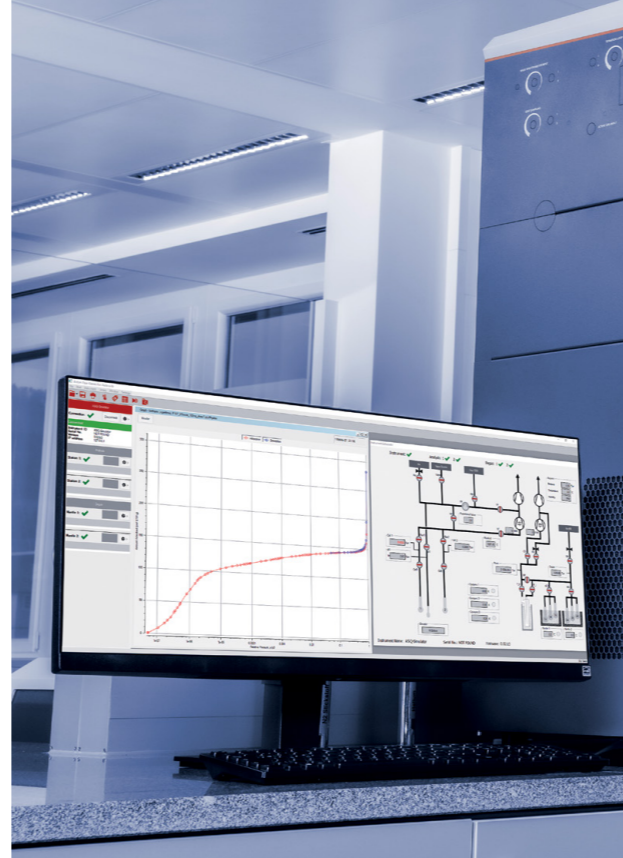


# High Vacuum Gas Sorption Analyzers

**Autosorb Series**





1

2

3

4

5

# The Choice Is Clear: Absolutely Autosorb

The new Autosorb series of customizable high vacuum gas sorption analyzers is designed for the most challenging measurements of BET surface area, active area, and pore size distributions in the nanometer range. With Autosorb, we deliver on the most important requirements of material characterization laboratories: **accuracy, agility, accessibility, adaptability, and assurance.**

## 1. Absolutely accurate

- Precise manifold temperature control  $<0.05\text{ }^{\circ}\text{C}$
- Exceptionally leak-tight system
- TruZone active coolant level control

## 2. Absolutely agile

- Six best-in-class degassing stations
- Three samples, three gases, three temperatures simultaneously
- 90+ hour cryogen Dewar or  $1,100\text{ }^{\circ}\text{C}$  furnace

## 3. Absolutely accessible

- DoseWizard
- PowderProtect
- Intuitive Kaomi software

## 4. Absolutely adaptable

- Autosorb 6100 for routine micropore analysis
- Autosorb 6200 for an extended measurement range
- Autosorb 6300 for maximum measurement flexibility

## 5. Absolutely assured

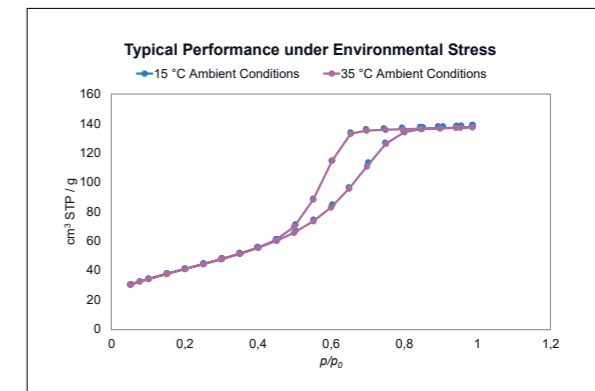
- Compliant with 20+ ASTM, DIN, and ISO standards
- Three-year warranty
- Anton Paar global support network



Find out more

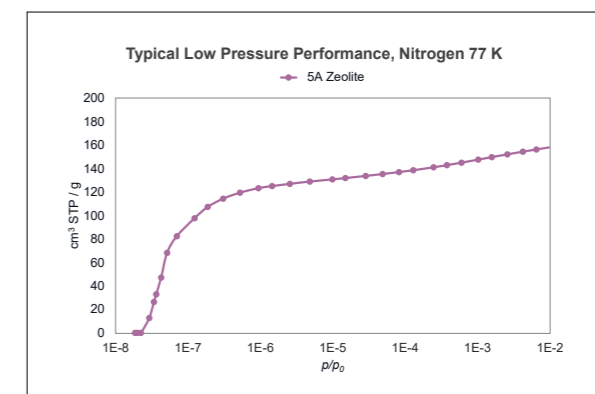
# Absolutely Accurate: Free from Error, Exact

Leveraging over 50 years of experience in gas sorption technology, the Autosorb series has been engineered from the ground up to optimize every step in the measurement process for accuracy and performance.



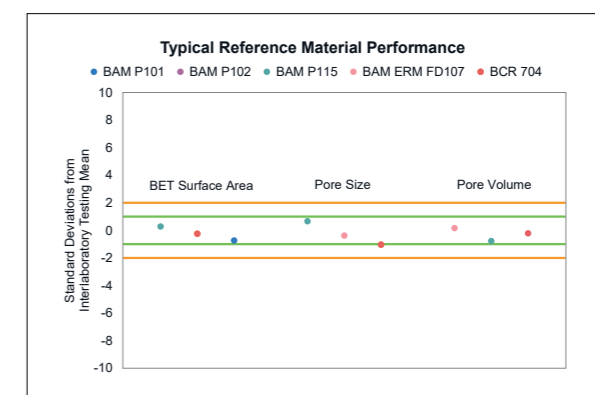
### Precise manifold temperature control

Control the manifold temperature between 35 °C and 50 °C with stability better than 0.05 °C. Obtain accurate results day in and day out, no matter the environmental conditions.



### Exceptionally leak-tight system

Vacuum-brazed, stainless steel manifold block construction and pneumatically actuated bellows valves ensure 38 % better vacuum performance than previous-generation instruments and high-accuracy data in the 10<sup>-8</sup> p/p<sub>0</sub> domain with nitrogen.

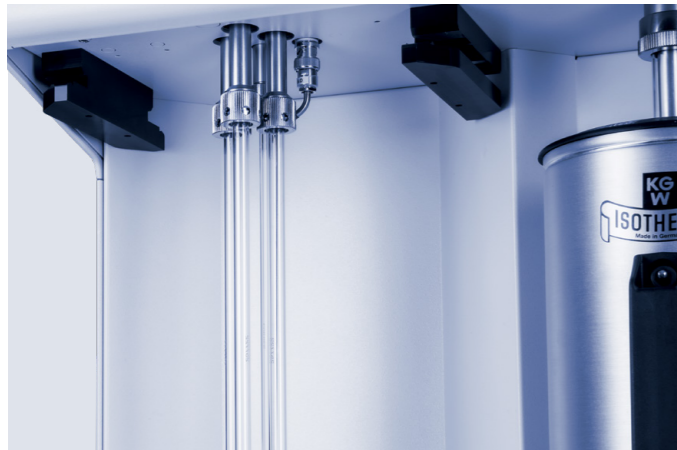


### TruZone active coolant level control

TruZone active coolant level control generates a near-constant temperature profile along the analysis cell, ensuring accurate measurement of a wide range of material properties and sample types. The small and constant cold zone also ensures better than 2 % reproducibility of nitrogen BET surface areas even with less than 2 m<sup>2</sup> in the cell.

# Absolutely Agile: Able to Move Quickly and Easily

Best-in-class analysis and sample preparation features on the Autosorb series keep your research agile, maximizing your laboratory's output of advanced measurements and novel materials.



## Up to three independent analysis stations to keep you flexible

Because the analysis stations are separate and have dedicated transducer sets, you can analyze up to three different samples with three different analysis gases simultaneously. You can also pair these with our patented CryoSync accessories so that each station measures at independent analysis temperatures.



## 90+ hour analysis Dewar for long-lasting measurements

The three-liter Dewar included with Autosorb instruments holds enough cryogen to last for more than 90 hours. You'll never have to come in on the weekend to refill the Dewar again. Connect your Autosorb with alternative Dewars and external temperature control accessories for maximum analysis flexibility.



## Measurement agility realized with quick switching to the 1,100 °C furnace

Switch between the cryogenic Dewar and the 1,100 °C furnace on Autosorb 6200 and 6300 instruments in minutes. Rapidly perform a complete characterization of your catalysts – including BET surface area, pore size distribution, active area, and metal dispersion – quickly and easily.



## Six degassing stations and two independent heating zones for maximum flexibility

Simultaneously prepare two sets of samples at two independent temperatures up to 450 °C. A built-in two-liter cold trap, turbomolecular pump, and adaptive heating profiles, including automated pressure-controlled heating and test for completion, ensure your samples are properly prepared for analysis.

# Absolutely Accessible: Easy to Understand, Easy to Use

The new Kaomi software gives you streamlined control of your Autosorb – no matter your experience level – while also offering advanced analytical performance and flexibility.



#### **DoseWizard system for simplified workflows**

Kaomi for Autosorb makes gas sorption easy for users of all levels. Simply select one of our 45+ built-in analysis profiles or tell the instrument your desired analysis methods, and Autosorb will do the rest. For expert users, an advanced mode provides full control of analysis procedures.

#### **PowderProtect keeps instrument downtime to a minimum**

Our new PowderProtect feature virtually eliminates the risk of sample elutriation (loss of powder into the instrument) without requiring special evacuation parameters for different sample types, preventing contamination of the instrument by inexperienced operators.

#### **Sample ID tracking ensures traceability**

The Kaomi for Autosorb sample library stores and tracks all sample IDs, sample weights, cell selections, and degassing conditions so you don't have to.

#### **Streamlined user interface keeps you in control**

Monitor the instrument status from the sidebar, log view, or an enlarged instrument schematic view. Ensure optimal performance of your instrument by tracking the next service date and performing fully guided maintenance routines. With Kaomi, you're always in control.

#### **Dynamic Kaomi React interface makes complex analyses easy**

Analyzing dynamic flow chemisorption measurements has never been easier. The new Kaomi React interface helps you easily find measurement files and intuitively guides you through advanced peak deconvolution and pulse titration analyses.

#### **Multi-language support for operators around the globe**

With support for eight different languages, Kaomi for Autosorb lets you control the instrument and analyze data in the language in which you are most comfortable.

# Absolutely Adaptable: Adjusts to New Conditions, Flexible

Select the Autosorb to meet your current application needs with a choice of three instrument models. As your research changes, accessory kits for physisorption, chemisorption, and more allow your Autosorb to adapt to new applications.

## Autosorb 6100

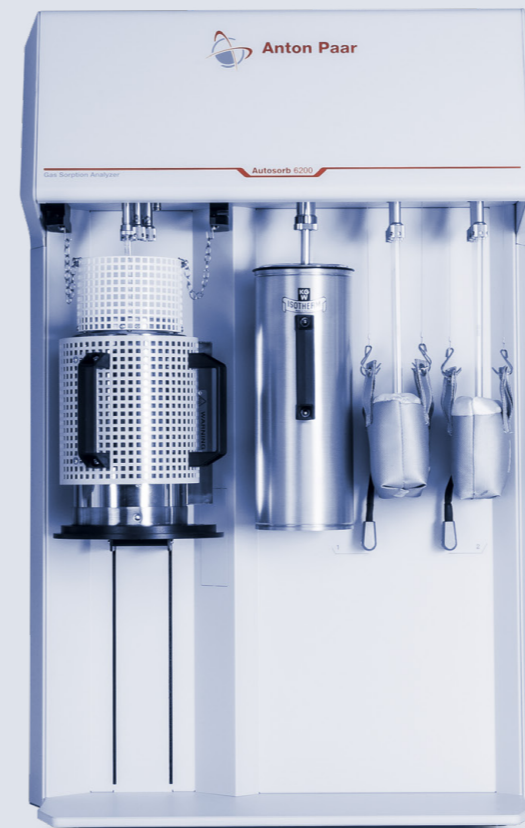
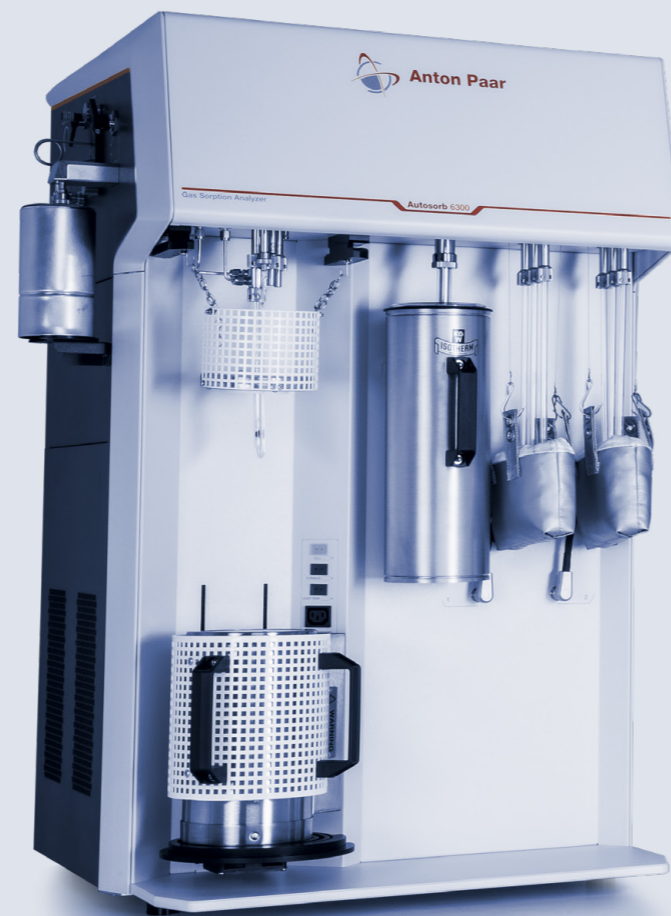
Our basic high-vacuum analyzer features independent analysis stations and a long-lasting cryogen Dewar perfect for analyses of surface area and pore size.

## Autosorb 6200

Our mid-range analyzer extends the measurement capabilities of the 6100 with lower pressure transducers and wider chemical compatibility. Autosorb 6200 can be paired with a 1,100 °C furnace or vapor sorption accessories to perform a wide range of static chemisorption, vapor sorption, and physisorption analyses.

## Autosorb 6300

Our most powerful instrument features full chemisorption and physisorption capabilities ideal for advanced catalyst characterization applications. A built-in TCD, pulse titration loop, mass flow controller, and optional integrated mass spectrometer give you access to flow chemisorption capabilities and the widest range of potential measurements in the series.



Instrument feature	Application	Autosorb 6100	Autosorb 6200	Autosorb 6300
Sealing materials / chemical compatibility	Standard resistance: (N <sub>2</sub> , Ar, Kr, CO <sub>2</sub> , CO, H <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> )	✓	✓	✓
	Extended range: (N <sub>2</sub> , Ar, Kr, CO <sub>2</sub> , CO, H <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> , NH <sub>3</sub> , H <sub>2</sub> O, C <sub>6</sub> H <sub>6</sub> , C <sub>5</sub> H <sub>5</sub> N, C <sub>3</sub> H <sub>6</sub> O, C <sub>2</sub> H <sub>5</sub> OH, CH <sub>3</sub> OH, C <sub>3</sub> H <sub>7</sub> OH)		✓	✓
Turbo pump system and low pressure transducers	BET surface area Pore size distribution	✓	✓	✓
Vapor capability	Water activity Moisture uptake		✓	✓
Integrated CryoSync Control	Heats of adsorption Advanced pore size analysis		○	○
High-temperature (1,100 °C) furnace	Active area Dispersion Crystallite size		✓	✓
Integrated TCD	Reduction/oxidation Acid site strength Activation energy			✓
Integrated injection loop	Automated pulse titrations			✓
Integrated mass spectrometer	Reactive species identification			○

✓ Included in base instrument  
 ○ Factory-installed option

# Absolutely Assured: Protected, Secure, Confident

With compliance to 20+ ASTM, DIN, and ISO standards, you can be certain that the Autosorb series is the right choice for your characterization needs. What's more, Anton Paar's global network of subsidiaries and distribution partners ensures a qualified expert is always nearby and ready to help.



## 1 Advanced ceramics

- ASTM C1274 Advanced ceramic specific surface area
- ISO 18757 Specific surface area of ceramic powders

## 2 Carbons

- ASTM D6556 Total and external surface area

## 3 Catalyst and catalyst carriers

- ASTM D3663 Surface area
- ASTM D3908 Hydrogen chemisorption
- ASTM D4222 Nitrogen adsorption and desorption isotherms
- ASTM D4365 Micropore volume and zeolite area
- ASTM D4641 Pore size distributions
- ASTM D4780 Low surface area
- ASTM D4824 Catalyst acidity by ammonia chemisorption

## 4 Other non-porous and nanoporous solids

- ASTM B922 Metal powder specific surface area
- ASTM C1069 Specific surface area of alumina or quartz
- ASTM D1993 Precipitated silica – surface area
- DIN 66134 Pore size distribution and specific surface area
- DIN 66135, 1-4 Particle characterization – micropore analysis
- ISO 9277 Specific surface area of solids
- ISO 15901, 2-3 Pore size distribution and porosity of solid materials

**Reliable. Compliant. Qualified.**



Our well-trained and certified technicians are ready to keep your instrument running smoothly.

Maximum uptime | Warranty program | Short response times | Global service network

	Autosorb 6100	Autosorb 6200	Autosorb 6300
<b>Measurement specifications</b>			
Measurement principle	Vacuum volumetric	Vacuum volumetric	Vacuum volumetric Dynamic flow
Adsorption gases	Standard N <sub>2</sub> , Ar, Kr, CO <sub>2</sub> , CO, H <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub>	Extended range N <sub>2</sub> , Ar, Kr, CO <sub>2</sub> , CO, H <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> , NH <sub>3</sub>	
Adsorption vapors	-	H <sub>2</sub> O, C <sub>6</sub> H <sub>6</sub> , C <sub>6</sub> H <sub>5</sub> N, C <sub>3</sub> H <sub>6</sub> O, C <sub>2</sub> H <sub>5</sub> OH, CH <sub>3</sub> OH, C <sub>3</sub> H <sub>7</sub> OH - Number: 1, 2, or 3	
Physisorption analysis stations	- Independent analysis stations: Up to 3 gases at 3 analysis temperatures can be used concurrently, 1 analysis gas and temperature per station - Independent p <sub>0</sub> station (dedicated cell and transducer)		
Chemisorption analysis stations	-	1	
Maximum pressure	1,100 Torr (0.997 p/p <sub>0</sub> for N <sub>2</sub> 77 K)		
Pressure resolution	2 x 10 <sup>-5</sup> Torr (2.6 x 10 <sup>-8</sup> p/p <sub>0</sub> for N <sub>2</sub> 77 K)	1 x 10 <sup>-6</sup> Torr (1.3 x 10 <sup>-9</sup> p/p <sub>0</sub> for N <sub>2</sub> 77 K)	
BET surface area	- Absolute detection limit: 0.1 m <sup>2</sup> (N <sub>2</sub> 77 K) - Specific detection limit: 0.01 m <sup>2</sup> /g (N <sub>2</sub> 77 K) - Typical reproducibility: 1 % (measured on BAM P115) - Reproducibility limit: 2 % with 2 m <sup>2</sup> in the cell		
Pore size	- Range: 0.35 nm to 500 nm (diameter) - Typical reproducibility: 0.5 % (measured on BAM P115)		
Active area	-	- Absolute detection limit: 0.03 m <sup>2</sup> (H <sub>2</sub> on Platinum 313 K) - Specific detection limit: 0.003 m <sup>2</sup> /g (H <sub>2</sub> on Platinum 313 K) - Typical reproducibility: 2 % (measured on 2 % Platinum on Alumina reference sample)	
TruZone	Yes (active coolant level control)		
PowderProtect	Yes (prevents sample elutriation)		
Analysis Dewar	- Duration: 90+ hours with liquid nitrogen - Refill during analysis: Yes - Volume: 3 L		
Analysis furnace	-	- Maximum temperature: 1,100 °C - Maximum ramp rate: 50 °C per minute - Furnace cooling by built-in fan	
Sample preparation	- 6 integrated degassing stations with dedicated cold trap - Temperature control: 2 independent heating zones, ambient to 450 °C - Available methods: flow and vacuum, programmable multi-step degassing profiles, test for completion routines, pressure-controlled heating		
CryoSync control option	-	Yes	Yes
Mass spectrometer option	-	-	Yes
<b>Software specifications</b>			
Kaomi for Autosorb software	- Control up to 4 instruments from 1 PC - 8 languages: Chinese, English, French, German, Japanese, Korean, Portuguese, Spanish - DoseWizard: 45+ built-in analysis profiles (ASTM, USP, DIN, ISO)		

	Autosorb 6100	Autosorb 6200	Autosorb 6300
<b>Technical specifications</b>			
Dimensions (W x D x H)	79.5 cm x 70.1 cm x 107.9 cm (31.3 in x 27.6 in x 42.5 in) dependent on instrument configuration		
Weight	136.4 kg (300 lbs) dependent on instrument configuration		
Operating environment	- Temperature: 15 °C to 35 °C (59 °F to 95 °F) - Humidity: 20 % RH to 80 % RH, non-condensing - Indoor use only - Altitude up to 3,000 m		
Analysis manifold construction	Vacuum-brazed manifold block in stainless steel		
Analysis manifold temperature	User adjustable 35 °C to 50 °C (stability ±0.05 °C)		
Pressure transducer (1,550 Torr)	- Number: 3 to 5 (dependent on instrument configuration) - Accuracy: ±0.1 % of span typical, ±0.15 % of span maximum - A/D data acquisition: 32 bit		
Pressure transducer (10 Torr)	- Number: 1 to 3 (dependent on instrument configuration) - Accuracy: ±0.15 % reading up to 10 Torr - Resolution: 0.002 % full scale		
Pressure transducer (1 Torr)	- Number: 1 to 3 (dependent on instrument configuration) - Accuracy: ±0.15 % reading up to 1 Torr - Resolution: 0.002 % full scale	-	-
Pressure transducer (0.1 Torr)	-	- Number: 1 to 3 (dependent on instrument configuration) - Accuracy: ±0.15 % reading up to 0.1 Torr - Resolution: 0.001 % full scale	
Pirani vacuum gauge	- Number: 1 - Accuracy: 5 x 10 <sup>-4</sup> to 1 x 10 <sup>-3</sup> Torr: ±10 % of reading 1 x 10 <sup>-3</sup> to 100 Torr: ±5 % of reading 100 Torr to atmosphere: ±25 % of reading		
Vacuum system	- Turbomolecular drag pump and dry diaphragm pump - Manufacturer's specification: 5 x 10 <sup>-10</sup> mbar - Typical pressure at analysis port: 2.67 x 10 <sup>-8</sup> mbar		
Thermal Conductivity Detector (TCD)	-	-	- Two-filament TCD with rhenium/tungsten filaments - Detection limit: 0.5 µL (air injected into helium)
Input ports	7 ports (5 analysis (FKM), 1 helium, 1 degas/backfill)	8 ports (4 analysis (FKM), 1 analysis (PFE), 1 vapor, 1 helium, 1 degas/backfill)	16 ports (11 analysis (FKM), 1 analysis (PFE), 1 vapor, 1 helium, 1 degas/backfill, 1 titration)
Gas supply	- Purity: 99.999 % - Input pressure: 8 psig to 10 psig (0.55 bar to 0.69 bar)		
Thermal Conductivity Detector (TCD)	-	-	- Two-filament TCD with rhenium/tungsten filaments - Detection limit: 0.5 µL (air injected into helium)
Air	Input pressure: 50 psig to 100 psig (3.45 bar to 6.9 bar)		
Electrical	- Supply: AC 100 to 240 V AC, 50 / 60 Hz - Maximum consumption: 1,810 VA (dependent on instrument configuration)		
PC connection	Ethernet		
RoHS <sup>3</sup> compliant	Yes		
CE / UKCA certified	Yes		

**Trademarks: Autosorb (3983957), DoseWizard (4930639)**

