IF-3200S

Wet-dispersion type

Injection Flow Particle Image Analyzer

JASCO INTERNATIONAL CO.,LTD.

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Wet-dispersion type

Injection Flow Particle Image Analyzer

This instrument captures images of particles dispersed in liquid, measures particle size and shape distribution, and evaluates sample characteristics.
It pursues ultimate simplicity to achieve versatility, and is available for a wide range of applications from quality control to research and development.

Ultimate Simplicity, Achieve Versatility

Simplicity

The IF-3200S is a wet-dispersion type image analysis particle size distribution analyzer. A suspension made by dispersing powder sample in a liquid is introduced into a flow cell and a projected image of the particles passing through the flow cell is captured. The projected images are analyzed using dedicated software. The size and shape of particles are measured to determine particle size and shape distributions. In addition, it is possible to measure and analyze particle shape in a way that is not possible with laser diffraction/ scattering particle size distribution analyzers.

High-resolution camera

The IF-3200S uses a 10-megapixel camera for precise particle shape analysis. The smallest unit that can be captured is 200 nm.

Optics for accurate image capture

In order to accurately capture the projected image of particles, the light from a 440 nm blue strobe light source is collimated and irradiated to the particles. By applying parallel light with a short wavelength to the particles, the projected image of the microscopic particles is clearly captured. In addition, adopting a unique telecentric zoom lens which has a deep depth of focus and constant magnification within the depth of focus enables to provide accurate projected images.

Available for variety of applications

- Quality control of toner particles
- Evaluating the aggregation and dispersion state of particles
- Evaluating new materials and functional particles
- Inspecting for foreign matter and coarse particles mixed in during the manufacturing process

Measurement

- Simple flow path
- No need to change the sample concentration and conditon
- Support for a variety of sample volumes
- Freely select the liquid to be dispersed
- Easy adjustment for optimum conditions for sample size

Analysis

- Unique particle detection algorithm
- Unique shape analysis parameters to evaluate particles
- Easy operation from measurement to report creation in a short time
- Useful analysis functions

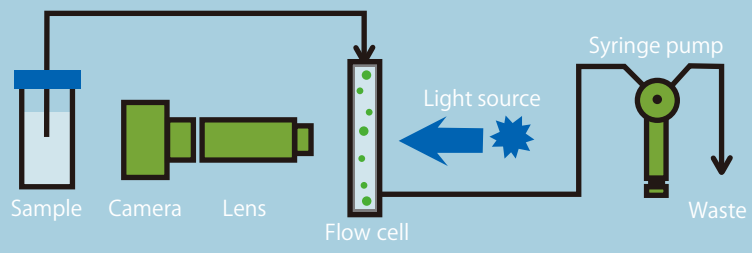
Maintenance

- Easy access to all parts
- Demountable flow cell for easy cleaning and spacer replacement

Measurement

Simple flow path

Simple flow path allows flexible response to a wide range of needs from quality control to research and development. The short flow path allows measurement with a small volume sample, easy cleaning, and less liquid waste.



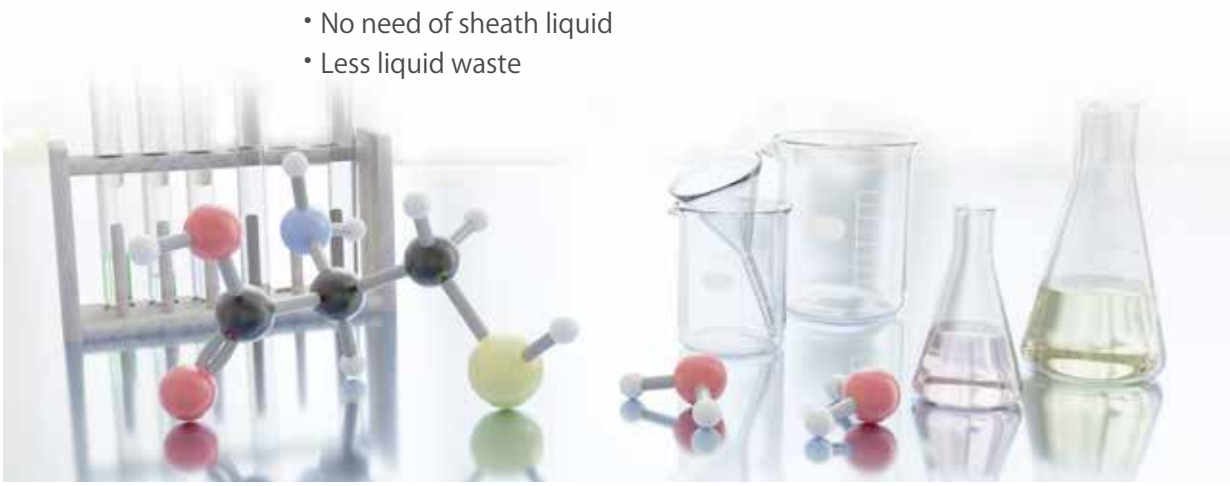
Sample is injected into the flow cell by syringe pump for measurement

No need to change the sample concentration and condition

The telecentric zoom lens, suitable for dimensional measurements, focuses on all particles flowing through the flow cell to capture particle images. Since there is no need to add sheath liquid, the sample can be measured as it is without changing its concentration and condition.

Benefits

- Sample can be measured without changing its concentration and dispersion state
- Simple measurement conditions
- No need of sheath liquid
- Less liquid waste



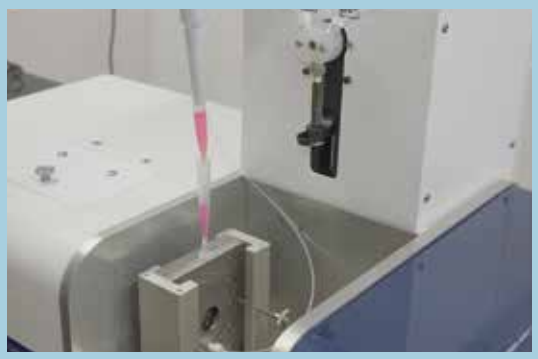
Simplicity

Easy and fast measurement

Supports variety of sample volumes

Supports a wide range of sample volumes. Small volumes of sample are introduced into the pipette tip set at the top of the flow cell with a pipettor for measurement.

Small volume sample using a pipette (minimal volume 100 µL)



Large volume sample using a beaker

Supports variety of dispersion medium

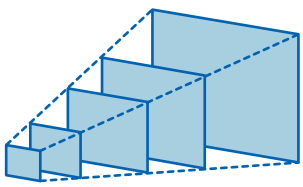
The liquid to be dispersed can be freely selected depending on the sample and the purpose of measurement. (Organic solvents are supported as an option.) Various additives can be used depending on the characteristics of the particles. This is effective for measuring newly developed particles such as new materials under freely changing conditions and evaluating their behavior.

Applications

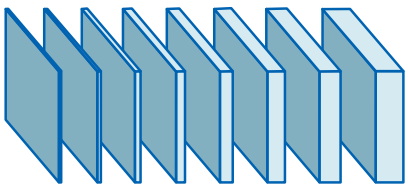
- Detection of only the particles of interest using the refractive index of the dispersion medium
- Measurement of heavy particles using high viscosity dispersion medium

Easy adjustment for optimum conditions for sample size

By adjusting the magnification of the lens and the thickness of the spacer of the flow cell, it is possible to perform measurements under optimal conditions according to the sample size and measurement purpose. With simple adjustments, IF-3200S can perform a variety of measurements, from counting coarse particles to measuring fine particles with high accuracy.



Lens magnification : 5-steps (standard)



Spacer : 8-types (standard)

Analysis

Unique particle detection algorithm

Unique particle detection algorithm, “Aquila”, enables the detection of particles that were previously difficult to detect.

Applications

- Measurement of submicron particles
- Measurement of highly transparent particles such as aggregated proteins

Evaluating particles with unique shape analysis parameters

Each particle is quantified using various size and shape parameters from the captured particle image, and the distribution is displayed. In addition to commonly used parameters such as area-equivalent diameter and circularity, there is a unique shape parameter that quantifies the degree of convexity and concavity of the particle surface. There is also a parameter for analyzing fibrous particles.

Applications

The shape parameter "Bluntness" is used to quantify the degree of convexity and concavity of the particle surface and evaluate the degree of wear on the particle surface.

Bluntness :	45.784	58.275	71.955	88.799

← Rough　　Smooth →

* As the Bluntness value decreases, the surface becomes more uneven.

Easy operation from measurement to report creation in a short time

With simple operations, the entire process from measurement to report creation can be completed in a short time. Multiple standard operating procedures (SOPs) with measurement/analysis conditions set in advance and report formats can be registered. Highly reproducible results can be obtained by any operator. Measurement is performed automatically by simply selecting a SOP and clicking the measurement start button, and the results can be obtained within a few minutes of starting the measurement. Repeated measurements are also possible.

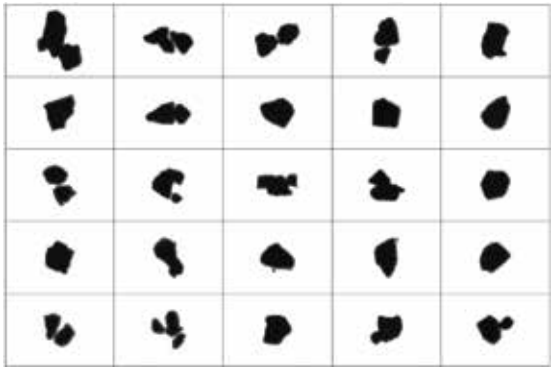
Simplicity

Unique particle detection algorithm

Useful analysis functions

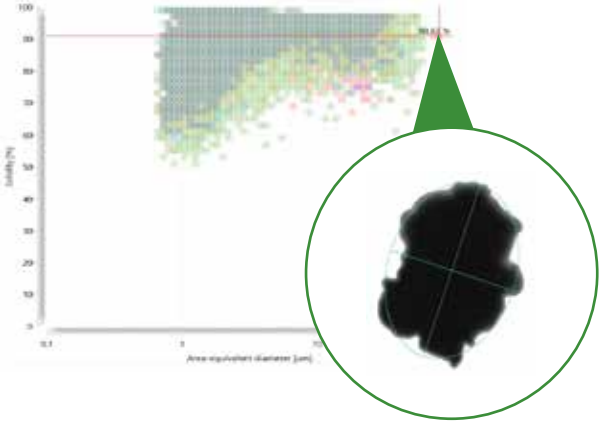
List of images of detected particles

Images of detected particles can be displayed in a list. Using the filter function, you can display only the particles of interest, select similar particles, or remove particles other than those of interest.



Displaying specific particle information on a 2D scatter plot

Corresponding particle image can be displayed by clicking a plot on a 2D scatter plot.
Size and shape parameters of the displayed particle are also displayed in the Particle Information table.



Filter function

By applying filters that specify the range of values for size and shape parameters, it is possible to extract only the target particle group for further analysis.

Saving captured images

Saving captured images enables to analyse repeatedly with different analysis conditions.

Saving data in Excel format

Measurement results are saved in Excel format which is supported by many commercial applications.

Report function

Report function supports users to create reports with any combination of measurement results and particle images.

Maintenance

Easy access to all parts

Easy access to all parts. Easy cleaning and parts replacement.

1 Optical system

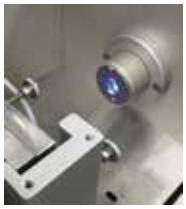
A telecentric zoom lens with a deep depth of focus and constant magnification within the depth of focus provides accurate projection images of the particles.

3 Syringe module

The 3-way valve and syringe can be controlled from software for easy sample injection and flow path cleaning. Syringe replacement is also easy.

2 Flow cell

By changing the spacer, the cell thickness can be optimized for the particles to be measured. Easy to demount and clean.



4 Light source

The collimated blue strobe light is irradiated to the particles to accurately capture particle projection images.

Size and Shape Parameters

To evaluate powder samples, it is important to quantify the size and shape of particles. Many parameters are prepared for the quantification. For samples that are difficult to analyze using only commonly used parameters, the IF-3200S quantifies the characteristics of the sample using a variety of parameters.

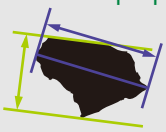
Main size parameters

Area-equivalent diameter
The diameter of a sphere having the same projection area as the particle.

Inner diameter
The diameter of biggest circle inscribed into the projection area of the particle.
Highly compatible with the results of sieve.

Feret diameter minimum
The minimum distance between parallel tangents to the projection area of the particle
Equal to the minimum value measured with calipers.

Main shape parameters



Aspect ratio
The ratio of Feret diameter minimum to Feret diameter maximum.

Circularity
The degree to which the projection area of the particle is similar to a circle, considering the perimeter.

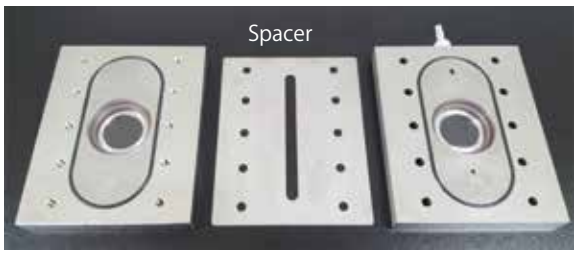
Solidity
A measure of the overwall concavity of the projection area of the particle.

Simplicity

Simple design for easy maintenance

Demountable flow cell for easy cleaning and spacer replacement

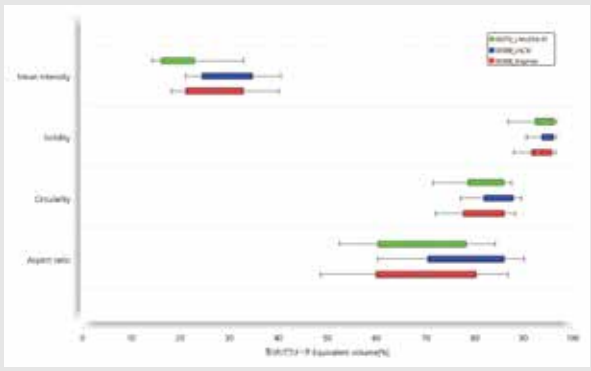
Demountable flow cell is required when washing inside, or when changing spacers for fitting the particle size. However, it can be done very easily with only an allen key.



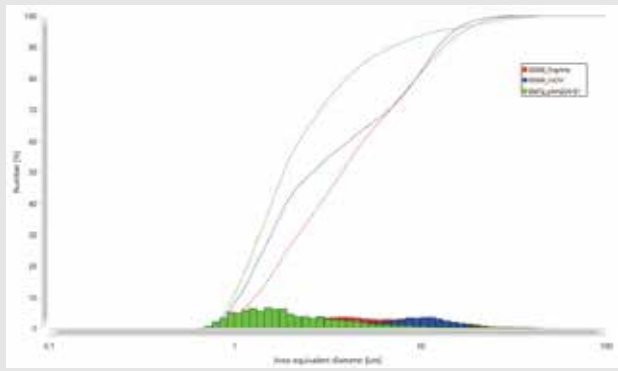
* The spacer thickness should be selected based on the size of the particles to be measured, ensuring that all particles passing through the flow cell are within the depth of focus.

Result display function

Select any parameter from a variety of size and shape parameters to display the particle size and shape distribution. A variety of result display functions, such as histogram, 2D scatter plot, and box plot, enable multifaceted sample characterization.



box plot



histogram and cumulative curve

IF-3200S Specifications

	IF-3200S Injection Flow Particle Image Analyzer 
Particle size range	200 nm–1 mm
Light source	LED（Wavelength: 440 nm）
Camera	10 Megapixels CMOS, 3,840（W） × 2,748（H） pixels
Pixel size	1.67 × 1.67 µm
Lens	Telecentric variable magnification zoom
Pixel resolution	0.185–1.113 µm/pixel
Image size（W × H）	710 × 508 µm (0.185 µm/pixel) 4,274 × 3,058 µm (1.113 µm/pixel)
Flow cell	Demountable flow cell
Flow cell thickness	Variable thickness by changing spacers
Spacer thickness	50, 100, 150, 200, 300, 400, 500, 1,000 µm
Dimensions（W × D × H）•Weight	63 × 35 × 33 cm
	19 kg
Power supply	100–220 V (50/60 Hz)

●Specifications are subject to change without notice.

JASCO INTERNATIONAL's Particle Image Analyzers

Particle size
Small

Particle size
Large

Dry-dispersion type

DW-3000
Dry & Wet Dispersion
Image Analyzer

Particle size range
Dry: 200 nm–3 mm
Wet: 800 nm–300 µm

FF-3000S
Free Fall
Particle Image Analyzer

Particle size range
30 µm–30 mm

Wet-dispersion type

IF-3300
Temp-controlled
Injection Flow
Particle Image Analyzer

Particle size range
200 nm–600 µm

IF-3200S
Injection Flow
Particle Image Analyzer

Particle size range
200 nm–1 mm

CF-3000
Circulation Flow
Particle Image Analyzer

Particle size range
800 nm–1 mm

Scanner type

SC-3000S
Scanning
Image Analyzer

Particle size range
10 µm–50 mm

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B-JASO-PSA-IF32-03(1)202310 Printed in JAPAN