10^{-4} -0.998	10^{-8} -0.998	10^{-8} -0.998
Pore size	2 nm-500 nm; Pore Size Repeatability: ≤ 0.2 nm, enabling accurate analysis of pores larger than 2 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.
Vacuum pump	A two-stage rotary vane mechanical vacuum pump, the ultimate vacuum is 6.7×10^{-2} Pa	Turbo molecular pump (ultimate vacuum 10^{-8} Pa) and mechanical vacuum pump	Turbo molecular pump (ultimate vacuum 10^{-8} Pa) and mechanical vacuum pump
Specific surface area	> 0.0005 m ² /g, standard sample test repeatability (RSD) $\leq 1.0\%$		
Analysis stations	3		
Analysis ports	3 independent analysis ports		
Minimum pore volume	0.0001 cm ³ /g		
Analysis gases	N ₂ , Ar, Kr, H ₂ , O ₂ , CO ₂ , CO, NH ₃ , CH ₄ , etc.		
Degassing system	2 additional vacuum heating degas station; samples on analysis ports can be degassed independently, option is external independent vacuum degasser		
Volume and weight	L 870 mm × W 570 mm × H 890 mm, 80 kg-90 kg		
Power requirements	200-240 VAC, 50/60 Hz, maximum power 300 W		

Specification

Model	Micro 300A	Micro 300B	Micro 300C
Pressure sensor	1000 Torr for each analysis port	1000 Torr, 10 Torr, 1 Torr (0.1 Torr) for one analysis port; 1000 Torr for another one	1000 Torr, 10 Torr, 1 Torr (0.1 Torr) for each analysis port
Range of relative pressure P/P0	10^{-5} -0.998	10^{-8} -0.998	10^{-8} -0.998
Pore size	2 nm-500 nm; Pore Size Repeatability: ≤ 0.2 nm, enabling accurate analysis of pores larger than 2 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.	0.35 nm-500 nm; Pore Size Repeatability: ≤ 0.02 nm, enabling accurate analysis of pores larger than 0.35 nm.
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Analysis gases	N ₂ , Ar, Kr, H ₂ , O ₂ , CO ₂ , CO, NH ₃ , CH ₄ , etc.		
Degassing system	3 additional vacuum heating degas station; samples on analysis ports can be degassed independently, option is external independent vacuum degasser		
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Applications

Applied Field	Typical Materials	Details
Material Research	ceramic powder, metal powder, nanotube	According to surface area value of nanotube, hydrogen storage capacity can be predicted.
Chemical Engineering	carbon black, amorphous silica, zinc oxide, titanium dioxide	Surface area of carbon black is one of the important factors affecting the reinforcement performance of rubber products.
New Energy	lithium cobalt, lithium manganate	Increasing surface area of electrode can improve Electrochemical reaction rate and promote iron exchange in negative electrode.
Catalytic Technologies	active alumina oxide, molecular sieve, zeolite	Active surface area and pore structure influence reaction rate.



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