Anton Paar

Particle Size Analyzer

PSA Series

Particle Size Analysis by **Laser Diffraction**

Our PSA series has more than 50 years of experience to lean on. In 1967, the world's first laser diffraction particle size analyzer, the PSA, was invented. Today, our three models – PSA 990, PSA 1090, and PSA 1190 – are designed to measure a wide range of particle sizes in liquid dispersions or dry powders.

FIND OUT MORE

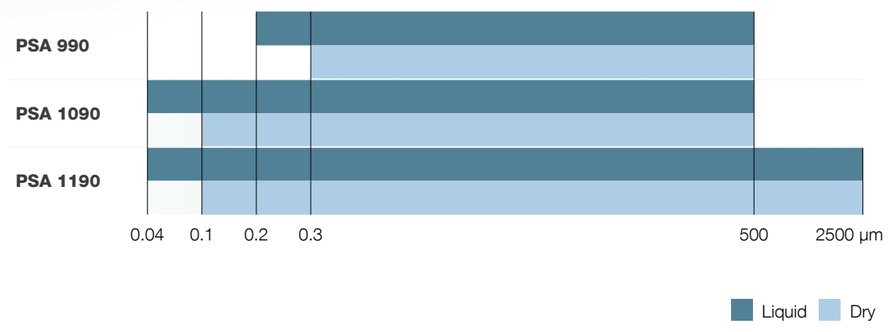
www.anton-paar.com/apb-psa-series

The PSA instruments stand out for their broad particle size measuring range and their robustness due to:

- ✓ Multiple-laser technology
- ✓ Flexibility to measure in dry and liquid mode with one setup
- ✓ Permanently aligned optics
- ✓ Accessibility and easy maintenance

The laser diffraction technique is an established method to measure particle sizes from the upper nanometer to the millimeter range. A laser beam is first directed onto dispersed particles. Then, the laser light is diffracted by the particles, and the corresponding diffraction pattern is detected and evaluated. Our PSA instruments work with high-resolution detectors to provide accurate and reproducible measuring signals that are used to calculate particle size distributions based on the Fraunhofer and Mie theories. This guarantees full compliance with the ISO 13320 and USP <429> standards.

PSA PRODUCT FAMILY



Solutions for **a Wide Range of Industries**

FIND OUT MORE

www.anton-paar.com/apb-particle-size-applications

The PSA series covers a broad field of applications in practically any industry. Whenever quality control of powder materials or emulsions is needed, PSA offers a quick and reliable solution to monitor the particle size distribution. Additionally, the PSA series serves as an indispensable method in R&D to optimize the final product properties related to particle size distribution.

Cement and building materials
A request from the cement industry to develop a new technique for particle size measurement led to the development of the first PSA instrument. To date, the requirements haven't changed, and the instruments are still widely used in the cement and building industry. The cast-iron base plate makes the system rugged enough for use in the harshest environments. Additionally, the dry sample path doesn't have a sample cell, meaning there are no glass surfaces that could get scratched by abrasive samples.

Mining and minerals
In the mining and minerals industry, the robust design of the PSA instruments comes into play. All optical components are mounted on a cast-iron base plate to ensure the system remains in alignment even under the harshest conditions. PSA 990's standard measurement range of 0.2 µm to 500 µm is ideally suited for the needs of this industry. The integrated ultrasonic transducer is an effective tool to de-agglomerate samples.

Pharmaceuticals and cosmetics
Accurate, repeatable, and traceable measurements are crucial for pharmaceutical applications. To ensure the highest accuracy and repeatability, all PSA particle size analyzers are calibrated according to the ISO 13320 and USP <429> standards. The software complies with 21 CFR Part 11 for complete traceability of results. PSA 1190's extended measurement range of 0.04 µm to 2,500 µm lets you analyze the widest range of particles, from raw materials to final formulations.

Food and beverage
Particle size is an important parameter that affects the characteristics of food products. Our PSA instruments provide important information for production, inspection of raw materials, product development, and quality control. The PSA 1190 particle size analyzer covers a measuring range from 0.04 µm to 2,500 µm, letting you characterize both small and large particles. The "free fall" module, specifically designed for fragile food samples, ensures the non-destructive transport of the sample to the measuring patch. This means even large and fragile particles stay intact during sample dispersion.

Chemical and petrochemical
Companies in the chemical and petrochemical industries are challenged with analyzing a wide range of materials. Only our laser particle size analyzers fully integrate liquid and dry dispersion modes, meaning you don't need to manually switch, adjust, or align any hardware, which saves you valuable time. Solutions are available for all types of samples, including aggressive or expensive products and reagents. What's more, the liquid sample path contains a robust quartz glass measurement cell without an inner coating. This reduces the risk of physical abrasion of the glass to a minimum and eliminates the risk of chemical abrasion.

Technical **Highlights**

Need to measure in both liquid and dry mode?
Both are integrated into one instrument
PSA instruments are the only particle size analyzers that can be configured with fully integrated liquid and dry dispersion modes in one instrument. This unique design eliminates the need for the operator to handle several accessories or make manual adjustments. The software lets you switch between liquid and dry dispersion modes with a single click, saving you time and preventing operator errors. You don't need to exchange the hardware, revalidate, or realign sensitive optics when switching between dispersion modes.

Need fully reliable results?
You can rely on the PSA series
Fully compliant with ISO 13320, our particle size analyzers give you traceable, accurate, and repeatable results. Whether running samples in dry or liquid dispersion modes, the complete analyzer is qualified using certified reference materials. The unique design of the lasers and the optical bench set the market standard for a measurement reproducibility that is better than 1 % variation. Accuracy and reproducibility are guaranteed for its entire lifetime.

Need stability for a lifetime?
Don't think twice about it
The unique optical bench design has all optical components permanently mounted on a cast-iron base plate. This ensures alignment-free operation, even in the harshest environments. The rugged design ensures that the system remains aligned, which reduces maintenance requirements to a minimum for the entire life of the instrument. Beyond this, the glass-free path of the dry mode, along with the robust measurement cell of the liquid mode, mean you have to rarely – if ever – replace the measurement cell.

Need to measure difficult samples in dry mode?
The Dry Jet Dispersion technology is your answer
The size of dry powders is often difficult to measure because the particles tend to agglomerate, which falsifies the results. Dry Jet Dispersion (DJD) technology is Anton Paar's patented technique (FR2933314) for efficiently dispersing and precisely analyzing powder particles. The innovative design features an air pressure regulator that quickly and easily adjusts the air flow in accordance with the sample properties. The shear forces created by the air flow separate agglomerated particles. This way, the size of each single particle can be detected.

Need a wide particle size range?
PSA has you covered from nanometers to millimeters
The single-laser PSA 990 covers a wide measuring range of 0.2 µm to 500 µm. For an even wider range, PSA 1090 and PSA 1190 have a unique optical design for diffraction analysis, which includes multiple lasers. While PSA 1090 has been designed with two lasers to resolve particles as small as 40 nanometers, PSA 1190 has an additional third laser to cover the full measurement range of up to 2.5 millimeters.

Need maintenance in your own hands?
It's easier than ever
Since they're easy to open, cleaning and maintaining PSA instruments is simple and fast. For dusty environments – where regular cleaning is required – this is critical. Besides this, the liquid cycle has a peristaltic pump that isn't at risk of cross-contamination because sample can't accumulate in it. You can also replace all of the liquid cycle's hoses on your own, giving you a perfectly clean start, whenever you need it.

The image displays the full capability of the instrument, and not a realistic measurement.

Kalliope Software
for Particle Analysis

The ingeniously simple particle analysis software Kalliope is one of the major highlights of the PSA. It enables particle analysis at the touch of a button.

FIND OUT MORE

www.anton-paar.com/apb-kalliope

Expertise in one minute
Even with little or no experience you can conduct expert-level measurements thanks to Kalliope. From Standard Operating Procedures to the Expert Advice function, Kalliope supports you at every step in your measurement process, ensuring you always get top quality results.

Ingenious simplicity
With its one-page workflow Kalliope displays all of your relevant data in an intuitive way, giving you an easy-to-read overview. Input parameters, live view of the measurement, and results in one place – all provide the transparency you need for your measurement. What's more, you can recalculate the measurement using a different set of input parameters once you are done with the initial measurement.

Real-time monitoring and control
Kalliope lets you track and monitor changes of particle sizes in function of dispersion parameters in real-time. Live measurement mode gives you full, live control of the dispersion and measurement parameters.

Pharma mode - US FDA 21 CFR Part 11
A pharma option, with its built-in data security functions, user management, and audit trails, makes Kalliope fully compliant with the US FDA's 21 CFR Part 11. A comprehensive pharma qualification package (PQP) is also available.

Application-specific measurement modes
With a single click, transform Kalliope into a completely new tool that does most of your work for you. These application-specific measurement modes – e.g., particle separation efficiency evaluations or soil classifications – give you the result you need in the application-specific form.

One software for a range of instruments
We designed Kalliope as a platform to be compatible with Anton Paar's particle sizing instruments. Laser diffraction, DIA, DLS, ELS – you can operate all of these with the same software. With users' requirements in mind, we frequently add new functions and features.

Accessories

Litesizer Autosampler
Our Litesizer Autosampler for the PSA series is the only sampler on the market that can be used for both wet and dry dispersions simultaneously. This accessory automates the sample measurement process by picking up and pouring samples automatically into the particle size analyzer, letting you focus on other tasks meanwhile. It's suitable for both industrial and lab applications and it is available for all PSA models.

- → Wet and dry measurements in the same run
- → Automatic pick-up and pouring of up to 60 samples
- → Suitable for repeatable processes and high-throughput laboratories
- → Time-saving
- → No risk of manipulation
- → Integrated rinsing cycles
- → User-friendly operation integrated in PSA's Kalliope software (no additional software required)

Small Volume Unit
The Small Volume Unit (SVU) was especially designed for users who need to reduce their measured sample volume. You only need 40 mL of sample. The SVU is also suitable for aggressive solvents.

- → Integrated mechanical stirrer, peristaltic pump, and ultrasonic probe
- → Solvent volume of down to 45 mL (PSA 1190) / 40 mL (PSA 1090, PSA 990)
- → Sample quantities of down to 50 mg

Filling Pump
The filling pump enables automatic filling of the sample tank from an external reservoir. It's controlled automatically by the Kalliope software and allows automatic filling when no running water is available. Providing compatible tubing, the filling pump can also be used for organic solvents or oils.

- → Compact and fitted inside the instrument
- → Controlled automatically by the software
- → Suitable for a wide range of liquids

Alcohol Regenerator
Our alcohol regenerator is a pumping and filtering system for solvents that lets you use them over and over again. Using the same volume of solvent multiple times doesn't just lower your costs, it also helps the environment.

- → Pumps and filters the solvent
- → Operates automatically through Kalliope software
- → Allows automatic rinsing
- → Compatible with a range of alcohols

Temperature Regulation Unit
The temperature regulation unit uses an external water bath, which cools or heats the PSA's carrier liquid. It's particularly useful for particle analysis in the food industry and life sciences.

- → Maintains liquid temperature at up to 47 °C
- → Prevents solidification of certain oils

	PSA 990	PSA 1090	PSA 1190
	↓	↓	↓
PERFORMANCE			
Measurement principle		Laser diffraction	
Measuring range (dry)	0.3 µm to 500 µm	0.1 µm to 500 µm	0.1 µm to 2,500 µm
Measuring range (wet)	0.2 µm to 500 µm	0.04 µm to 500 µm	0.04 µm to 2,500 µm
Accuracy		Better than 1 % variation+*	
Repeatability		Better than 0.5 % variation+	
Reproducibility		Better than 1 % variation+**	
Measuring time		<1 min	
PHYSICAL SPECIFICATIONS			
Dry dispersion	Venturi	Venturi	Venturi / free fall
Liquid dispersion		2 peristaltic pumps / ultrasonic transducer / stirrer	
Dimensions (L x D x H)		890 mm x 530 mm x 430 mm (35 in x 21 in x 17 in)	
Weight		Approx. 55 kg	
LASERS			
Number of lasers	1	2	3
Laser safety classification		FDA Title 21 CFR - Part 1040 & EN 60825-1:2014	
Laser class, closed cover		Class 1 of EN 60825-1:2014	
Laser class, open cover		Class 3R of EN 60825-1:2014	

COMPLIANCES	
Digital data security	FDA Title 21 CFR - Part 11
Electromagnetic compliance	EN 61326-1:2013
Low voltage	EN 61010-1:2010 & EN 61010-2-081:2015

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