

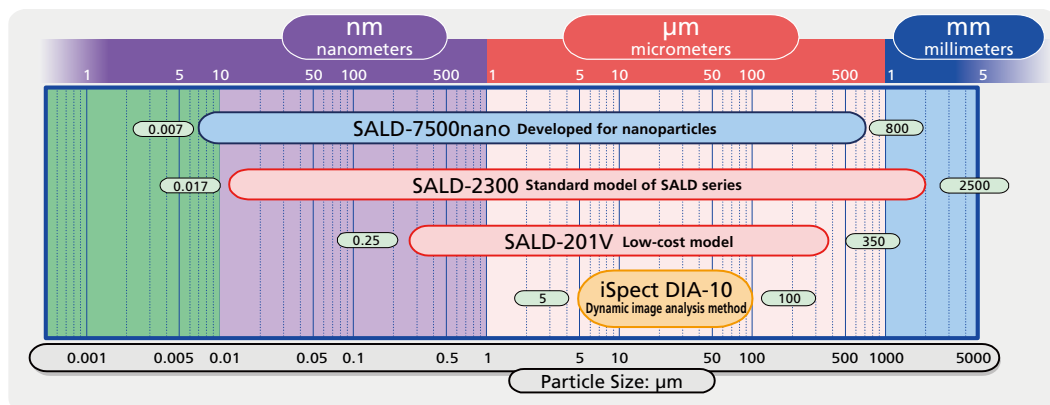
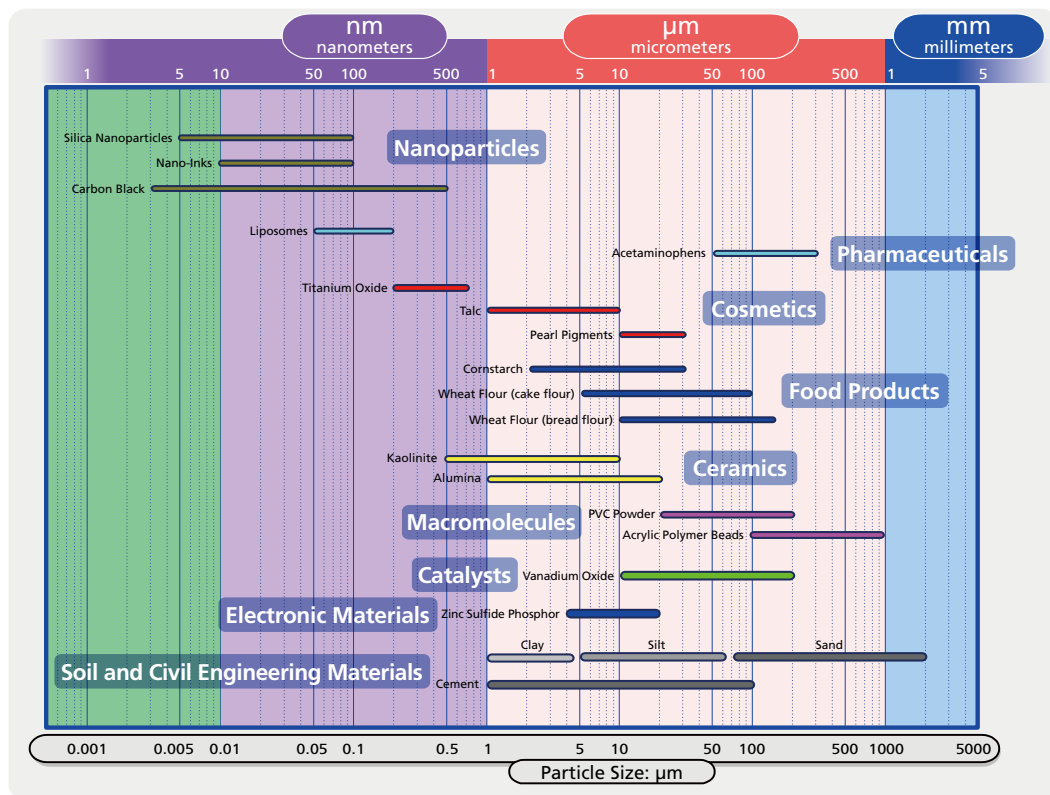
Particle Size Analyzers



Particle Size Analyzer Applications

Particle Size Is One of the Largest Factors That Influences the Characteristics of Powders and Particles.

Powders and particles are used in a wide variety of fields for a wide range of objectives and applications. In some cases, they are used directly as pharmaceuticals, catalysts, additives, or binders while in other situations they are used as raw ingredients. In either case, the particle size distribution can have a major effect on the characteristics, performance, and quality of a final product. Consequently, measuring the particle size distribution is essential for controlling or improving the characteristics, performance, or quality of powders or particles.



Shimadzu Particle Size Analyzers Are Used in a Wide Variety of Fields, for a Wide Range of Purposes and Applications

1. Nanoparticles	Nanoparticles are expected to provide benefits as a result of special properties related to their size. Particle size analyzers are an extremely important tool for developing methods to maintain good characteristics by ensuring contaminants and aggregates are identified.
2. Pharmaceuticals	In the case of particles in medical injection, the particle size determines how they pass through or penetrate capillaries and blood vessel walls and which parts of the body they reach. This has a major influence on the efficacy and side effects of pharmaceuticals.
3. Cosmetics	For lipstick, mascara, and eye shadow, subtle differences in color and shine are controlled by differences in the particle size distribution. The smoothness or UV light-blocking properties of creams also vary depending on the particle size distribution.
4. Food Products	Many food products include powdered ingredients. The mouth, tooth, and tongue feel and other characteristics of bread, cakes, pasta, etc. depend on the particle size distribution. Also, controlling the particle size distribution in beverages is important to ensure consistent quality. For example, smaller particle sizes are used in milk and lactic acid beverages to prevent differences in concentration and taste between the upper and lower portions of the container.
5. Ceramics	The strength, density, hardness, heat resistance, water and air permeability, and other characteristics of ceramics depend not only on the type of ingredient particles, but also on the particle size distribution.
6. Macromolecules	When particles are used as ingredients in pipes, films, and sheets, the particle size distribution can affect the strength and light permeability of the final product.
7. Catalysts	Though chemical reactivity is affected by the specific surface area and pore structure, given the same material, the chemical reactivity can be controlled by varying the particle size distribution.
8. Electronic Materials	The manner and degree to which particle size affects electronic materials differ depending on the application and material. However, the quality control of particle size distribution is increasingly being required to ensure higher and more consistent quality of the final product.
9. Soil and Civil Engineering Materials	The particle size distribution of soil and cement has a large effect on the stability and strength of supporting ground, buildings and other structures, and how much these change over time. Also, measuring the particle size distribution is an important factor in understanding the scale of environmental pollution in soil.

Guide to Selecting Particle Size Analyzers

<p>Mainly measure particles in the submicron to micron range.</p> <p>* Want to measure dried powders in the dry state.</p>	▶	<p>SALD-2300 Laser Diffraction Particle Size Analyzer * Add a dry measurement unit.</p>
<p>Mainly measure particles in the micrometer to millimeter range. Measure particles with high specific gravity, such as metals.</p> <p>* Want to measure dried powders in the dry state.</p>	▶	
<p>Cost is important. Mainly measure particles in the micrometer range. Wet measurement of low specific-gravity particles is sufficient.</p>	▶	<p>SALD-201V Laser Diffraction Particle Size Analyzer</p>
<p>Screen nanoparticle samples for aggregates or contaminants. Measure nanoparticles in a viscous medium.</p>	▶	<p>SALD-7500nano Nano Particle Size Analyzer</p>
<p>Check rough particles in the micron range or particle shape of aggregates. Measure number concentration of particle.</p>	▶	<p>iSpect DIA-10 Dynamic Particle Image Analysis System</p>

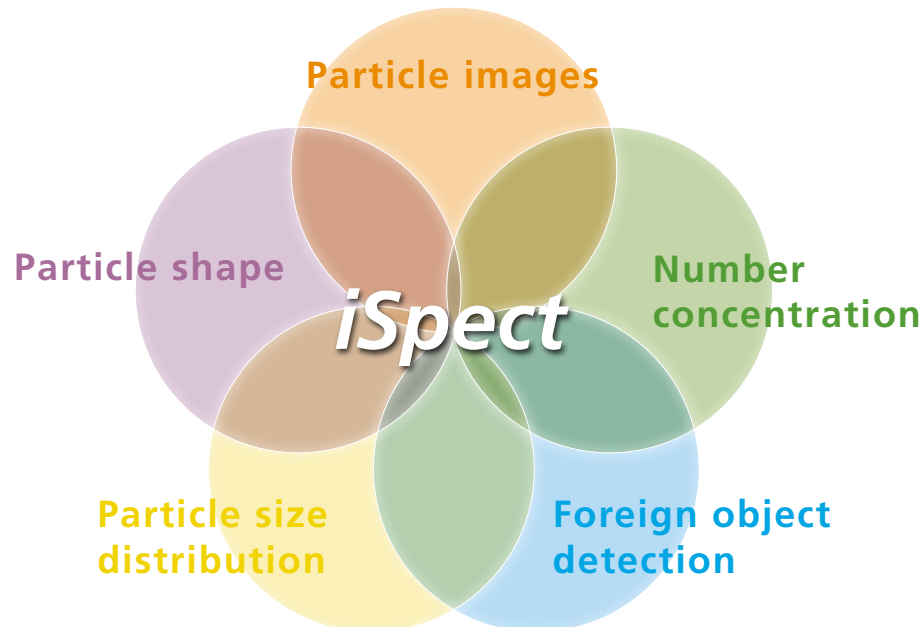
Comprehensive Particle Characterization

Dynamic Particle Image Analysis System

iSpect DIA-10



Shimadzu's iSpect DIA-10 Dynamic Image Analyzer combines particle size and image analysis technology to offer complete particle characterization. It can perform particle imaging, size analysis, and foreign object detection, and obtain size distributions and number concentration, in as little as two minutes.



Features

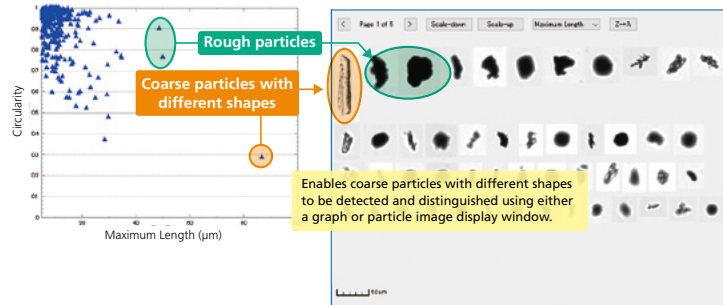
- Reliable particle detection system
- Unprecedented functionality and performance
- Easy operation

Applications

Detection of Coarse Particles in Lithium-Ion Battery (LIB) Cathode Material

Foreign object detection

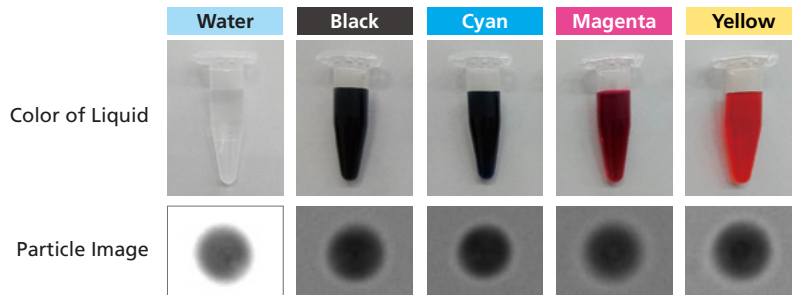
Coarse particles in powder used for LIB cathodes can lead to performance issues and degradation of the material. These particles can be detected and distinguished either through the image analysis window or a plot based on specific parameters. This allows the quality of the powdered raw material to be easily verified.



Evaluation of Foreign Matter in Paints by Image Analysis –Enables Measurement of Colored Liquid and Reduces Solvent Usage

Particle image

Particle images of latex particles in even dark, colored liquids can be obtained due to the short optical path length (120 µm).



Specifications

Measurement Method	Dynamic image analysis method
Particle Size Measurement Range* ¹	5 to 100 µm
Number Concentration* ²	Coefficient of Variation (CV) ≤ 5 %
Measurement Parameters	Particle Size Area circle equivalent diameter, perimeter equivalent diameter, maximum length, maximum perpendicular length, vertical Feret diameter, horizontal Feret diameter, particle perimeter, envelope perimeter Shape Analysis Circularity, aspect ratio, horizontal bounding rectangle aspect ratio Other Parameters Particle area, average brightness
Statistical Analysis Items	Average, standard deviation, CV, median (50 % value), mode value, user defined % value
Display Items	Particle image, histogram, scattergram, cumulative distribution, frequency/integration table, user defined area particle count
Required Sample Size	50 to 1000 µL
Pump	Syringe pump, flowrate 0.1 mL/min
Wetted Part Materials	Measurement unit: PEEK resin, fluorine resin, quartz, fluorine rubber Pump unit: Fluorine resin, glass
Power Supply Requirements	115 or 230 V AC, 100 VA, 50/60 Hz
Dimensions/Weight	Measurement unit: W223 × D465 × H205 mm, 10 kg Pump unit: W97 × D190 × H150 mm, 3 kg

*1: Performance guarantee range of area circle equivalent diameter. Measured using a Shimadzu NIST traceable particle size standard sample.

*2: Measured using concentration standard samples specified by Shimadzu.

SALD Series Particle Size Analyzers

Nano Particle Size Analyzer

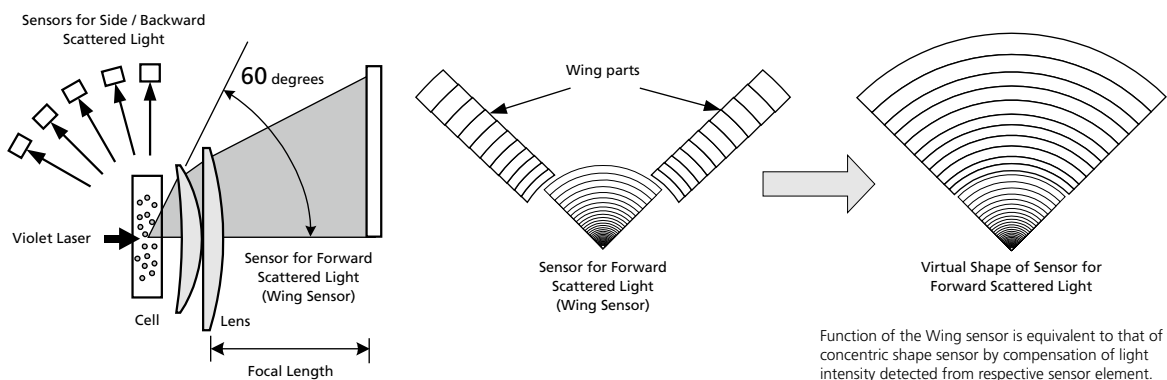
SALD-7500nano

Measurement Range: 7 nm to 800 μm (800,000 nm)



- Allows observing the status of unstable nanoparticles, from a few tens of nanometers to several hundred micrometers, in real time.
- Allows reliably evaluating the dispersion and aggregation processes of particles, as well as the status of contaminants, including how these change over time.
- Allows monitoring changes in the status of unstable nanoparticles in real time over a wide range, from 7 nm to 800 μm (800,000 nm).
- Designed specifically for wet measurement.
- Uses a violet laser light source (405 nm wavelength) and contiguous wide angle scattered light detection.

The laser diffraction method irradiates samples with laser light and detects the changes in intensities, which vary depending on the angle of the diffracted and scattered light. It then uses calculations to determine the particle size distribution. The violet laser light source and a contiguous wide angle scattered light detection system allows observing not only primary particles but also aggregates and contaminants, ranging from the nano region to several hundred micrometers, simultaneously and in real time.



Function of the Wing sensor is equivalent to that of the concentric shape sensor by compensation of light intensity detected from respective sensor element. In the compensation, area of respective sensor element and effect of polarization must be considered.

Optical System with Contiguous Wide Angle Scattered Light Detection

Laser Diffraction Particle Size Analyzer

SALD-2300

Measurement Range: 17 nm to 2500 μm

- Light Source: Red semiconductor laser (680 nm wavelength)
- The SALD-2300 is the standard model in the SALD series. It is capable of measuring a wide range of particle size distributions, such as pharmaceuticals, foods, and electronic materials. Operability and data analysis functions have been improved from its preceding models, the SALD-2001/2101/2201, while ensuring data remains inter-compatible.
- Supports injection type dry measurement as well.



SALD-201V

Measurement Range: 250 nm to 350 μm

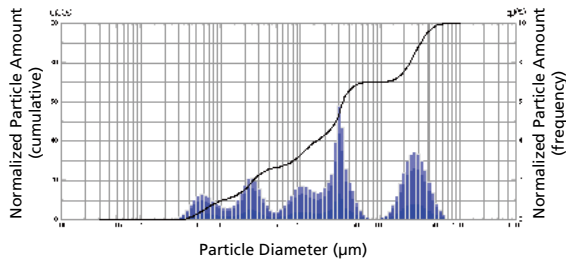
- Light Source: Red semiconductor laser (670 nm wavelength)
- Low-cost particle size analyzer that offers high performance and a small footprint.
- Ideal for particles with relatively low specific gravity (less than 2), such as foods, beverages, pharmaceuticals, cosmetics, and emulsions.
- Designed specifically for wet measurement.



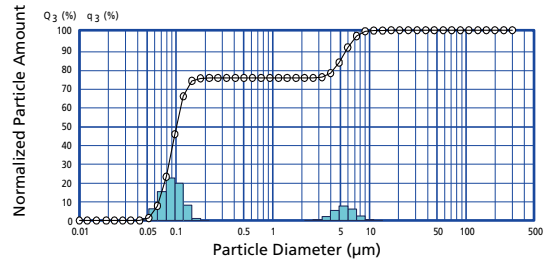
SALD Series Particle Size Analyzers

Detects Particle Size Distributions with Accuracy and High Resolution

SALD series analyzers accurately capture the true image of particle size distributions. They detect the presence of aggregates and contaminants in nanoparticle samples.



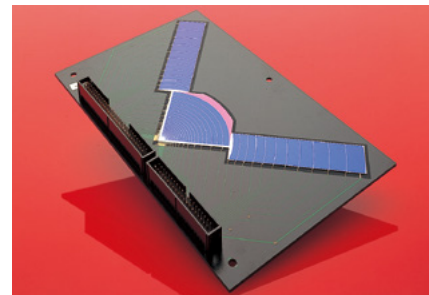
Particle Size Distribution Data with Five Peaks
Reliably reproduces particle size distributions with complicated distribution shapes. This is an example of measuring a mixture of five types of particles, with diameters of 0.6, 2.5, 10, 30, and 300 μm.



Rather large aggregates present in nanoparticle samples can be measured at the same time. For example, this can also be used for screening when reusing CMP.

* CMP: Chemical Mechanical Polishing

Scattered light from coarse particles is concentrated at low angles near the optical axis and fluctuates vigorously within a tiny angle, but scattered light from microparticles fluctuates slowly up to large angles away from the center. Whereas the intensity of scattered light from coarse particles is extremely high, the intensity of scattered light from microparticles is very low. The SALD series achieves high resolution over a wide range of particle sizes by utilizing the relationship between particle size and scattered light and increasing the detection surface area of each of the 78 concentric detector elements in the Wing sensor at a logarithmic rate from the center outward. In addition to the Wing sensor, one sensor is used for side scattered light and four sensors are used for backward scattered light.

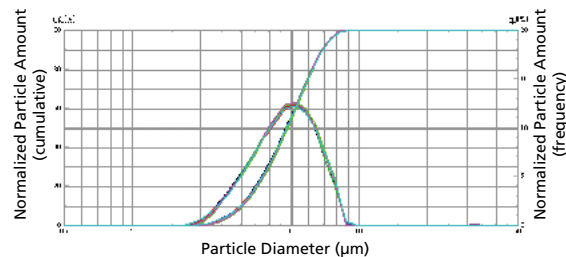


Wing Sensor II

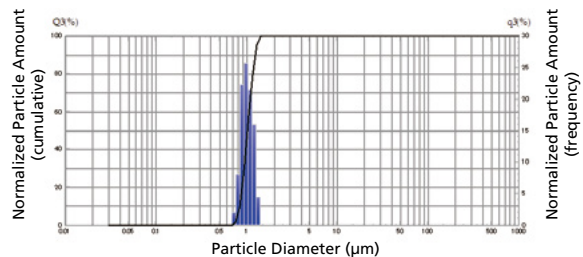
Note: SALD-201V models use a sensor with 54 concentric elements instead of a Wing sensor.
SALD-2300 and SALD-7500nano model use a sensor with 78 concentric elements instead of a Wing sensor.

Achieves High Reproducibility to Accurately Measure Subtle Changes in Samples

Utilizing a single light source and highly reliable optical system provides extremely high reproducibility in terms of consistent sample measurement results. This allows measuring and evaluating subtle changes in samples with confidence.



The above is an overlay of data from measuring the same sample 10 times, showing high reproducibility.



NIST (National Institute of Standards and Technology) traceable particles can be measured with extremely high reproducibility. The standard deviation from multiple mean particle diameter measurements is practically zero.

High Reliability Established by ISO-/JIS-Based Validation and Refined Hardware/Software

Laser diffraction method ISO 13320 and JIS Z 8825-1 compliant

SALD systems comply with ISO 13320 and JIS Z 8825-1 laser diffraction and scattering standards.

Validation possible with JIS standard particles

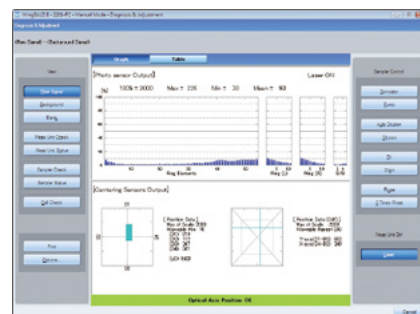
System performance can be confirmed using standard particles specified in JIS Z 8900-1 (for SALD-7500nano and SALD-2300 models). These samples have a broad particle size distribution, which is specified by the JIS standard. Using these samples allows verifying that the instrument is always accurate.

Model SALD-201V use JIS class 11 test dust, specified in JIS Z 8901, for validation.

Easy maintenance

Systems feature a powerful self-diagnostic function.

This allows checking the output signals from each sensor and detection element and the system functional status. The operation log function stores detailed information with all measurement data, such as the instrument operating status and cell contamination status. This allows retroactively verifying the validity of measurement data and confirming the cell contamination status.

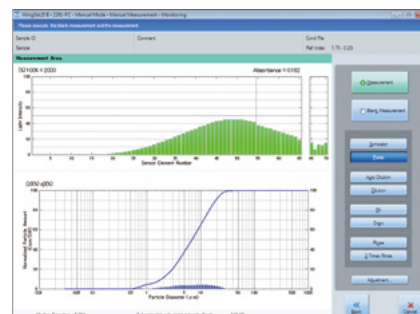


Improved stability of the optical system

SALD systems utilize an OSFAF (omnidirectional shock absorption frame). This completely isolates all elements of the optical system from impacts, vibration, and other external disturbances. Therefore, optical axes rarely need adjustment.

Allows verifying the validity of measurement results (particle size distribution data) by referencing light intensity distribution data (raw data)

Since light intensity distribution data (raw data) and measurement results (particle size distribution data) can be displayed on the same screen, measurement results can be verified while viewing both sets of data. This allows not only verifying whether the detection signal level (particle concentration) is appropriate or not, but also confirming the validity of measurement results from multiple aspects, such as in terms of the distribution width and the presence of aggregates and contaminants.



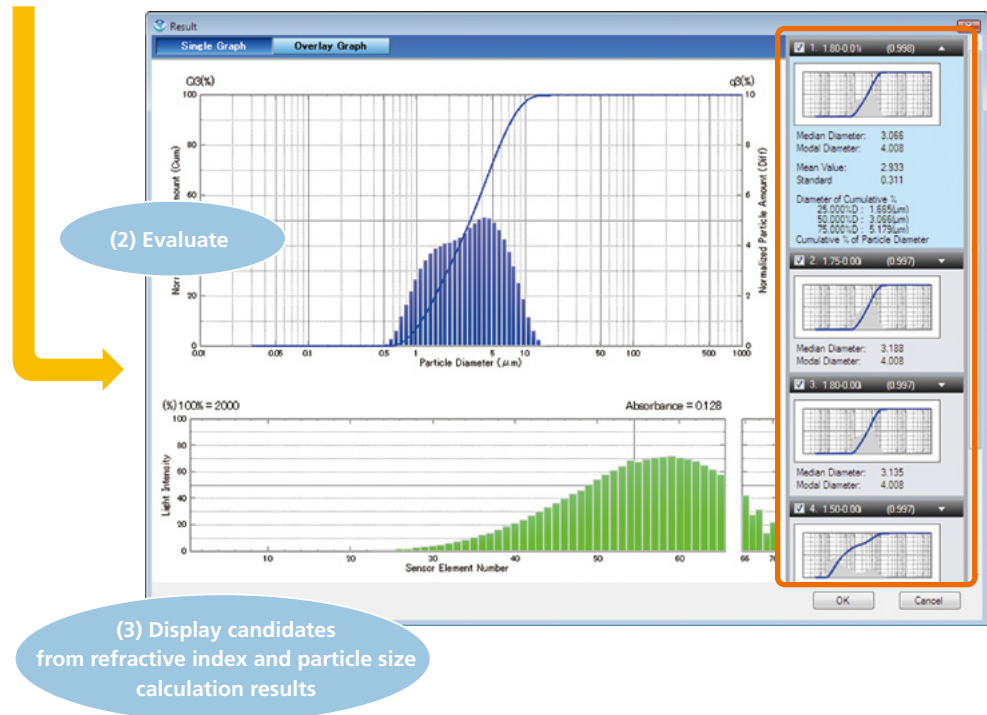
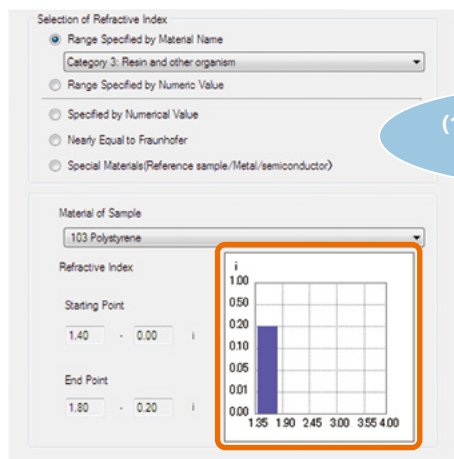
SALD Series Particle Size Analyzers

Automatic Refractive Index Calculation Function Eliminates Selecting Refractive Indices

Selecting a refractive index was an unavoidable part of using the laser diffraction method, where generally a published value was entered, but such values were not necessarily appropriate, considering the effects of particle composition and shape. Therefore, tedious trial-and-error processes were used to select refractive indices.

WingSALD II solves such problems by being the world's first software to include a function that automatically calculates an appropriate refractive index based on the LDR method (light intensity distribution reproduction method).

Note: The LDR method automatically calculates an appropriate refractive index based on consistency between the actual measured light intensity distribution and one reproduced (recalculated) from particle size distribution data. This method was developed by Shimadzu and published in two technical papers. It is sometimes called the "Kinoshita Method", in academic communities, after the name of Shimadzu's engineer.



Measurement Assistant Function Allows Preparing an SOP to Ensure Measurements Are Always Performed Using the Same Conditions and Procedures

Creating, saving, and sharing measurement conditions and procedures, including pretreatment methods and conditions, ensures measurements are performed using the same conditions and procedures, even if performed by a different operator or at a different location or plant, and allows safely comparing data.

Furthermore, when the measurement assistant function is used, measurement instructions for the operator are displayed on the screen. This enables inexperienced operators to perform measurements correctly.

In addition, administrators and operators can be assigned different operating privileges to ensure security.

Note: SOP is an acronym for Standard Operating Procedure.

Create and save measurement conditions and procedures (SOP)

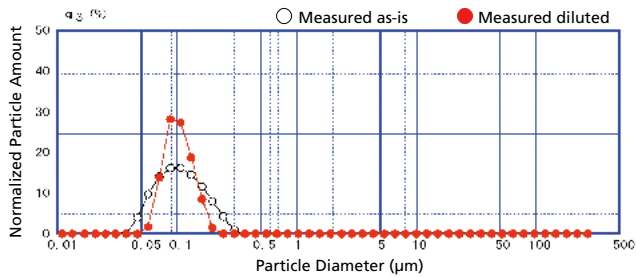
Procedures, remarks, and other information are displayed interactively during measurements. This standardizes measurement procedures and prevents mistakes.

Includes security features that limit the functionality available to operators

SALD Series Particle Size Analyzers

Measures Without Diluting Concentrated Samples, Such as Creams

Concentrated samples that were not previously measurable with laser diffraction and scattering can now be measured without dilution. If high-concentration samples are measured using a standard flow cell or batch cell, the optical path length becomes very long, causing multiple scattering, which prevents accurate measurement. Therefore, samples are now sandwiched in a special sample cell that shortens the optical path length, avoiding the negative effects of multiple scattering. This makes it possible to measure such samples accurately.



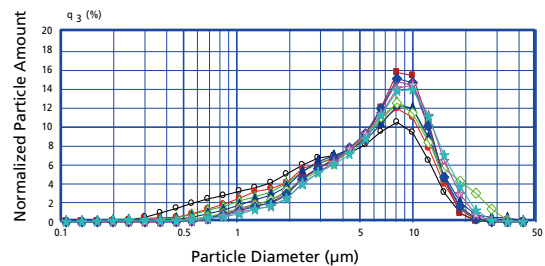
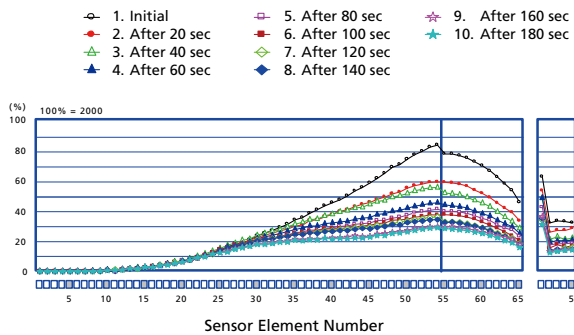
This example compares measuring hand cream as-is (highly concentrated) and diluted. It shows that diluting the sample made the distribution narrower and prevented an accurate measurement. Measuring the undiluted solution as-is allows obtaining accurate measurement results.

Monitors Changes in Sample Status in Real Time

Particle size distribution data and light intensity distribution data can be displayed in real time. This means that sample changes over time or shifts in the dispersion status can be monitored in real time. Since both the light intensity distribution data, which is the raw data, and particle size data can be monitored simultaneously, they can be compared to keep track of any changes in the status of samples.



Using the continuous measurement function of WingSALDII software allows measuring changes to particle size distributions at intervals as short as one second and saving the results.



This is an example of light intensity distribution data and particle size distribution data for the dissolution process of calcium carbonate. It shows how dissolution progresses from smaller diameter particles and how the normalized amount of large particles increases.

Evaluates Measurement Data from Multiple Facets

–Extensive Assortment of Data Analysis Applications Included Standard

The following data analysis applications are included standard.

Evaluation of Scattering Angle

Graphs the components of scattered light intensity at each angle. This takes advantage of the features of the highly-integrated photodiode array to allow evaluating the low-angle scattered light with high resolution.

Application Fields: Evaluating the scattering characteristics of films and sheets.

Data Emulation Function

Based on SALD series measurement results, this function allows emulating measurement results obtained using other models and measurement principles. This allows maintaining data compatibility with previous measurement methods.

Mixture Data Simulation Function

Allows simulating particle size distributions using any mixture ratio of multiple particle size distributions. This makes it possible to determine the optimal mixture ratio for obtaining the desired particle size distribution, without the trouble of actually measuring the particle size distribution of sample mixtures over and over.

Data Connecting Function

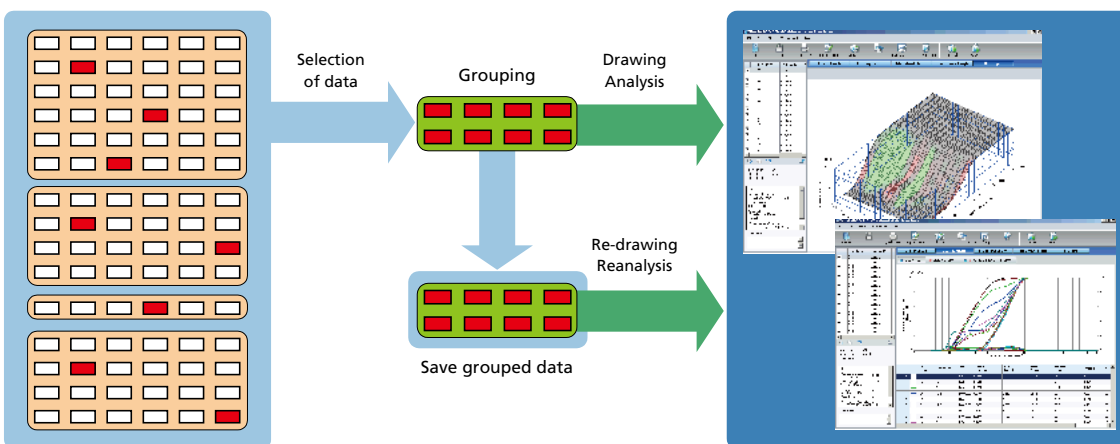
Allows combining the measurement results for two different measurement ranges at any particle size point to create a single particle size distribution. For example, sieve data for particles above 2000 μm can be combined with SALD series data for particles below 2000 μm to create a wide-ranging particle size distribution, which is required for civil engineering, disaster prevention, and environmental fields.

Processes Multiple Sets of Data More Efficiently

Multiple sets of data can be stored as a group.

This makes organizing, re-displaying, and re-analyzing data easier.

Data can be loaded as a group and displayed or analyzed at the same time, rather than having to load each set of data separately.



SALD Series Particle Size Analyzers

Summary Chart of SALD Series Measurement Functions

Performance		Model	SALD-7500nano	SALD-2300	SALD-201V
Measurement Principle		Laser Diffraction and Scattering			
Measurement Range (µm)		0.007 to 800	0.017 to 2500	0.25 to 350	
		One measurement principle, one optical system, and one light source used for entire measurement range			
Light Source (wavelength nm)		Semiconductor Laser			
		405	680	670	
Detector		84 elements	84 elements	54 elements	
Wet Measurement	Sampler (circulation type)	✓ *1	✓ *2	✓ *3	
	Batch Cell	✓ *4	✓ *5	✓ *6	
	High-Concentration Sample	✓ *7	✓ *8	✓ *9	
Dry Measurement	Injection Type		✓ *10		

- *1 Use an SALD-MS75 sampler for SALD-7500nano analyzers. Sold separately from the main analyzer (measurement unit).
- *2 Use an SALD-MS23 sampler for SALD-2300 analyzers. Sold separately from the main analyzer (measurement unit).
- *3 Samplers for models SALD-201V is included standard with the analyzer.
- *4 Use a batch cell for SALD-7500nano analyzers. Sold separately from the main analyzer (measurement unit).
- *5 Use a batch cell for SALD-2300 analyzers. Sold separately from the main analyzer (measurement unit).
- *6 Batch cells for models SALD-201V is included standard with the analyzer.
- *7 Use a high-concentration sample measurement system for SALD-7500nano analyzers. Sold separately from the main analyzer (measurement unit).
- *8 Use a high-concentration sample measurement system for SALD-2300 analyzers. Sold separately from the main analyzer (measurement unit).
- *9 Use a high-concentration sample measurement system for SALD-201V analyzers. Sold separately from the main analyzer (measurement unit).
- *10 Use an SALD-DS55 Injection Type Dry Measurement Unit. Sold separately from the main analyzer (measurement unit). Requires separate, compressor, and dust collector.

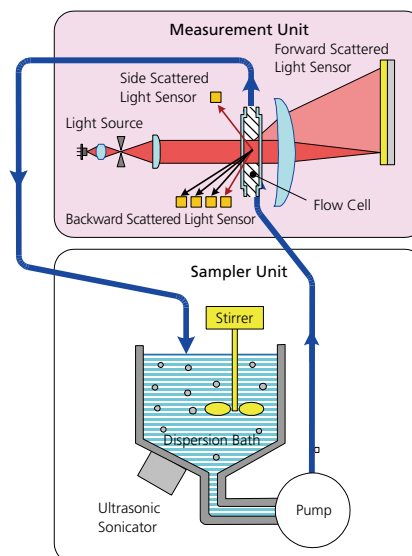
Standard Wet Measurement Method

Samplers for SALD-2300/SALD-7500nano

SALD-MS Series

(includes flow cell)

- Groups of particles are dispersed in a liquid medium and measured as they are circulated between the flow cell, which is placed in the measurement unit, and a dispersion bath in the sampler.
- The dispersion bath incorporates a stirrer and an ultrasonic sonicator. A pump delivers the dispersed suspension to the flow cell.
- The pump is specially designed to ensure both the liquid medium and the particles are circulated.
- Most organic solvents can be used as dispersion media.



Model Name	Dispersion Bath Capacity	Max. Pump Flow Rate	Liquid Media Supply Pump	PC Control	Applicable Model
SALD-MS75	100 to 300cm ³ *	2000cm ³ /min	Yes	Yes	SALD-7500nano
SALD-MS23	100 to 300cm ³ *	2000cm ³ /min	Yes	Yes	SALD-2300

* The sample quantity is changeable. 100mL, 200mL or 300mL can be selected.

Measures Using Small Quantities of Samples and Liquid Media

Batch Cells for SALD-2300/SALD-7500nano

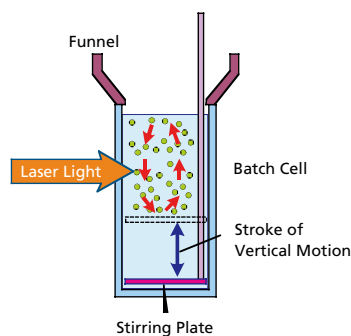
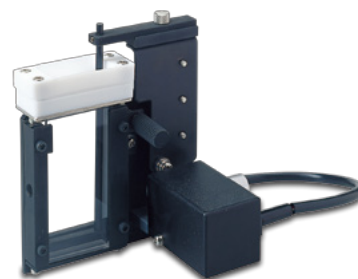
SALD-BC Series

(includes funnel and stirrer)

- Measures using small quantities of samples (particles being measured) and liquid media (dispersion media).
- Organic solvents or acids can be used.
- Less liquid waste is disposed of when using suspensions containing organic solvents or acids.
- Vertical motion of the stirring plate inhibits settling of particles.
- A funnel made of tetrafluoroethylene resin is included to prevent spilling the suspension.

This reduces the chance of getting it on hands or fingers and prevents contaminating the cell surface.

Model Name	Capacity	Applicable Model
SALD-BC23	12cm ³	SALD-2300
SALD-BC75	5cm ³	SALD-7500nano



SALD Series Particle Size Analyzers

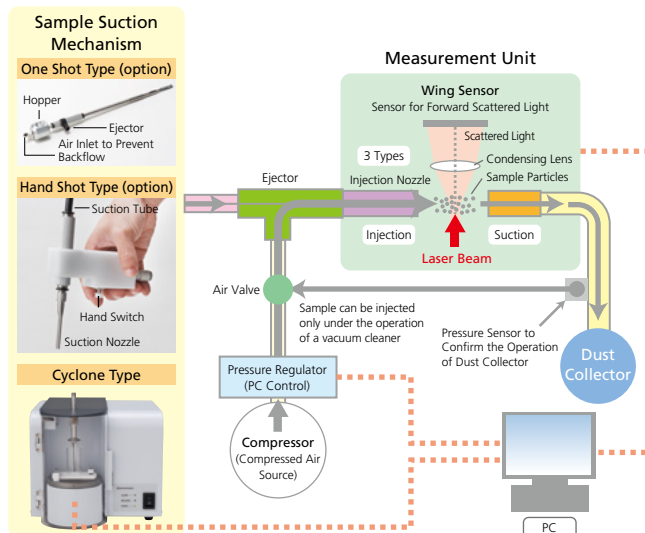
Dry Measurement Method

Dry Powder Measurement System for SALD-2300

SALD-DS55

Cyclone Injection Type Dry Measurement Unit for SALD-2300

- A cyclone type sample suction mechanism has been developed. Strong double dispersion process of suction and injection can be used. Measurement with high precision, high sensitivity, high reproducibility and high resolution
- Sample to be applied
 - Easily dissolved samples (medicine, powder foods)
 - Easily agglomerated samples (magnetized particles)
- Optimum combination can be selected from three sample suction mechanisms (cyclone type, one shot type and hand shot type) and three injection nozzles, considering properties and the amount of sample particles.



SALD-DS55 cyclone injection type dry measurement unit installed on SALD-2300

- When the one shot type is used, putting the sample into a small hopper is the only operation required for measuring. This type is suitable for a small sample amount.
 - When the hand shot type is used, the sample can be sucked directly from the beaker or chartula for measurement.
 - When the cyclone type is used, sample is sucked from the vial, which is rotated and moved upward, injected from the injection nozzle, and measured. The double dispersion process enables measurement with good reproducibility, whenever samples contain many agglomerates. Use of the vial can prevent the scattering of the sample and dirt from the operator's hands.
 - Four types of dispersion nozzle
 - (1) Standard dispersion nozzle
 - (2) ϕ 2.5 mm dispersion nozzle (option)
For particles that require strong dispersion
 - (3) ϕ 3.0 mm dispersion nozzle (option)
For slightly larger particles that require strong dispersion
 - (4) Straight nozzle (option)
For fragile particles that require weak dispersion
- * (2) and (3) are set options

Model Name	Applicable Model
SALD-DS55 for 2300	SALD-2300

*1 Requires separate compressor and dust collector

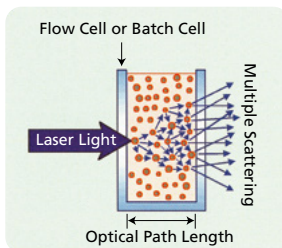
Measures High-concentration Samples Without Dilution

High-Concentration Sample Measurement System for SALD Series

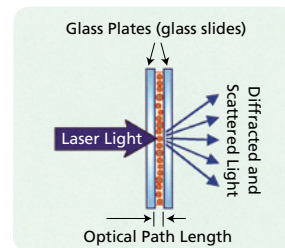
SALD-HC Series

High-Concentration Sample Measurement

- Allows using the laser diffraction method to measure high-concentration samples.
- Samples are sandwiched between two glass plates to minimize optical path length and avoid the negative effects of multiple scattering.
- For some samples, dilution can change the particle size distribution. This system allows obtaining a true image of the sample distribution by measuring the sample as-is, in the undiluted state, or diluted as minimally as possible.



Measuring high-concentration samples using regular methods



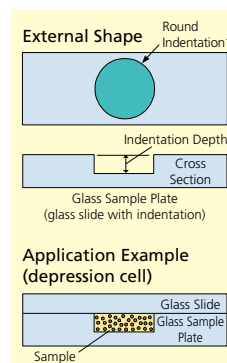
Using high-concentration sample measurement system

Model Name	Applicable Model
SALD-HC75S	SALD-7500nano
SALD-HC23S	SALD-2300
SALD-201V-HC	SALD-201V

Glass Sample Plates (Standard with SALD-HC23S/75S)

Useful for medium-concentration samples, extremely expensive samples that can only be used in small quantities, or samples for which only a small amount could be acquired.

Name	Indentation Depth	Sample Volume	Particle Concentration (wt%)
Glass sample plate (0.02mm)	0.02mm (20μm)	0.006cm ³	Few hundred ppm to several percent
Glass sample plate (0.05mm)	0.05mm (50μm)	0.015cm ³	
Glass sample plate (0.1mm)	0.1mm (100μm)	0.03cm ³	
Glass sample plate (0.2mm)	0.2mm (200μm)	0.06cm ³	
Glass sample plate (0.3mm)	0.3mm (300μm)	0.09cm ³	
Glass sample plate (0.4mm)	0.4mm (400μm)	0.12cm ³	
Glass sample plate (0.5mm)	0.5mm (500μm)	0.15cm ³	



*The indentation of glass sample plate (0.02mm) is rectangular in shape.

Providing Secure, Confident Data Management on a Network System!

Software for SALD-2300 Laser Diffraction Particle Size Analyzer

LabSolutions™ SALD



The SALD-2300 laser diffraction particle size analyzer is now compatible with data integrity requirements. Connecting LabSolutions SALD to the LabSolutions system, with its proven compatibility with ER/ES regulations, enables confident, reliable data management. In addition to SALD data, consolidated management is available for LC, GC, and UV data.

Provides a Comfortable Operating Environment

- Check the operational status of instruments within the network at a glance.
- Data can be viewed from both the analysis PC and other PCs
- Quickly search through voluminous amounts of data.

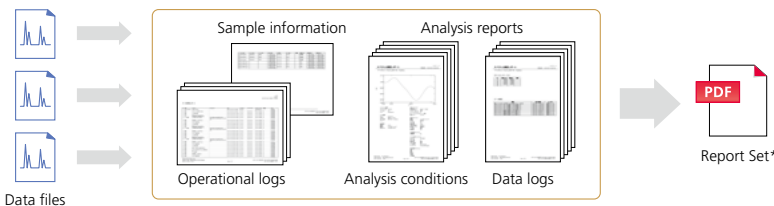
Heightened Management Productivity

- Consolidated management of data, user information and other system information on the server
- Management of related information for each project

Secure, Confident Data Management

- Mistakes are avoided thanks to database management.
- Robust security

Data Integrity and Report Set



Data integrity refers to the assurance that all the data has been collected and that it is free from defects or non-conformities. In other words, it is necessary to present not only the data itself but also the meta data (conditions settings, data analysis and other results of processes in which human hands have intervened) in a form that can be clearly seen for verification. This is provided by Report Set.

Point What is Shimadzu LabSolutions Report Set?

This function collates the operational information distributed within the software (operations and settings in which human hands have intervened) and arranges it in a single report. With the feeling of an e-book, the reader can check the contents while turning the pages, so there is no longer any need to switch between pages and tabs while checking operations and settings.



Best solution for the particle size analysis of biopharmaceutical aggregations in the submicrometer and micrometer

Application System of SALD-7500nano

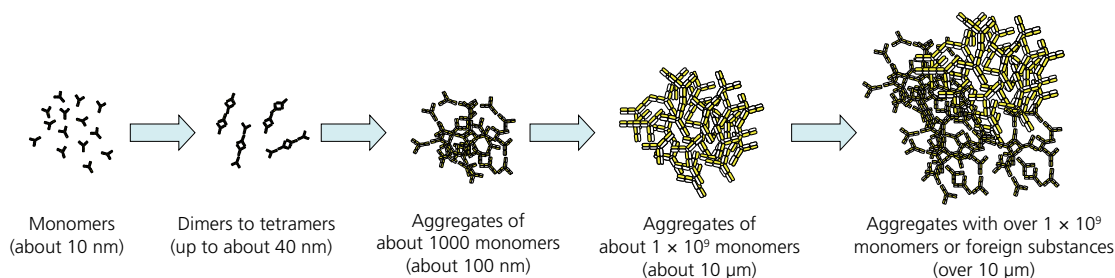
Aggregation Analysis System for Biopharmaceuticals

Aggregates Sizer™

The Aggregation Analysis System for Biopharmaceuticals makes it possible to quantitatively evaluate particle concentrations

(unit: $\mu\text{g/mL}$, or count/mL) in the $0.1 \mu\text{m}$ to $10 \mu\text{m}$ range.

- (1) Quantitative evaluation of the concentration of aggregates from $0.1 \mu\text{m}$ to $10 \mu\text{m}$
- (2) Measure using only a small sample ($125 \mu\text{m}$)
- (3) Evaluate the agglomeration process quantitatively in real time (every 30 seconds)
- (4) Temperature control function ($20 \text{ }^\circ\text{C}$ to $42 \text{ }^\circ\text{C}$, option)
- (5) FDA 21 (FR Part II compatible software, option)



Quantitatively evaluates SVP range aggregate concentrations without dilutions

Concentrations in the SVP (sub-visible particle) range, from 100 nm to $10 \mu\text{m}$, can be evaluated quantitatively (in terms of $\mu\text{g/mL}$).

High-concentration samples can be measured without dilutions, allowing the relationship between aggregation and concentration to be evaluated.

Quantitatively evaluates aggregation processes at intervals as short as one second

Changes (sizes and quantities) in aggregates can be confirmed quantitatively as a concentration (unit: $\mu\text{g/mL}$) at intervals as short as one second. This allows observing the status at various intermediate stages, not just at two stages, before and after such changes, which allows evaluating rates of change. Using a batch cell (5 mL sample capacity), aggregation processes can be observed as samples are mechanically stimulated.

SALD Series Measurement and Data Processing Software

WingSALD II Specifications

Measurement and Data Display Functions	
Measurement of Particle Size Distribution	Allows measurements using measurement assistant function (interactive process based on SOP)
Refractive Index Setting	Automatic refractive index calculation function makes setting the refractive index easy.
Real-Time Display of Particle Size Distribution	Min. 1-second intervals
Real-Time Display of Light Intensity Distribution	Min. 1-second intervals
Display of Particle Size Distribution Data	Displays overlay of max. 200 distributions
Display of Light Intensity Distribution	Displays overlay of max. 200 distributions
Recalculation of Particle Size Distribution	Batch recalculation of max. 200 distributions
Diagnostics/Adjustments	Self-diagnostic function and cell check function
Statistical Data Processing	Max. 200 sets of data (also allows overlaying max. 200 data sets)
Time-Series Processing	Max. 200 sets of data
3-Dimensional Graphing	Max. 200 sets of data
Data Transfer via Clipboard	[Image Output]: Outputs entire data sheet or graph only. [Text Output]: Outputs summary data, particle size distribution data, or light intensity distribution data.
Data Sorting	Sorts by file name, sample ID, sample number, or refractive index
Report Function	Single data sets (6 templates), overlaid data (5 templates), statistical data, time-series data, or 3D data can be selected and output using batch processing

Output Conditions		
Particle Size (μm) Divisions	Fixed 51 or 101 divisions	User settable 101 divisions
Particle Amount (%) Divisions	Fixed 49 divisions	User settable 51 divisions
Distribution Basis	Count, length, area, or volume	
Expression of Cumulative Distribution	Oversized or undersized	
Expression of Frequency Distribution	q , $q / \Delta x$, $q / \Delta \log x$	
Smoothing Levels	10 levels	
Distribution Function Fitting	Rosin-Rammler distribution, logarithmic Gaussian distribution	
Data Shifting	± 10 levels	

Data Analysis Functions	
Scattering Angle Evaluation Function	Evaluates scattering characteristics within micro angle regions for samples such as optical films and sheets.
Data Emulation Functions	Emulates measurement results from other instruments and measurement principles, using SALD series measurement results.
Mixture Data Simulation Function	Simulates particle size distributions using any mixture ratio of multiple particle size distributions.
Data Connection Function	Combines two particle size distributions with different measurement ranges at any particle size point to create a single particle size distribution.

PC Requirements

The software is included standard on a CD-R with the SALD system (optical system). Install the software on a PC that meets the following specifications.

OS	Windows® 10 (32 / 64 bit)
CPU	Intel®Core™ i5, i7
MEMORY	4GB min.
HDD	Min. 1 GB of free space required.
CD-ROM Drive	Required for software installation
USB / RS-232C Port	SALD-2300: 1~4 USB Ports SALD-7500: 1~2 USB Ports SALD-201V: 1 RS-232C Port (Depending on Sampler Configuration)
Display	SXGA (1280 × 1024 pixels) min.
Printer	Must be compatible with operating system.

Aggregates Sizer is a trademark of Shimadzu Corporation or its affiliated companies in Japan and/or other countries.

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Intel and intel core are trademarks of Intel Corporation or its subsidiaries.



Shimadzu Corporation

www.shimadzu.com/an/

For Research Use Only. Not for use in diagnostic procedures.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

Company names, products/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation, its subsidiaries or its affiliates, whether or not they are used with trademark symbol "TM" or "®".

Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services, whether or not they are used with trademark symbol "TM" or "®".

Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

The contents of this publication are provided to you "as is" without warranty of any kind, and are subject to change without notice. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication.