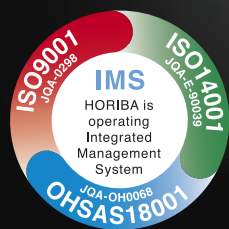


# HORIBA

Explore the future

Laser Scattering Particle Size Distribution Analyzer  
**partica LA-950V2**

*The world's fastest analysis.*



# The world's fastest analysis.



[ Speed ]

The central focus of the Partica LA-950V2 development is speed.

Fresh thinking on all aspects of instrument design and operation have resulted in a system capable of complete sample analysis sequences in one minute.

With a regular laser diffraction particle size analyzer, the entire measurement procedure, including adding the dispersion medium, aligning the optical axis, blank measurement, data measurement, draining, and rinsing requires at least 3 to 4 minutes for each sample.

The LA-950V2 combines the advanced optical system and sampling systems into a single high-speed system that optimizes all of these steps.

## For example,

- \* Powerful fill-pump with high reproducibility is included as standard equipment.
- \* High-speed data processing at 5000 cycles per second.
- \* Auto alignment of the optical axis.
- \* Built-in ultrasonic probe with high dispersion efficiency.
- \* Highly efficient drain and rinse system.

As a response to user needs, the LA-950V2 requires only 1/3 to 1/4 the operator steps of previous systems, improving efficiency and ease-of-use.



# 10 nm – 3 mm. Setting a new global standard in particle measurement.

Absolute particle sizing has always been difficult.

The LA-950V2 uses an innovative optical system to obtain the world's widest dynamic range of 10 nm – 3000  $\mu\text{m}$ .

This makes it possible to perform precise particle size measurements on a wide scale in many different industries.

From ultra-fine nano-order particles to individually visible particles,

all can be measured with this single instrument.

Designed to handle the entire range of applications extending from the complex needs of research to

routine quality control procedures, the LA-950V2 offers practicality as a

“standard instrument” that is easy to use and enables precise measurement.

A wide range of applications, from research and development to quality control.

- Nano-level Research and Development • Ceramics • Pigments • Battery Materials • Catalysts
- Cosmetics • Pharmaceuticals • Food Products





[ New optical system ]

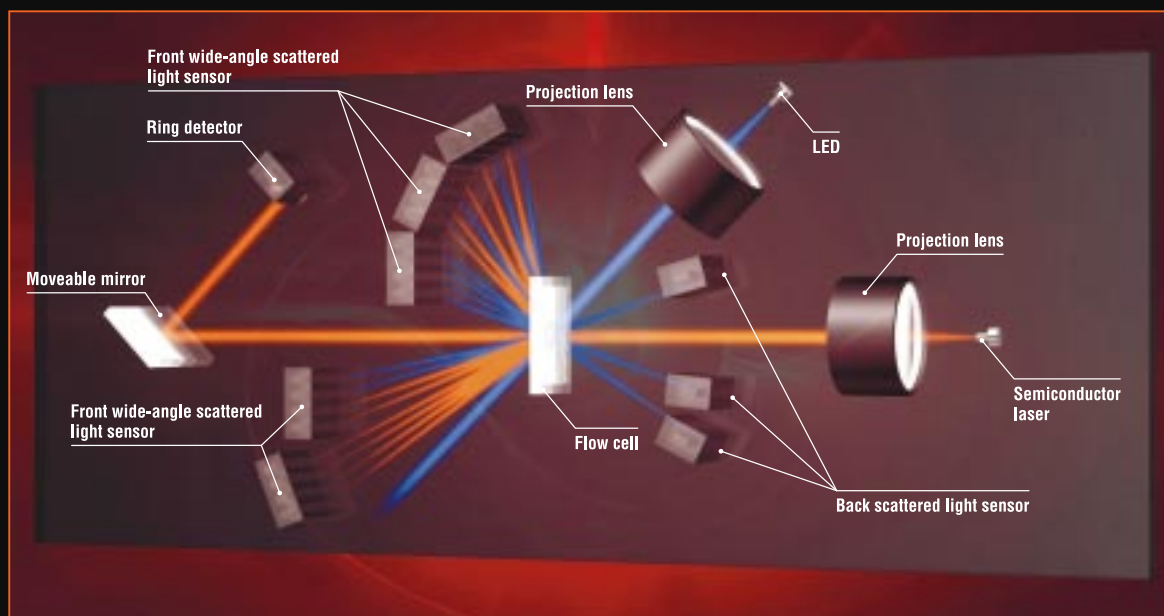
## Guarantee of reliable high precision

The HORIBA LA Series was among the first to implement detector calibration, considered difficult in particle analyzers, and has continued to maintain a high level of precision control. The accuracy specification guarantee has been upgraded for the LA-950V2. Calibration is performed using NIST traceable standard particles (polystyrene polymer) to guarantee high accuracy of  $\pm 0.6\%$  or less\* and a reproducibility of  $\pm 0.1\%$  or less.

These high reliability levels comply with the well-defined instrument performance control required by GLP, GMP, ISO, and other standards groups, and provide the performance and practicality of global standards.

\*Excluding tolerances in the standard particles themselves.

## The innovative LA-950V2 optical system enables high-precision measurement



**HORIBA's innovative optical design perfects the laser scattering method.**

To measure particle size with the laser scattering method, the instrument detects the correlation between the intensity and the angle of light scattered from a particle, then calculates the particle size based on the Mie-scattering theory. As the particle size becomes smaller, the intensity pattern stops changing at the front toward the light source, and in particular for particles several microns or less in diameter, it becomes important to capture scattered light signals at the sides and rear relative to the light source. The optical layout of LA-950V2 uses a light path (the distance from the cell to the sensor) that is about four times the length of previous models, and the area of the center of the ring detector is about four times as large, enabling stable capture of signal differences near the center of the detector with high sensitivity.

## Why does HORIBA use two light source wavelengths?

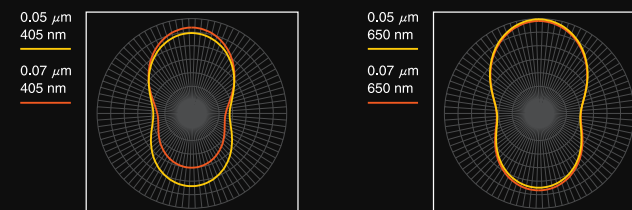
To measure large particles up to  $3000 \mu\text{m}$  with high sensitivity, it is necessary to use a sharp-focus long-wavelength laser source and a layout that is close to the center of the detector. For ultra-microscopic particles to  $0.01 \mu\text{m}$ , a short-wavelength light source improves detection sensitivity. The scattering pattern due to scattering from microscopic particles is determined by the diameter of the particles relative to the wavelength, not the absolute diameter of the particles.

Examples of scattering patterns are shown below.

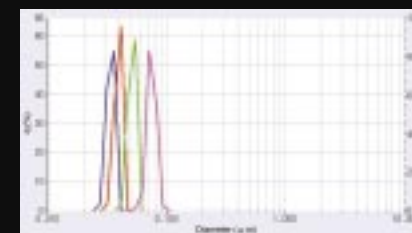
The scattering patterns of  $0.05 \mu\text{m}$  and  $0.07 \mu\text{m}$  particles, which differ only slightly in size, are compared. The scattering patterns obtained using laser light ( $\lambda = 650 \text{ nm}$ ) show no obvious difference, regardless of the detection angle. However, when LED light ( $\lambda = 405 \text{ nm}$ ) is used, a difference is clearly detected even though the difference in particle diameter is only  $20 \text{ nm}$ . For this reason, the use of light sources of different wavelengths provides a critical advantage in creating an instrument that is capable of wide-range, high-precision measurement.

A mechanism has been introduced that monitors the quantity of light from each light source and adjusts the balance for each measurement, and multiple sensors are arranged so that the ranges overlap, enabling seamless measurement of a dynamic range of  $0.01 - 3000 \mu\text{m}$ .

### Changes in scattering patterns from microscopic particle diameters



### Results of microscopic particle measurements



Overlaid measurement results of 30, 40, 50, and 70 nm particles, showing the Partica's high measurement performance.

The detector for transmitted light intensity at the center is evenly divided into four sections by means of ultra high-precision work, allowing the exact same state to be maintained from adjustment of the optical axis to measurement of the sample. The measuring time is also very short, enabling analysis to be performed while the optical axis remains stable.

The result is enhanced detection of large particles up to  $3000 \mu\text{m}$ . Needless to say, stable optical axis adjustment is the most important factor that affects the accuracy and reproducibility of the data. The detectors are arranged efficiently above and below the cell and the sample chamber is large, which not only allows easy cell replacement and maintenance, but also reduces the effects of stray light.





## The circulation system quickly processes any sample

[ Circulation System ]

### POINT 1 Excellent Reproducibility

One of the most important factors that enables the measurement process, from sampling to cleaning and data display, to be performed in under a minute is the high-reproducibility circulation system. The system is equipped standard with a dispersion medium fill-pump. Simply click the "Fill" command in the software and the circulation system is immediately filled for measurement or cleaning.

A fluid level sensor ensures that the specified amount of dispersion medium is correctly added.

### POINT 2 High Performance

The inclinations and contours of the flow paths are designed for efficient draining of all sample and medium from the circulation system.

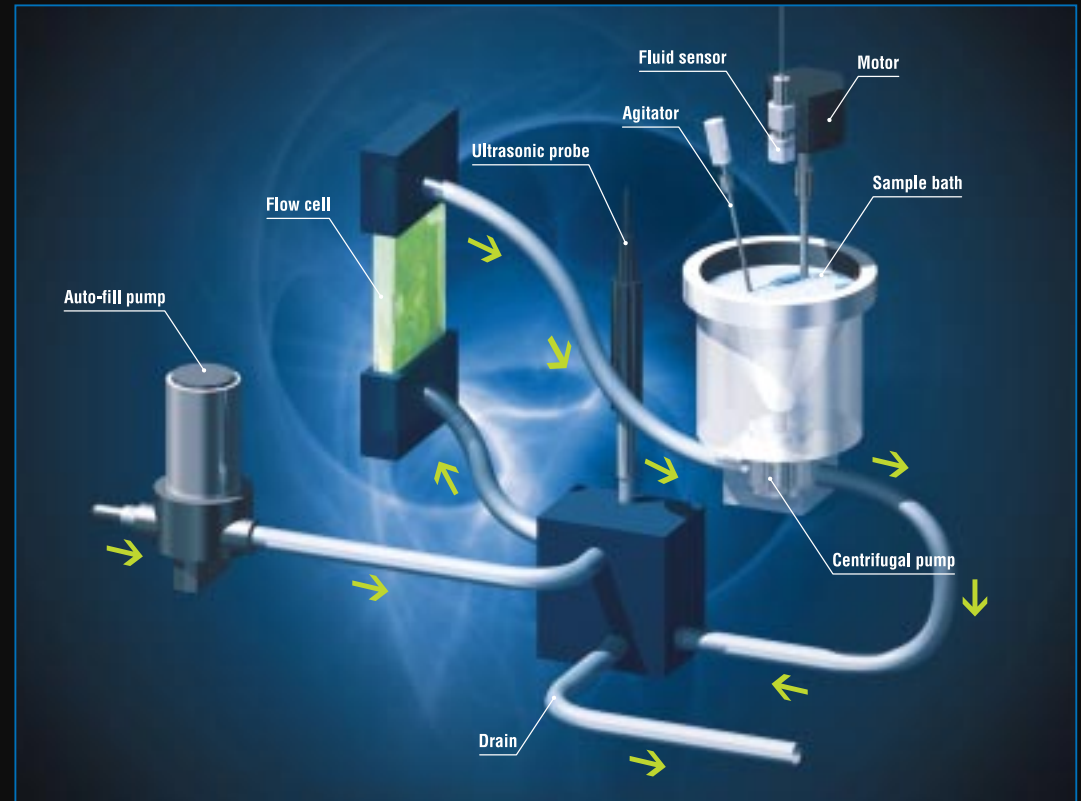
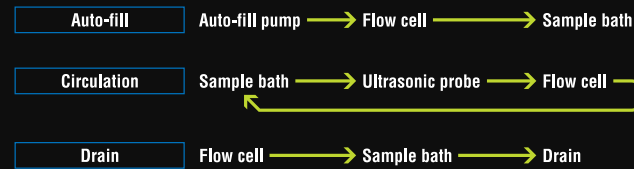
This results in high rinsing and cleaning efficiency and allows work to be performed quickly and with confidence.

### POINT 3 Flexibility

The centrifugal pump has sufficient output power to circulate 3-mm lead particles, giving the system the ability to handle samples of any size and weight.

The circulation speed can be set to one of 15 speeds as appropriate for the sample.

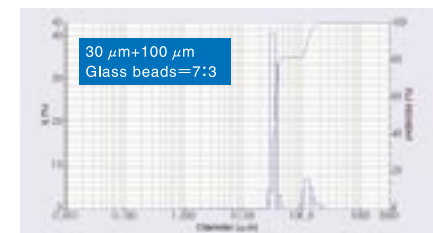
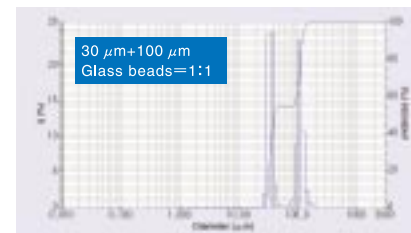
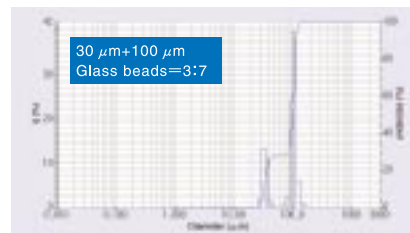
To promptly pre-process strongly cohesive particles, the sample is directly dispersed using an ultrasonic probe. The probe strength can be adjusted to one of 7 levels as appropriate for the sample, making the system suitable for a wide range of applications.



### Excellent resolution.

(Example of mixed sample)

Equipped with measurement ranges and capabilities that make it possible to detect agglomerates other than the primary particle size, as well as mixed-size samples, the LA-950V2 can be used for precision quality control and research applications.





[ Operability ]

## Easy-to-understand interface procedures are supported by Navigation

The LA-950V2 features a "Navigation function" that continuously provides a clear indication of the entire sequence of measurement steps, from the setting of measurement conditions and sample loading to dispersion, printing, and data storage.

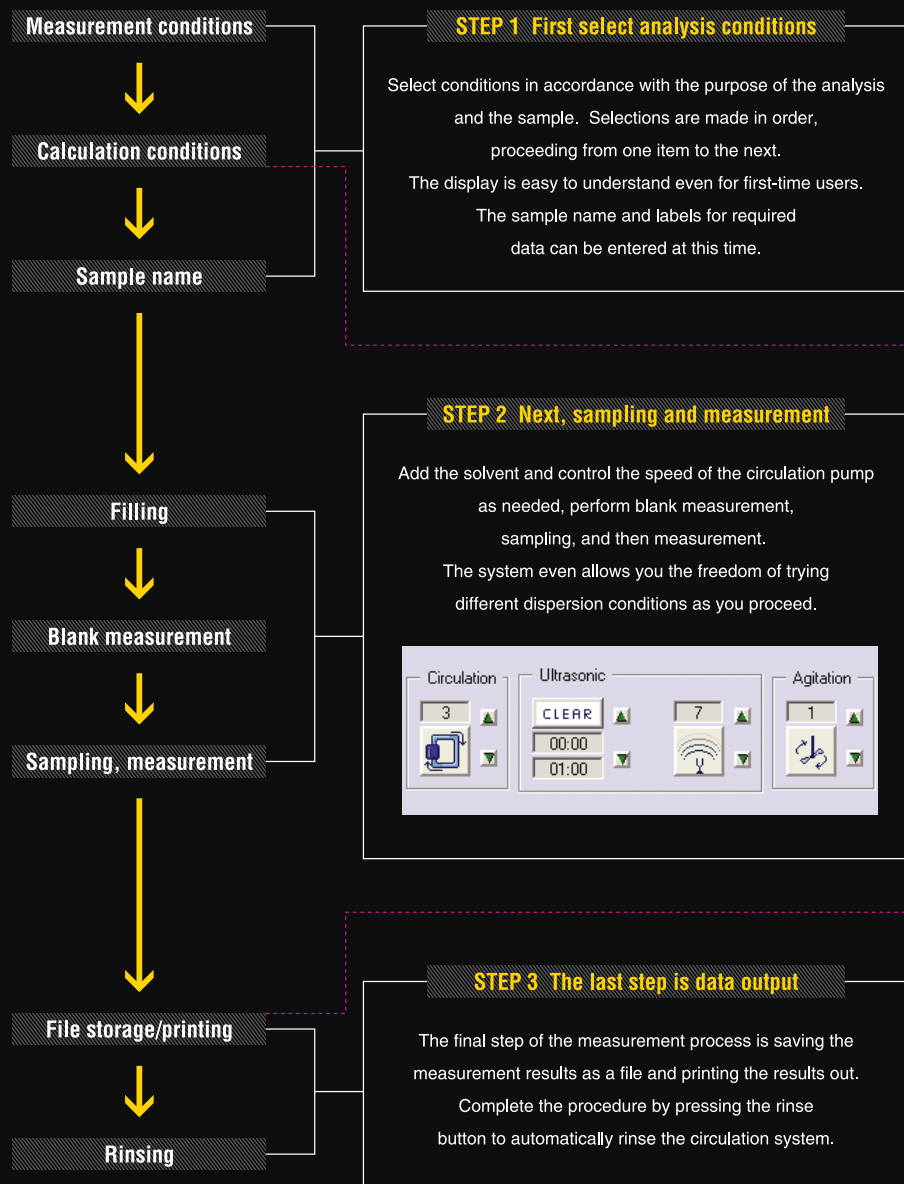
Prompting for the next selection and an operation flow chart that is easy to understand, even for first-time users, enables analysis to be accomplished with ease.

Moreover, the sequence of steps can be saved as a file, which is very convenient when performing repeated analyses.

Saved files can be shared between departments, allowing standardization of quality control and inspection procedures at the work site.

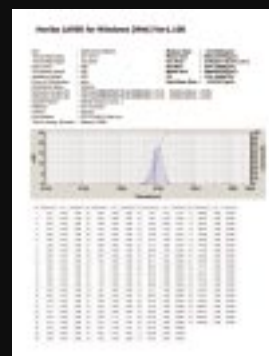
This is a landmark function that encompasses the entire course of a product, from product research to production control.

## Navigation window



I don't know the refractive index of the sample

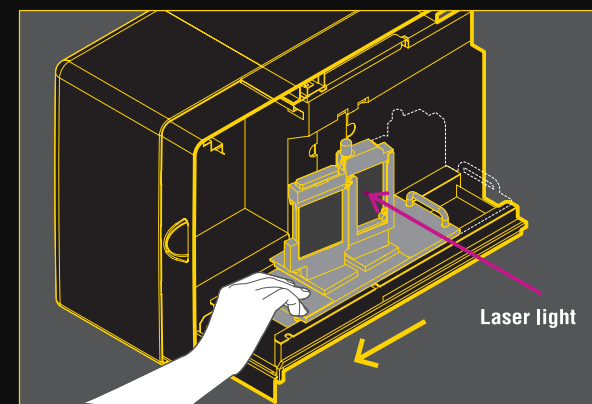
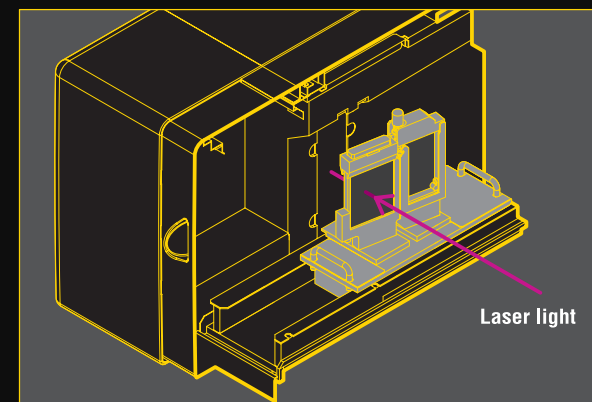
The refractive index table lists the refractive indices of commonly used samples. A more detailed refractive index table can be found in online Help!



Printout example

## Easy maintenance and easy cell changing

The LA-950V2 enables one-touch cell removal for cleaning without the need for tools or special skills, taking the bother out of daily maintenance. Changing cells for a different measurement method (for example, switching from the wet method to the dry method) is quickly accomplished by one-touch sliding of the entire cell holder. There is no need for replacement, removal, or other work. This sophisticated design and operability were achieved by placing ourselves in the position of those who use the instrument.



### The software has a range of other easy-to-use functions.

- Real time window
- Print template layout function
- Database function
- Data overwriting, recalculation of conditions, and more.





## Accessories

[ Flexible Accessories ]

### Powder Jet Dry Feeder System

#### Quick and easy switch between wet and dry measurement.

When the dry unit is installed, you can switch back and forth between dry and wet measurement by simply sliding the cell. The cell can be changed with ease, allowing you to select the necessary measurement method at any time. The cell in the measurement position is automatically recognized.

#### One instrument, all sample requirements.

The system has a range of capabilities designed from the start. Cohesive particles can be dispersed with a variable-pressure compressed air nozzle. Fragile particles or agglomerates can be measured without any dispersive force. The speed and automation allow samples as small as 10mg to be measured reliably. Very large quantity samples can easily be measured on the same system. A wide range of accessories are available to optimize the system for different sample types, including different sample trays and hoppers.

#### Installed on the main unit, the dry measurement unit requires no additional space.

The dry measurement unit attaches to the LA-950V2 unit, with no need for any installation space apart from the LA-950V2. Wet measurement is possible with the dry measurement unit installed, and thus there is no need for removal when changing measurement methods or extra storage requirements.

#### Automatic control of sample feed rate.

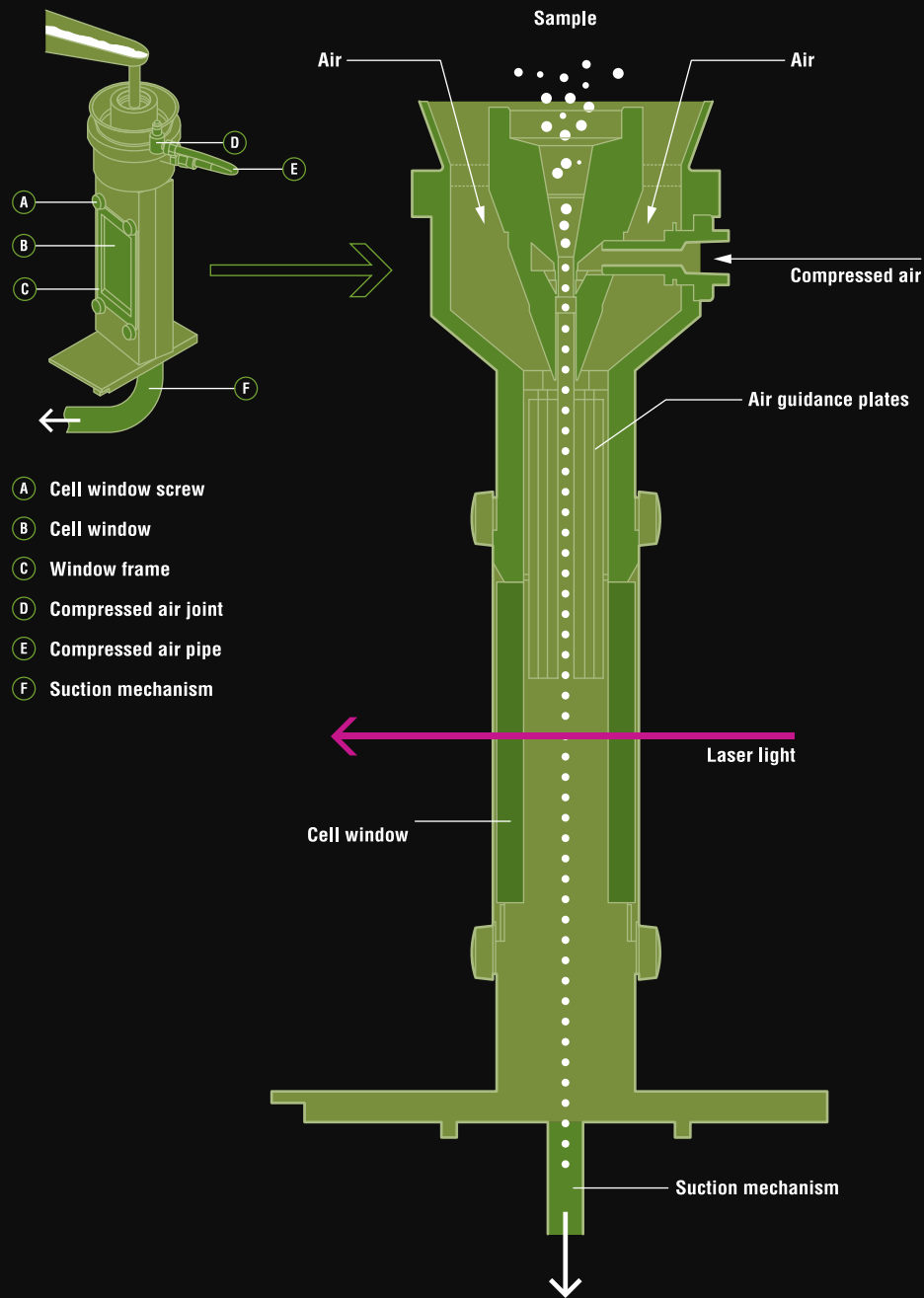
A difficulty of dry measurement is the fact that powder does not always exhibit the same behavior each time it is measured. By monitoring the amount of sample supplied from the vibratory feeder using the transmissivity of the LA-950V2, the sample feeding rate is automatically controlled to enable smoother measurement.

#### Easy disassembly and easy maintenance.

The cell window and dispersion nozzle of the dry cell can be easily disassembled for cleaning with no tools required. Maintainability is excellent.

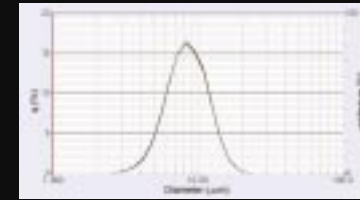


## Dry cell (part names and sample flow)



## Dry measurement example

Micro-quantity samples can also be measured with high reproducibility. The graph shows six overlaid measurements of one microspatula scoop of alumina particles.



Median diameter CV value = 0.39%

High correlation is obtained with both the wet and dry methods.

The same optical system is used for measurement, thus if the dispersion state is the same, a high correlation should be obtained in the results. (Measurement example: abrasive)



Wet method: Median diameter 8.73 µm



Dry method: Median diameter 8.35 µm

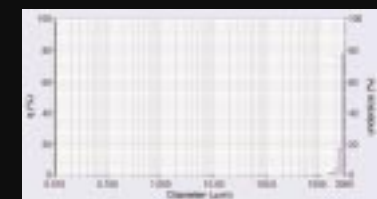
LA-950V2 enables you to measure a wide range of particle sizes from submicron to over millimeters.

Dispersion effects are obtained even with strongly cohesive samples such as titanium oxide (anatase form).

3mm alumina balls and submicron samples can be measured with only one dry unit.



Dry method: Median diameter 0.51 µm  
Air compression: High



Dry method: Median diameter 2,700 µm  
Non-dispersion measurement

## Accessories

### Fraction cell unit for micro samples

This accessory is ideal when total sample amount is small, the sample or dispersant is toxic or you wish to recover the measurement sample.

### Paste cell unit for magnetic materials

This accessory is ideal for magnetic samples or materials that flocculate easily.

### Mini flow (Small volume circulation system, Solvent resistant)

Minimize sample and dispersant volume requirements with all the convenience of a fully-automated circulation system. The software controls all sequences such as fill, rinse and drain, no manual operation required.

Specifications: Mini flow		
Measurement range	0.01-1000 microns	
Dispersing liquid volume	35-55 mL	
Circulation system details	Ultrasonic probe	40 kHz, 7 steps of power control, Titanium alloy
	Centrifugal pump	15 steps of speed control
	Auto-fill pump	Teflon diaphragm pump
	Other materials contact in fluids	Tempax glass, SUS316, Titanium alloy, Teflon, Perfluoro elastmer

### Auto sampler & Slurry sampler

Fully automate particle size measurement for improved reproducibility, system availability and productivity. Combined with the built-in automation of the LA-950V2, these systems are flexible and powerful enough to accommodate any sample requirement. The Auto sampler is a 24-position carousel-type system, with each sample cup being completely added to the analysis system.

The Slurry sampler mixes the sample, withdrawing the appropriate amount of sample for measurement, mixing and diluting as necessary. This system is a robotic-arm sampling system that can accommodate up to 60 samples, depend on container size (15, 30 or 60 samples).

There are three kinds of nozzles, depend on sample size (scoop, thin or thick nozzles).

Specifications: Auto sampler	
Number of sample cups	24
Cup material	Aluminium
External dimensions	380 x 580 x 540 mm (15 x 23 x 21 in) (W x D x H; not including dimensions of projections)
Mass	22 kg (48 lb)

Specifications: Slurry sampler		
Sample applications	15, 30, or 60	
Communication	RS-232C	
Materials of surfaces in contact with liquids	Sample container	Plastic
	Peristaltic pump tube	Silicone rubber
	Sample nozzle	SUS304 steel
	Agitation propeller and shaft	SUS304 steel
	Rinse station	Vinyl chloride polymer
Power supply	200 VA (excluding LA-950V2)	
External dimensions	550 x 630 x 610 mm (20 x 25 x 24 in) (W x D x H; not including dimensions of projections) (excluding projections, cables or tubes)	
Mass	51 kg (112 lb)	



Fraction cell



Paste cell



Mini flow



Auto sampler



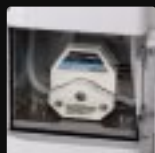
Slurry sampler



Peristaltic

## Peristaltic pump circulation system (Water & Ethanol use version or solvent resistant)

This system uses a roller pump for gentle circulation of the sample.



Specifications: Peristaltic		
Measurement range	0.01-1000 microns	
Dispersing liquid volume	160 mL	
Circulation system details	Ultrasonic bath	40W, SUS316
	Peristaltic pump	Tubing material depends on the solvent in use, 15 steps, 1 L/min. at maximum
	Auto-fill pump	Diaphragm pump
	Other materials contact in fluids	Tempax glass, SUS316, Teflon, Perfluro elastmer, Kalrez

## Pressurized fill adapter

The Pressurized Fill Adapter replaces the standard automatic fill pump in the Partica LA-950V2 for those customers who wish to connect directly to a pressurized water system.

The standard fill pump is not designed to handle input pressure, so it is replaced with a solenoid valve and a flow regulator.

## LitreFLOW (Large volume circulation system, Water & Ethanol use limited)

1 liter volume circulation system to increase sampling amount for wider size distribution material measurement or for better statistical representation of large size sample.

## 21CFR Part 11 compliant software

This software package includes functions that meet the requirements of FDA regulations.

This supports users in the pharmaceutical and food industries who control equipment based on strict validation procedures.

Features include configurable security settings to limit access to certain functions, electronic signatures, and an audit trail for tracking activity related to each data file.

## Other features

### Traceability certification can be issued upon request

The LA-950V2 shipping inspection conforms to Japanese standards and ensures traceability. Certification documents can be issued upon request.

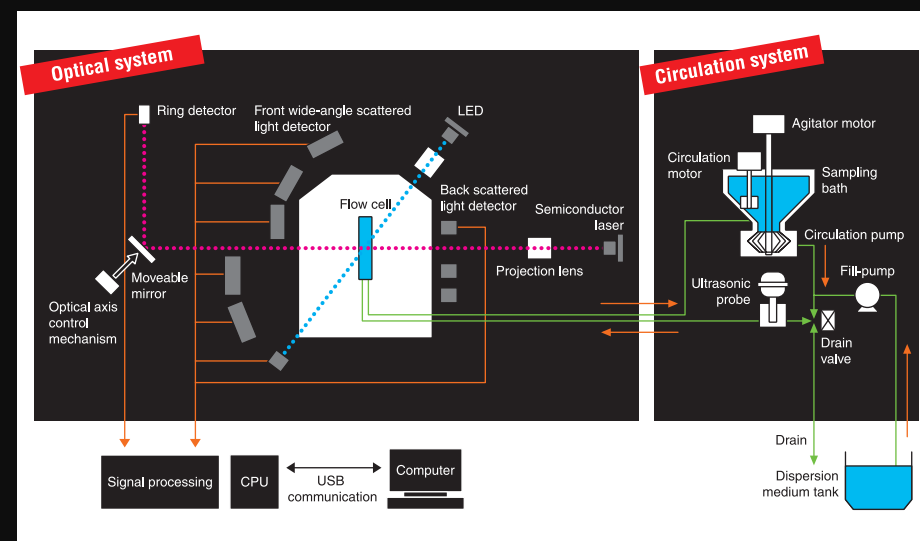
Certificate sample ▶



### A circulation system for organic solvents is also available

This version of the circulation system has all of the features that make the standard version so powerful, with materials that allow a wide range of organic solvents to be used for sample dispersion.

## Configuration of the LA-950V2 system



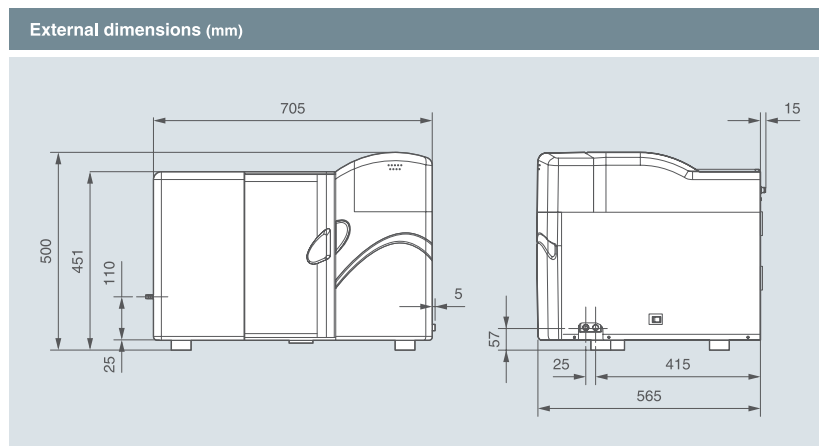
# Laser scattering particle size distribution analyzer: **Model: LA-950V2**

© LA-950A2 Water/ Ethanol version: G2010101 © LA-950S2 Solvent resistant version: G2010102

Specifications	
Measurement Method	Mie Scattering Theory
Measurement Range	0.01 $\mu\text{m}$ to 3000 $\mu\text{m}$
Measurement Time	1 minute from dispersion liquid filling to measurement and rinse.
Sampling System	Required Sample Amount: Sample 10 mg to 5 g (Depends on sample material) Dispersion Medium: Approx. 180 mL to 250 mL (Using Flow Cell) Viscosity: Less than 10 mPa·s
Optical System	Light Source: 650 nm Laser Diode approx. 5.0 mW 405 nm Light Emitting Diode (LED) approx. 3.0 mW Detectors: Silicon Photo Diode
Circulation System	Ultrasonic Probe: Frequency 20 kHz 7-Level selections Circulation Pump: 15-Level selections Agitator: 15-Level selections Flow/Fraction Cell: Tempax Glass
Power Supply	120 V AC $\pm 10\%$ or 230 V AC $\pm 10\%$ , 50/60 Hz $\pm 1\%$
Power Consumption	300 VA
Operating Temperature	15 to 35°C (59 to 95°F)
Operating Humidity	Relative Humidity 85% or less (no condensation)
External Dimensions	705 x 565 x 500 mm (28 x 23 x 20 in) (W x D x H; not including dimensions of projections)
Mass Approx	56 kg (123 lb)

## Application examples

- ◎ Evaluation of the dispersion conditions of carbon black.
- ◎ Control of food product feel and texture.
- ◎ Adjustment of the effectiveness and solubility of pharmaceuticals, measurement of granulated powder size.
- ◎ Research, development, and quality control of battery materials and catalysts.



## Class 1 Laser Product

Laser Scattering Particle Size Distribution Analyzer LA-950V2 Standard Model

\* The display screen is not a real image. Actual use of the system requires the connection of a power cord and cable.



# Laser scattering particle size distribution analyzer: **Model: LA-950V2**

© LA-950V2 Powder jet Dry Feeder Accessory: G2010109

Specifications	
Dispersion method	Injector-driven forced dispersion in air, using compressed air
Sample supply method	Vibrating feeder
Sample ejection method	Vacuum-driven forced ejection
Measured particle diameter range	0.1 $\mu\text{m}$ to 3000 $\mu\text{m}$ (median diameter of about 1 $\mu\text{m}$ to 3000 $\mu\text{m}$ ) The actually measurable particle diameter range will vary according to sample powder characteristics such as dispersion quality.
Sample concentration adjustment method	Adjusted by feeder vibration power.
Control method	Serial communication with LA-950V2 measurement unit
Controlled items	Feeder vibration power alteration (automatic or user-set), vacuum ON/OFF, compressed air valve ON/OFF, pressure is adjustable.
Measurement time	Normally about 2 seconds from start of measurement
Operating temperature/humidity	15 to 35°C, 85% RH max. (no condensation) (59 to 95°F)
Outer dimensions	332 mm x 321 mm x 244 mm (13 x 13 x 10 in) (W x D x H; not including dimensions of projections and LA-950V2 measurement unit)
Power supply	AC 100 V, 50 or 60 Hz, 1500 VA (Including vacuum; not including LA-950V2 measurement unit)
Compressed air pressure	0.4 MPa to 0.8 MPa
Compressed air supply port	Quick connector for resin tube with 6 mm outer diameter (Compressed air supply equipment must be provided separately)

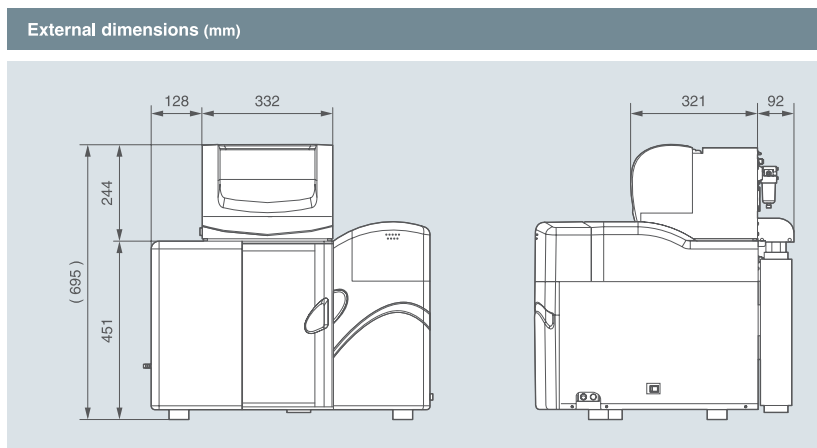
\*When ordering a dry unit, please specify the power supply voltage and frequency.

\*The above specifications and functions are only effective when the unit is installed on the LA-950V2 measurement unit and control is performed from a computer on which the dry method program is installed.

\*The manufacturers and models indicated for the computer and monitor are subject to change.

## ■ Compressor

Pressure: within a range of 0.4 - 0.8 Mpa Air tank: 26L or higher, Flow rate: 45 L/min



## Class 1 Laser Product

Laser Scattering Particle Size Distribution Analyzer LA-950V2 Model with Dry Unit Accessory

\* The display screen is not a real image. Actual use of the system requires the connection of a power cord and cable.

## Specifications of LA-950V2 Series

Model		LA-950N2 G2010100	LA-950A2 G2010101	LA-950S2 G2010102	LA-950W2 G2010103	LA-950L2 G2010104	LA-950P2 G2010105	LA-950PS2 G2010106
Optics	Double laser system	●	●	●	●	●	●	●
Aqua type	Standard pump system	—	●	—	—	—	—	—
	Pressurized fill adopter	—	—	—	●	—	—	—
	Liter flow	—	—	—	—	●	—	—
	Peristaltic pump system	—	—	—	—	—	●	—
Solvent type	Standard pump system	—	—	●	—	—	—	—
	Peristaltic pump system	—	—	—	—	—	—	●
Accessories	Fraction cell holder LY-9501 G0269950	●	●	●	●	●	●	●
	Mini flow with ultrasonic unit LY-9502 G2010107	●	●	●	●	●	●	●
	Mini flow without ultrasonic unit LY-9503 G2010108	●	●	●	●	●	●	●
	Paste cell holder LY-9504 G2008192	●	●	●	●	●	●	●
	Dry unit LY-9505 G2010109	●	●	●	●	●	●	●
	Slurry sampler LY-9506 G2010110	—	●	●	●	●	—	—
	Auto sampler LY-9507 G2010111	—	●	●	●	●	—	—

# HORIBA Global Network



*Horiba continues contributing to the preservation of the global environment through analysis and measuring technology.*



**Please read the operation manual before using this product to assure safe and proper handling of the product.**

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**HORIBA**  
Explore the future