

THE NEW ALTERNATIVE IN PARTICLE SIZE ANALYSIS

partica LA-950V2

While some companies consider laser diffraction particle size analysis a mature technology, HORIBA has applied some fresh thinking to set a completely new standard in performance and usability with the *Partica* LA-950.

Any instrument brochure will present an attractive picture of the specifications, but the real proof is in true measurement performance. When performance is your primary criteria in selecting an analyzer, the *Partica* LA-950 clearly stands ahead of the alternatives.

Experience an unprecedented level of performance with the next generation of laser diffraction particle size analysis:

Unparalleled:

- Accuracy
- Precision
- Instrument-to-instrument variability
- Widest true measurement range
- Speed
- Sampling system change
- Powerful sampling systems

Can Your Analyzer Do This?

A number of laser diffraction particle size analyzers exist with seemingly similar specifications to the *Partica* LA-950. However, when put to the test, the real-world performance is sometimes significantly different from that stated.

The *Partica* LA-950 has a very impressive specification, but most importantly, actually performs as advertised. Compare the real performance to any other analyzer on the market and see why the *Partica* LA-950 should be your next choice.

Accuracy – Guaranteed!

- +/- 0.6% on NIST-traceable polystyrene latex calibration standards
- 3% on d50 (median) for broad-distribution glass bead standards
- 5% on d10 and d90 for broad-distribution glass bead standards

Meets or exceeds all requirements of ISO 13320 and USP 429

Accuracy is commonly verified with mono-disperse polystyrene latex standards. This tests the ability to measure exactly what the size should be. The performance and stability of the LA-950 allow HORIBA to guarantee this impressive specification.

The ISO 13320 (Particle size analysis — Laser diffraction methods) standard for laser diffraction particle size analysis recommends a broad-distribution standard as a test of the ability of the system to measure not only the median size, but the distribution of sizes. The test calls for a measurement of the median size, as well at the 10% and 90% points on the distribution. The Partica LA-950 is able to meet or exceed this specification on the full range of certified polydisperse glass bead standards available.

The LA-950 provides performance unmatched by any other instrument so you have confidence in your results. Nobody else comes close to meeting this claim with such a wide range of standards. Most alternatives don't claim an accuracy specification at all or use a single, non-certified standard material.

Accuracy and Precision for PSL Standards

Standard value	102nm	491nm	1.02um	12.01um	102um	1004um
Tolerance	3nm	4nm	0.022um	0.07um	1.4um	14um
1	104.41	489.41	1.021	11.97	102.64	1001.14
2	104.39	489.28	1.019	11.97	102.66	1000.20
3	104.39	490.24	1.019	11.97	102.73	1001.49
4	104.33	489.52	1.021	11.96	102.70	1001.28
5	104.38	489.55	1.019	11.97	102.73	1000.14
6	104.36	489.52	1.021	11.97	102.74	1000.27
7	104.36	489.50	1.019	11.97	102.76	1001.67
8	104.35	489.91	1.021	11.96	102.74	1001.22
9	104.37	488.99	1.021	11.97	102.74	1000.76
10	104.34	489.68	1.021	11.97	102.76	1000.45
Average	104.37	489.56	1.020	11.97	102.72	1000.86
Std. Dev.	0.024	0.321	0.001	0.004	0.039	0.540
CV	0.02%	0.07%	0.10%	0.03%	0.04%	0.05%

Precision – 0.1%

The combination of a rigid optical bench, stable, high-intensity light sources, optimized detectors, and highly-refined electronics virtually eliminates variability in the background noise and fluctuations in the response of the instrument. The *Partica* LA-950 has a guaranteed precision of 0.1% on polystyrene latex calibration standards

A table of numbers that are exactly the same is not very interesting, but is what you might come to expect from the LA-950. The stability of the optical system combined with an advanced electronics package and stable light sources provide essentially no instrument-dependent variability in repeat measurements. Eliminating one possible source of variation allows the user to have a greater degree of confidence in results and to identify and eliminate other possible sources of error.

Minimized Instrument to Instrument Variation

As a result of each instrument being extremely accurate and precise, the variation in results from instrument to instrument is decreased. This is particularly important when multiple units are installed at different production facilities or when comparing data from supplier to customer.

It is particularly important to be sure that the result you get is something that can be reproduced elsewhere and can serve as a useful comparison to other data. When the data varies significantly from one instrument to another, what is the possible correlation with other sites, vendors' or supplier's data?

The following data summarizes a test on 20 instruments on a range of polydisperse glass bead standards. Besides the excellent instrument-to-instrument agreement, note that every reading falls within the ISO 13320 specification for these standards.

Sample	CV D10	CV D50	CV D90
PS202 (3-30 μ m)	2%	1%	2%
PS213 (10-100 μ m)	2%	2%	2%
PS225 (50-350 μ m)	1%	1%	1%
PS235 (150-650 μ m)	1%	1%	2%
PS240 (500-2000 μ m)	3%	2%	2%
All samples measured on 20 different instruments			

True Measurement Capabilities

As a result of some fresh thinking on optical design, the Partica LA-950 has the most compact measurement system of any full-range particle size analyzer, while still providing the widest dynamic range available (0.01–3000 μ m).

Real Measurement Range

Most importantly, the specified measurement range is also the most realistic. Rather than being just a wishful specification as with most other systems, the Partica LA-950 has truly exceptional performance from the sub-100nm range to several millimeters.

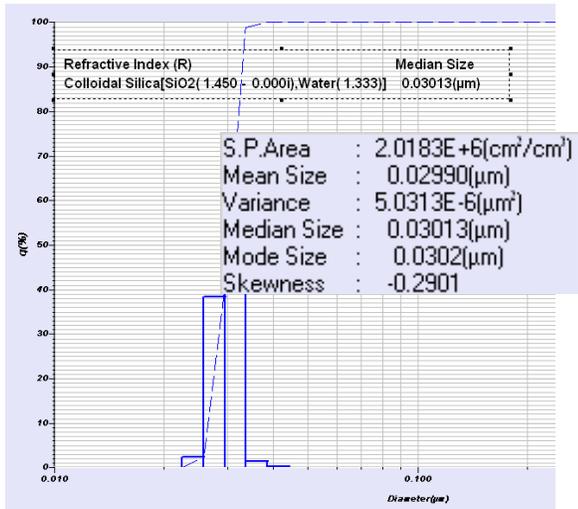
This allows a single instrument to take over the responsibility of measuring a much wider range of materials than would have previously been possible with laser diffraction instruments.

Optical Design

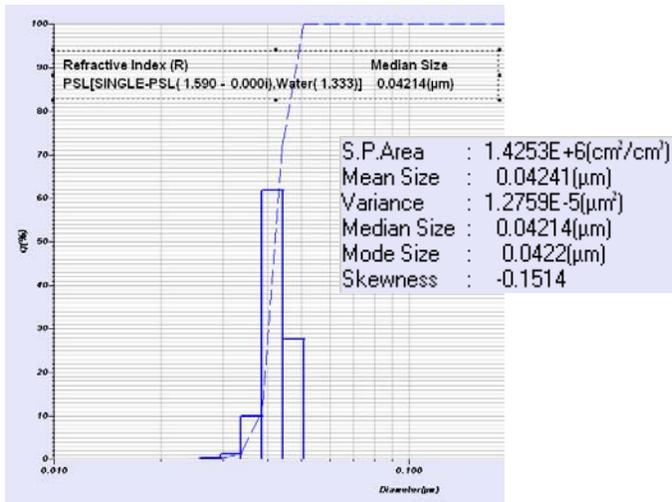
HORIBA has always been well known for impressive small particle measurement. The LA-950 extends this capability to even smaller sizes by refining the optical system, calculation algorithm and dual light sources. A high intensity 405 nm wavelength solid-state light-emitting diode (LED) second light source increases the intensity of the scattered signal. The result is increased sensitivity, accuracy, and resolution for smaller particles, thus allowing measurement of a wide range of new nanosized materials that would normally require a different analytical technique, such as photon correlation spectroscopy (PCS).

Combining excellent small and large particle size capabilities may possibly avoid the need to obtain a second analyzer. The larger size measurements are made possible by a reverse-Fourier optical design with a folded optical path, which achieves the longer focal lengths necessary while reducing the footprint to almost half of that required by systems with an equivalent upper size limit.

Small Particle Detection

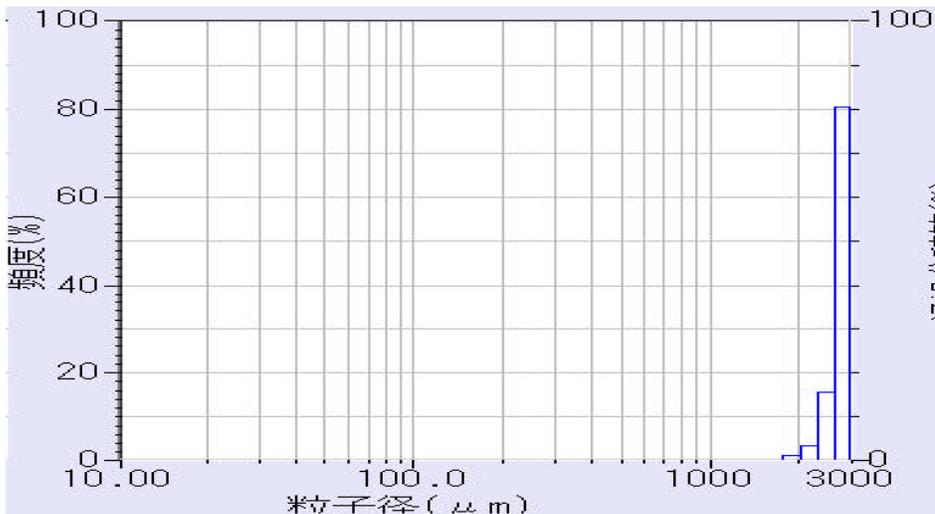


30 nm silica Ludox
Measured 29.9 nm mean



PSL 40nm standard
Measured 42 nm mean

Large Particle Detection



3mm alumina grinding balls

Performance by Design

Fresh thinking on optical and sampling system design, coupled with an uncompromising search for performance is evidenced in a number of features that make the *Partica LA-950* outperform any alternative design.

Speed – 60 seconds per sample

The best return on investment is provided when the greatest number of samples can be run on a single system. A complete sample analysis procedure can now be completed in 60 seconds, including filling with dispersant fluid, alignment of the detector system, blank measurement, adding sample, measurement, data saving, drain, and rinse.

Compare this to 3-5 minutes sample-to-sample time of alternative designs and the difference becomes obvious. The dramatically faster system can help increased sample throughput for reduced workload, more frequent checks of the manufacturing process, and faster return on investment

Fastest sampling system change

Multiple sampling systems can be installed simultaneously, allowing a single analyzer to cover a wide range of applications. Change from one system to another is simply moving the cell holder tray (5-15 seconds), maximizing system availability and flexibility.

The sampling system connections remain in place at all times. The instrument automatically recognizes the sampler type and configures the software for the sample operation. This allows for a single instrument to be used for multiple types of analysis without lengthy reconfiguration or operator involvement. Time is saved by eliminating the need to disconnect and remove the sampling system from the optical bench. This approach also eliminates the need for storage space for all the systems that are not currently in use

Powerful Sampling Systems

The best optical bench in the world wouldn't be much good without a sampling system to present the sample for measurement. The *Partica LA-950* offers a wide range of sampling systems to make the total sample analysis process as easy as possible.

Fluid recirculation systems are built to handle the full range of samples avoiding the need for different pumps for different types of samples. Precisely engineered flow paths with constant cross-section, no sharp corners or dead spaces to trap or segregate particles make these samplers reliable and robust.

The dry powder feeder system includes an adjustable pressure nozzle to disperse agglomerates before delivering the sample stream directly to the measurement cell. This eliminates the sample buildup and contamination found in systems that use a tube feed from the disperser to the measurement cell.

Robust Construction

Stability, reliability, quality of construction.

The massive optical bench and high-quality optical components are the bedrock that makes these performance specifications possible. The optical bench itself is made of cast aluminum for rigidity and thermal stability. This contributes to optimum precision compared to competitive optical systems with components mounted on sheet metal or on circuit boards. The *Partica LA-950* was built to a performance standard, not to a price target.



How do we compare?

Specification	Alternatives	Partica LA-950	Why does it matter?
Lower size limit, μm	0.02-0.05	0.01	Small particle detection
Upper size limit, μm	1500-2000	3000	Large particle detection
Measurement time	3-5 minutes/sample	1 minute/sample	Big advantage in throughput, ROI
Accuracy specification (standards)	Usually not stated, or use non-certified standards	0.6% w/ PSL standards; 3% w/ certified glass bead standards	Guaranteed performance; gives better unit-unit match
Precision	Not specified	0.1% (on PSL cal std's)	High repeatability
Optical bench design	Pressed sheet steel or aluminum plate with optics mounted separately	Strong, rigid casting	More stable construction, more detectors in critical sub-micron range
Primary light source	2mW He-Ne laser tube, 633nm, 4mW/466nm LED; or 3mW laser diode, 780nm	5mW laser diode, 650nm; 3mW LED, 405nm	More powerful, shorter-wavelength light sources for greater sensitivity,
System dimensions (WXDXH), mm	Up to 1300 x 650 x 500	704 x 530 x 450	Saves valuable bench and storage space
Standard volume pump system	50-120ml, centrifugal pump, stirrer, 30W ultrasonic probe, fill valve	180-280ml, centrifugal pump, stirrer, 130W ultrasonic probe, fill pump	Capable of all sample types, more powerful pump and ultrasonic, fill pump included
Large volume pump system	Either not available, or limited capability	800-1000ml, centrifugal pump, stirrer, 130W ultrasonic probe, fill pump	Automation
Small Volume Systems	Cuvette type and small volume pump systems, depending on vendor	40-50ml pump system, ultrasonics, fill pump; Fraction Cell - smallest volume available.	Multiple options in one supplier. MiniFlow gives all the advantages of a full flow system, ease of use.
Dry powder feeder	Vibratory feeder, dispersion nozzle, transports sample through tubes	Vibratory feeder, alternate dispersion nozzles and vacuum only cell.	Good dispersion capabilities, automated, no contamination issues. Compared to tube feed systems

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