Bettersize

BETTER PARTICLE SIZE SOLUTIONS

Bettersizer 2600

Better Particle Sizing for Every Need

PARTICLE SIZE



Laser Diffraction Analysis For Your Every Need

Laser diffraction technology is a well-established measurement technology of particle size, covering from tens of nanometers to several millimeters.

The Bettersizer 2600 utilizes this laser diffraction technology. There are 92 photoelectric detectors to convert light signals from the scattering spectrum to electrical signals, which are transmitted into an intelligent software. By implementing the Mie scattering theory to the data and performing mathematical conversion, the complete particle size distribution can be derived.

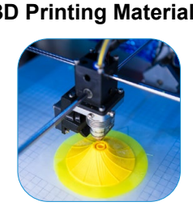


"Ultra-Met has been using the Bettersize Laser Particle Size analyzer for over 1 year. We are able to obtain accurate, repeatable results of our tungsten carbide spray dry powder. This is a crucial tool for our company for development and quality control for our powder metal product. Customer service is always very reliable. I can always rely on having my questions answered same day by a knowledgeable member of their staff. Great company very pleased with their product and customer service overall."

Cara D'Angelo
Metallurgical Engineer
Ultra-Met Carbide Technologies, USA

APPLICATIONS AND INDUSTRIES

INDUSTRIES	SAMPLES	SIGNIFICANCE
Pharmaceuticals 	Lactose, powder inhalers, magnesium stearate, microcrystalline cellulose, etc.	The particle size and size distribution of pharmaceuticals could affect the dissolution, body absorption, efficacy, and safety of drugs. The Bettersizer 2600 is capable of closely monitor the particle sizes during the processes of pharmaceuticals development.
Abrasives 	Silicon carbide, diamond, corundum, garnet, boron nitride, etc.	The Bettersizer 2600 measurements of abrasive particle size and size distribution help the users achieve professional results by determining the optimum size classes, specifically in fabrications and finishing for metal, wood, or plastic applications.
Batteries 	Lithium iron phosphate, lithium cobalt oxide, lithium manganate, modified graphite powder, etc.	The Bettersizer 2600 monitors the particle size distributions of the lithium-ion battery materials, which are critical in affecting the performances of a battery, including energy storage, stability, and safety. It is essential to strictly control the particle size distributions of lithium-ion battery materials.
Building Materials 	Cement, rock, clay, sand, wood, gravel, synthetic polymers, etc.	The particle size distribution of cement directly affects the hardening rate, strength, and fluidity of the final set concrete - the major user of cement. Accurate and repeatable measurements of the cement particle size provided by the Bettersizer 2600 reduce costs and provide an optimized distribution in the concrete manufacturing process.
Paints, Inks & Coatings 	Titanium dioxide, organic pigments, iron oxides, ceramic inks, etc.	The Bettersizer 2600 characterizes particle size and size distribution of pigment-based inks. It is a crucial process in ensuring the ink remains stable over long periods of storage to prevent aggregation, color inconsistencies, and blockages in the channels or nozzles.

INDUSTRIES	SAMPLES	SIGNIFICANCE
Mining & Minerals 	Calcium carbonate, kaolin, talc, quartz powder, graphite, barite, wollastonite, hydromagnesite, diatomite, mica, zirconium silicate, etc.	Minerals are used in many industries, including construction, fracking and abrasives. And the performances of the minerals strongly depend on the size and size distribution of the particles, which can be measured and characterized by the Bettersizer 2600.
Food & Beverages 	Sugar, milk, chocolate, coffee, mayonnaise, flour, etc.	The particle size that affects the manufacturing process and final taste of food can be monitored by the Bettersizer 2600. Particles at the fine ends cause excessive viscosity and poor flow properties, while coarse particles might affect the smoothness and taste during food production.
3D Printing Materials 	Polylactic acid (PLA), acrylonitrile butadiene styrene (ABS), alloys, intermetallic compounds, ceramics, organic materials, etc.	The particle size distribution of 3D-printing raw materials determines the degree of surface smoothness of the final printed product. Using the Bettersizer 2600, the particle size distribution could be optimized, thereby controlling the quality, surface roughness, and flow property of the final printed product.
Ceramics 	Aluminum oxide, zirconium oxide, iron oxide, etc.	Particle size analysis by the Bettersizer 2600 can help the manufacturers to determine the optimum time and temperature required for the green body to reach a predetermined optimal density in the sintering process, as a ceramic powder with a proportion of smaller particles reduces the sintering time due to its larger surface area.
Cosmetics 	Lipstick, mascara, eye shadow, moisturizer, skin cream, etc.	For cosmetics, the Bettersizer 2600 aids in monitoring subtle differences in color and shine 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.

Why the **Bettersizer 2600**?

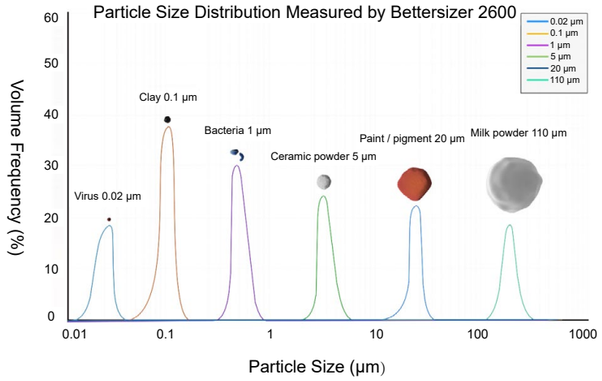
The Bettersizer 2600 is a powerful and versatile particle size analyzer that works under the principles of laser diffraction methods and complies with the ISO 13320 standard.

Our three patented technologies open new frontiers for almost every industry and application, with its wide measuring size range, allowing users to examine materials from 0.02 µm - 2600 µm. And with its modular design, both wet and dry measurements can be performed on one single device and software, ensuring data intergrity.



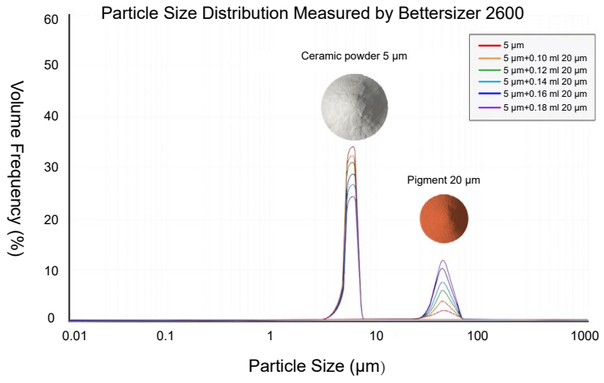
OPTICAL SYSTEM ADVANTAGES

- Stable optical system with high resolution and high sensitivity
- High signal-to-noise ratio for ultra-fine particles
- Wide measurement range: 0.02 µm - 2600 µm, down to nano and up to millimeter range
- Single-laser system (635 nm) – no mixing of different wavelengths in the spectrum



High Resolution

The Bettersizer 2600 is capable of distinguishing different samples with varying particle sizes within a single measurement due to its high-resolution analysis ability.



High Sensitivity

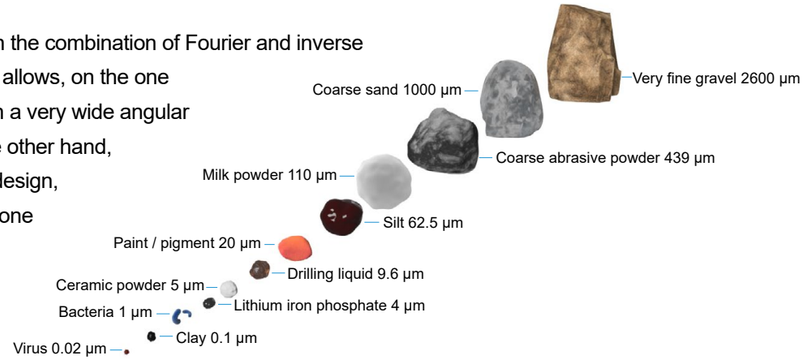
When gradually adding one sample to the other, the Bettersizer 2600 displays the change of particle size distributions in the curve, verifying its excellent sensitivity.

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PATENTED TECHNOLOGIES

I - COMBINATION OF FOURIER AND INVERSE FOURIER DESIGN

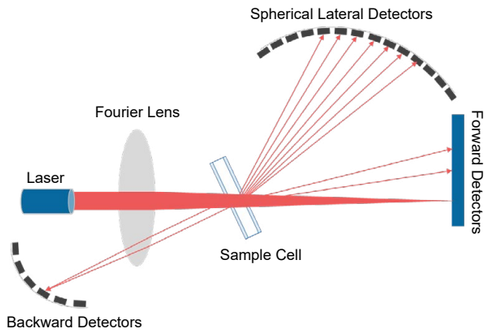
The Bettersizer 2600 is superior in the combination of Fourier and inverse Fourier design. This smart design allows, on the one hand, the detection of stray light in a very wide angular range from 0.016° to 165°. On the other hand, in contrast to the inverse Fourier design, the particles do not have to lie on one plane – the simultaneously accurate measurement of small and large particles is therefore achieved.

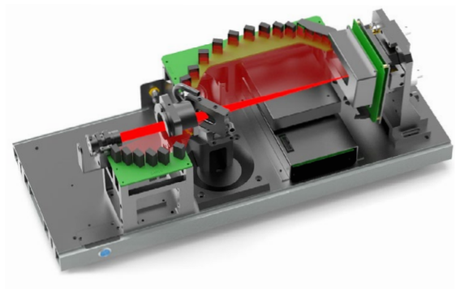


Wide Measurement Range: 0.02 µm - 2600 µm

Features

- Spherical detector array: Forward, lateral and backward detectors in 92 pieces in total;
- Super large Fourier lens;
- Small footprint: Compact design to save space.





Ⅱ - TILTED SAMPLE CELL

What is total internal reflection?

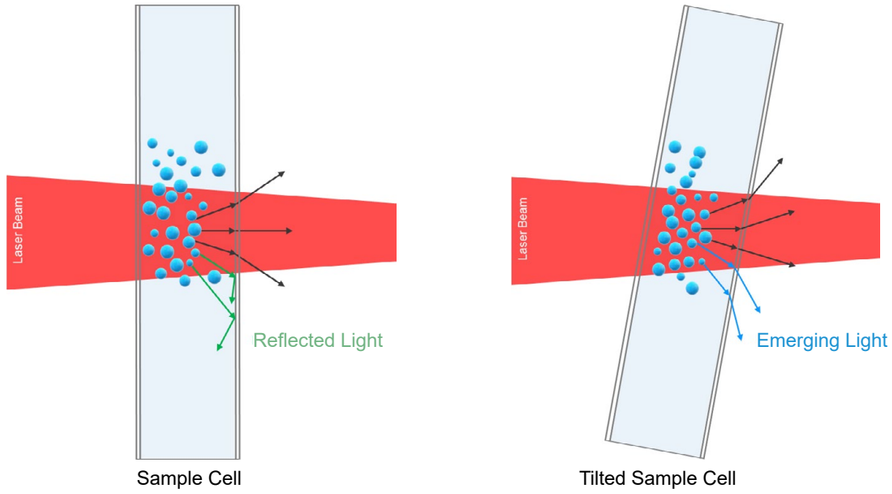
The reflection of light that occurs when it strikes an interface at an angle of incidence greater than the critical angle for the pair of media.

How to alleviate total internal reflection?

By tilting the sample cell, the receiving angle of scattered light has increased to reduce the impact of total internal reflection.

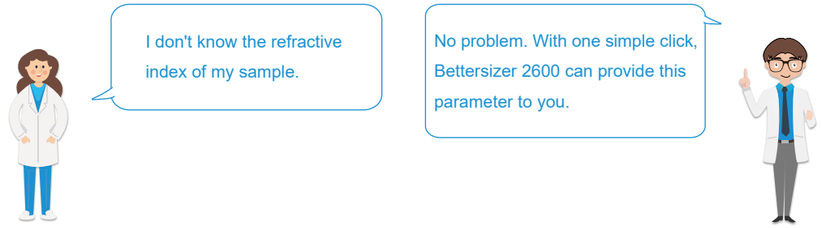
Advantages of tilted sample cell

- Significantly diminishes the effect of total internal reflection;
- Wide measuring range due to large receiving angle for scattered light.





Ⅲ - REFRACTIVE INDEX MEASUREMENT



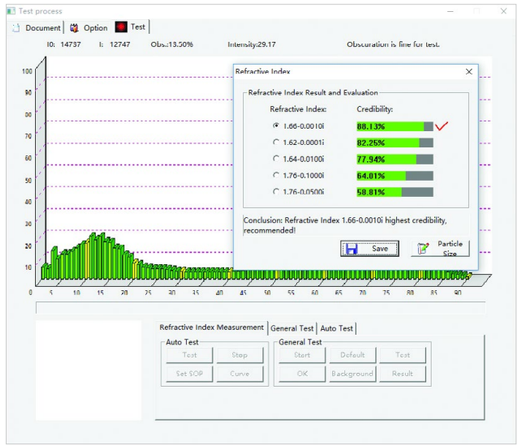
Under Mie theory, measurements by laser diffraction are challenging for samples including:

- Samples with completely unknown complex refractive index;
- Samples with heterogeneous chemical composition;
- Samples with significantly different particulate optical properties compared to the bulk material;
- Samples having a distinctly strong optical dispersion (small Abbe number).

Refractive index measurement is one of the best solutions. Bettersizer 2600 is capable of the following:

- Determine refractive index for samples with unknown refractive index;
- Measure samples with unknown properties;
- Verify the known data of a material at a specific light wavelength;
- Provide key parameters to calculate particle size distribution in real time.

Material	Refractive index (literature)	Refractive index (measured)
$CaCO_3$	(1.53-1.65)-0.1i	1.62-0.1i
$BaSO_4$	1.65-0.1i	1.68-0.1i
ZnO	2.008-0.1i	2.02-0.1i
Carbon black	1.88-0.55i	2.02-0.1i
Al Powder	1.4-3.9i	1.42-3.0i
SiO_2 – Quartz	1.54-0.00i	1.54-0.01i



"Bettersizer 2600 is easy to operate and provides accurate measurement results that greatly help with the quality control in the drug production process. "

Sichuan Industrial Institute of Antibiotics

MODULAR DESIGN OF THE BETTERSIZER 2600

Dry Measurement

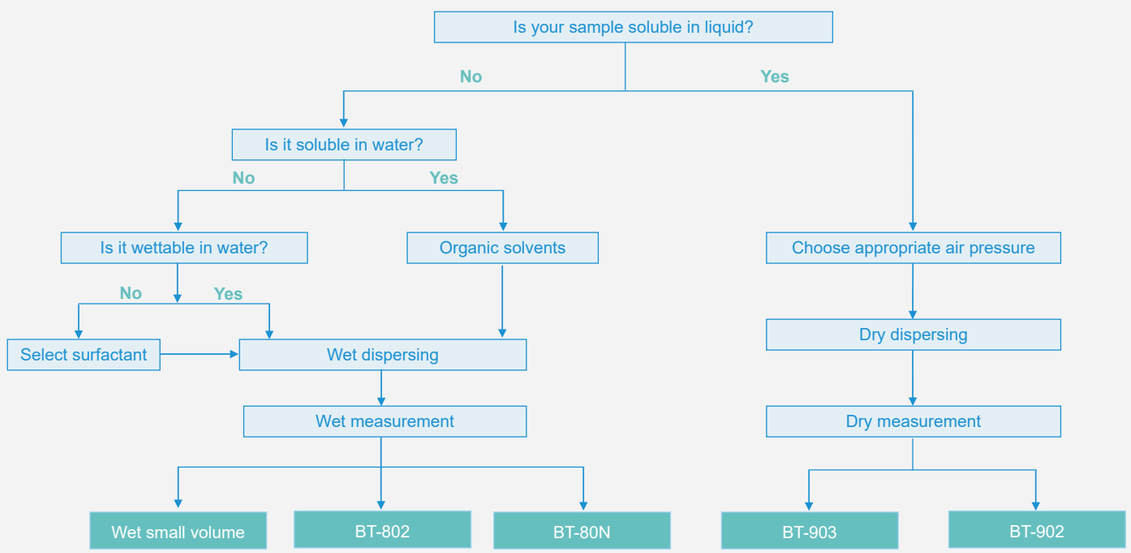
Model	BT-903	BT-902
Volume	0.02 – 1 g (sample)	0.2 – 10 g (sample)
Automation	Fully automated	Fully automated
Applications	Powders with only small volume	Powders

Wet Measurement

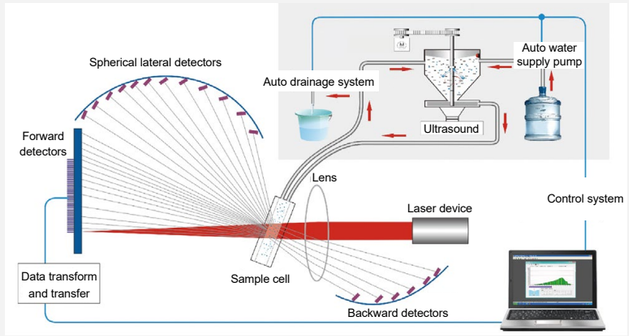
Model	BT-802	BT-80N	Wet small volume
Volume	600 mL (dispersion medium)	80 mL (dispersion medium)	8 mL (dispersion medium)
Automation	Fully automated	Semi-automated	Semi-automated
Applications	Samples dispersed in water	Samples dispersed in organic solvents	Valuable samples with only small volume



Decision Tree on Module Selection



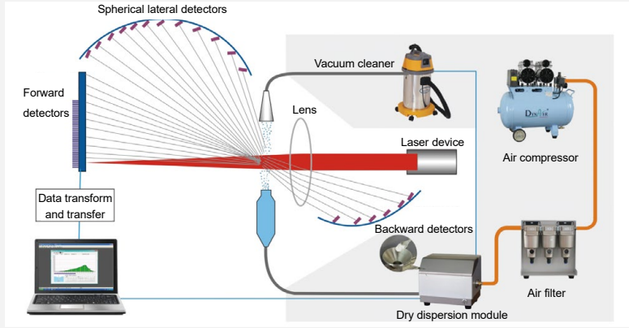
How does the wet dispersion system work?



Advantages of Wet Measurement

- More stable measurement results vs. dry measurement
- Availability for repeatability test
- Suitable for very fine particles and fragile samples

How does the dry dispersion system work?



Advantages of Dry Measurement

- Rapid measurements
- No surfactant required, low cost and environment friendly
- Suitable for samples that are easily dispersible and not fragile
- Less variables throughout the measurement process

WET DISPERSION MODULES

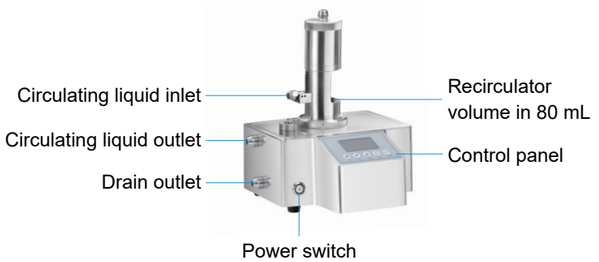


BT-802 Automatic Wet Dispersion Module

BT-802 is designed for particle size measurement with water as the medium.

BT-802 is made up of ABS shell. The components of it include centrifugal pump, peristaltic pump, ultrasonic disperser, pinch valve, control circuit, etc.

- The stirring speed is adjustable from 500 - 2500 rpm.
- Built-in ultrasonic system (50 W) ensures stable dispersion of samples.



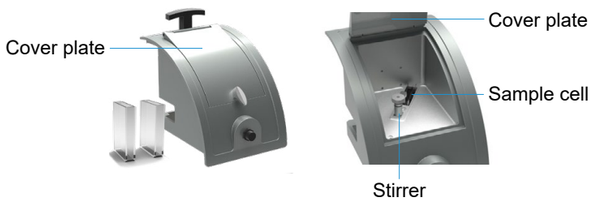
BT-80N Anti-corrosive Wet Dispersion Module

BT-80N is designed for particle size measurements with organic solvents as the media. BT-80N is suitable for common organic solvents, for example:

Ethanol	Methanol	Isopropanol	Ether
Toluene	Xylene	DCM	Octane
Ethyl-acetate	Acetone	Methyl-oleate	NMP solvents



BT-80N is made up of stainlesssteel shell. The components of it include centrifugal pump, ultrasonic disperser, PTFE pipeline, sintered-quartz sample cell, control circuit, etc.



Wet Small Volume Dispersion Module

Wet Small Volume Dispersion Module is designed for valuable or small-volume sample measurements, where the medium is solvent or water. The module consists of ABS shell, stirring motor, cuvette (8 ml), stirrer, etc.

- Maximum volume in 8 mL with samples mass in 0.005 - 0.1 g.
- Suitable for samples dispersed in water or organic phase.

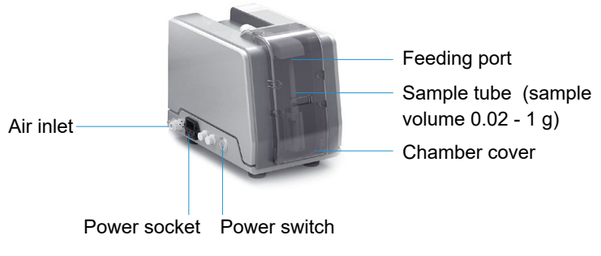
DRY DISPERSION MODULES



BT-902 Automatic Dry Dispersion Module

BT-902 is suitable for dry powders particle size measurements. The gas used can be compressed air, nitrogen or other noble gases.

BT-902 is made up of electromagnetic vibration feeder, venturi pipe, gas circuit, electric circuit, pressure sensor, etc.



BT-903 Dry Small Volume Dispersion Module

BT-903 is designed for particle size measurements of valuable and small amount dry powders with a minimum samples volume of 20 mg.

BT-903 is composed of venturi pipe, gas circuit, electric circuit, samples tube, etc.



DISPERSION ENERGY TREATMENT

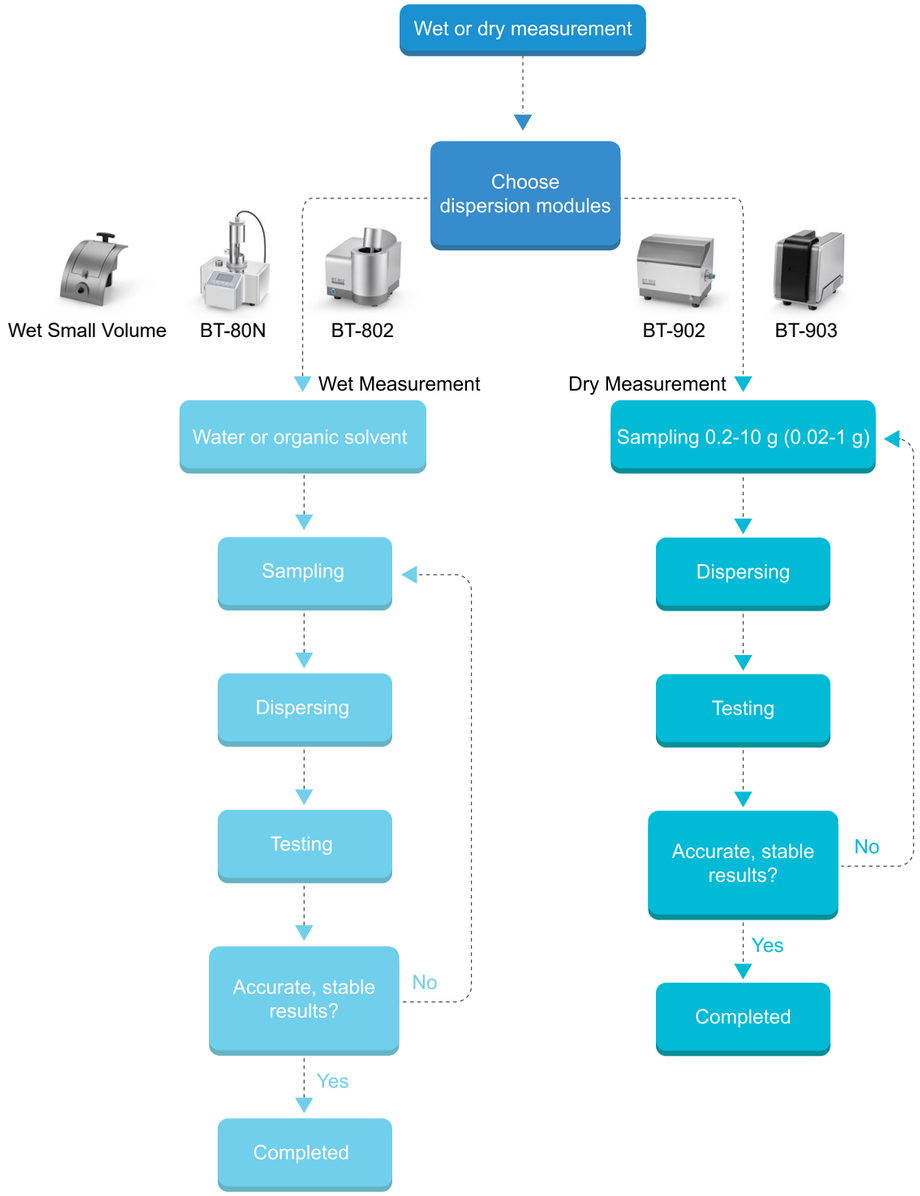


The selection of the appropriate dispersion energy, i.e., the pressure of compressed air, is crucial in the dry measurements.

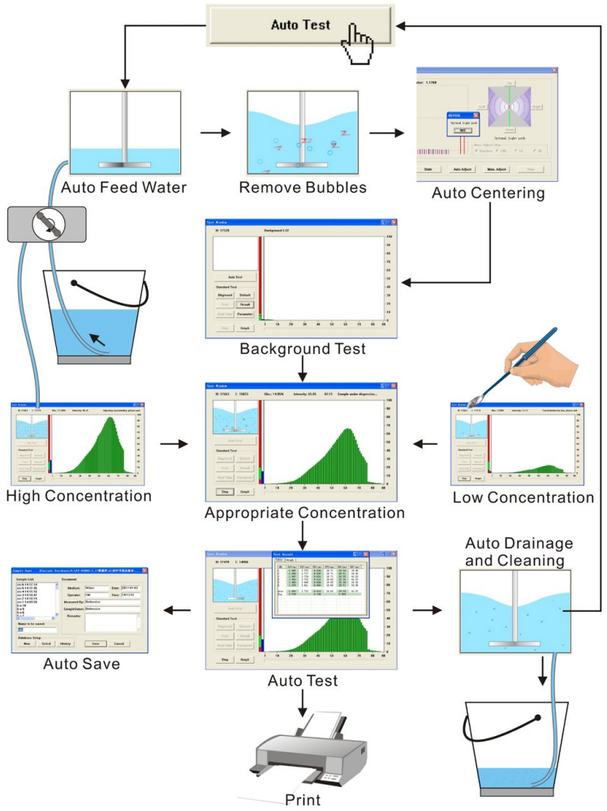
WET & DRY DISPERSION MODULES - MEASUREMENT PROCESS

In wet measurements, the particles are dispersed in a liquid medium in the dispersing module. Additional dispersion by an ultrasonic disperser can be utilized if necessary.

In dry measurements, dry dispersion is used without the use of solvent. When feeding sample, the sample is pre-dispersed by a vibrating feeder, falls into a channel and is conveyed by a venturi nozzle through the sample cell.

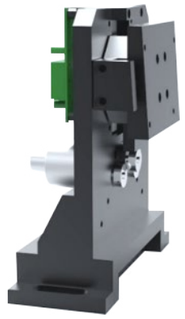


AUTOMATIC FUNCTIONS OF THE BETTERSIZER 2600



Standard Operating Procedure (SOP)

SOP is an easy solution for standardized and automatic testing, which ensures the measurement results operator-independent, making the results more objective and reliable.



Detector set

Auto-adjustment of laser power

This function ensures the long-term stability and accuracy of the instrument and extends the life of the laser.

Auto-alignment of detector set

This function guarantees good working conditions of the optical system.



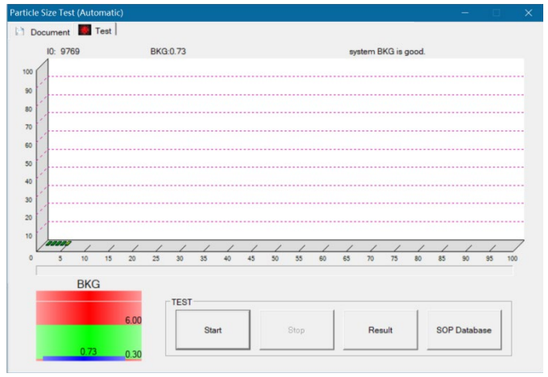
"Bettersizer 2600 has a high degree of automation and provides rapid measurement results, which not only saves our production costs significantly, but also provides quality assurance in our production line."

Jiangsu World Chemical Co., Ltd.

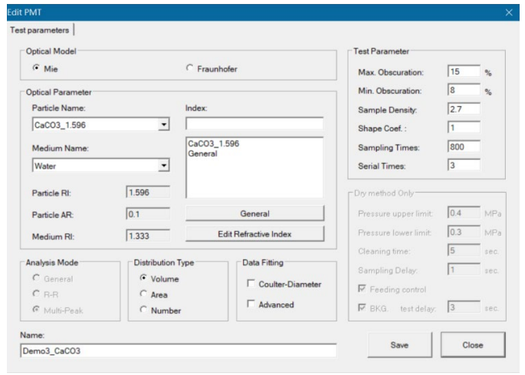
INTUITIVE AND POWERFUL SOFTWARE

The Bettersizer 2600 comes with the specialized software that includes various powerful built-in functions such as finite-difference algorithms, light flux compensation, inverse algorithms, multilingual operating system, SOP settings, etc. With these functions and a powerful software, the accuracy and repeatability of measurement results are thereby guaranteed.

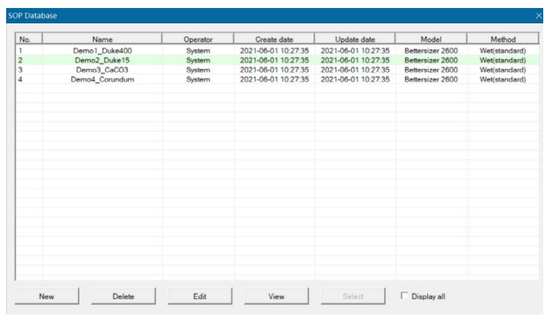
Measurement Screen



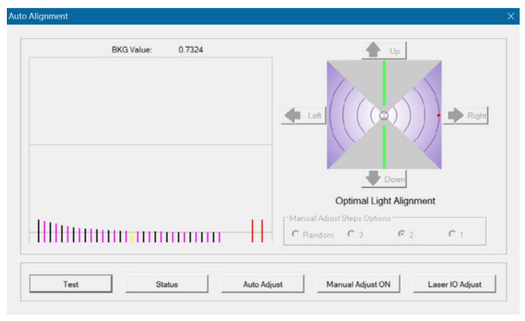
Measurement Template Settings



SOP Database Settings



Auto Alignment



Advantages of Bettersizer 2600 software

- Intuitive operation and orderly user interface
- Real-time mode for determining the optimal measurement conditions
- Fully automatic measurement routine
- Automatic cleaning routine
- Automatic data backup and highly customizable reports
- Direct conversion according to Fraunhofer and Mie evaluation models
- Switch between wet and dry dispersion modules with one click

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HIGHLY CUSTOMIZABLE PARTICLE SIZE ANALYSIS REPORT

Bettersize

Bettersizer 2600(Wet) Particle Size Analysis Report

Range : 0.02um - 2600um

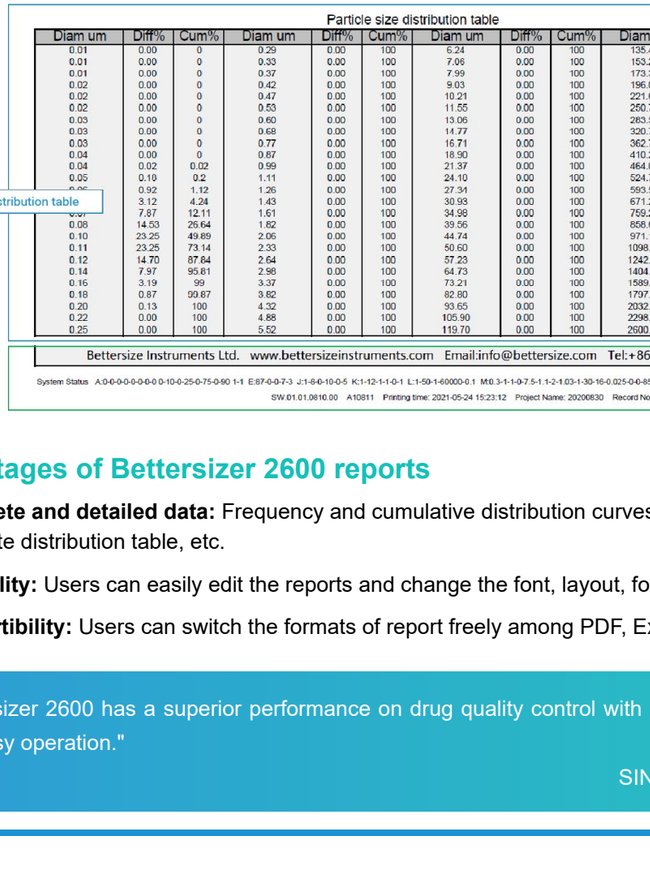
Sample Name:100nm-Average	Sample No.:1#	Sample Source:Bettersize
Operator:LC	Test Time:2020-08-30 16:41:20	Measure by:Bettersize
Particle RI:1.59	Particle AR:0	Medium RI:1.333
Optical Model:Mie	Analysis Mode:Multi-Peak	Distribution Type:Volume
Sampling:	Speed (rpm):1600r	Ultrasound:3min
Medium Name:Water	Dispersant:null	Remarks:

Basic information

D[4,3]:0.096um	D[3,2]:0.092um	D[1,0]:0.084um	Peak size:0.096um	
Span:0.548	SSA:24089m^2/kg	Residual:5.467%	Obscuration:0.89%	
D03 = 0.061um	D06 = 0.067um	**D10 = 0.071um**	D16 = 0.076um	D25 = 0.082um
D75 = 0.109um	**D50 = 0.095um**	D84 = 0.116um	**D90 = 0.123um**	D97 = 0.140um

Typical values

Particle size distribution graph



Table

Diam um	Percent
0.000 - 0.020	0.00
0.020 - 0.050	0.27
0.050 - 0.100	59.25
0.100 - 0.200	40.48
0.200 - 0.500	0.00
0.500 - 1.000	0.00
1.000 - 2.000	0.00
2.000 - 5.000	0.00
5.000 - 10.00	0.00
10.00 - 20.00	0.00

Simplified table

Particle size distribution table

Diam um	Diff%	Cum%	Diam um	Diff%	Cum%	Diam um	Diff%	Cum%	Diam um	Diff%	Cum%
0.01	0.00	0	0.29	0.00	100	6.24	0.00	100	135.40	0.00	100
0.01	0.00	0	0.33	0.00	100	7.06	0.00	100	153.20	0.00	100
0.01	0.00	0	0.37	0.00	100	7.99	0.00	100	173.30	0.00	100
0.02	0.00	0	0.42	0.00	100	9.03	0.00	100	196.00	0.00	100
0.02	0.00	0	0.47	0.00	100	10.21	0.00	100	221.50	0.00	100
0.02	0.00	0	0.53	0.00	100	11.55	0.00	100	250.70	0.00	100
0.03	0.00	0	0.60	0.00	100	13.06	0.00	100	283.50	0.00	100
0.03	0.00	0	0.68	0.00	100	14.77	0.00	100	320.70	0.00	100
0.03	0.00	0	0.77	0.00	100	16.71	0.00	100	362.70	0.00	100
0.04	0.00	0	0.87	0.00	100	18.90	0.00	100	410.20	0.00	100
0.04	0.02	0.02	0.99	0.00	100	21.37	0.00	100	464.00	0.00	100
0.05	0.18	0.2	1.11	0.00	100	24.10	0.00	100	524.70	0.00	100
0.06	0.92	1.12	1.26	0.00	100	27.34	0.00	100	593.50	0.00	100
0.07	3.12	4.24	1.43	0.00	100	30.93	0.00	100	671.20	0.00	100
0.07	7.87	12.11	1.61	0.00	100	34.98	0.00	100	759.20	0.00	100
0.08	14.53	26.64	1.82	0.00	100	39.56	0.00	100	858.60	0.00	100
0.10	23.25	49.89	2.06	0.00	100	44.74	0.00	100	971.10	0.00	100
0.11	23.25	73.14	2.33	0.00	100	50.60	0.00	100	1098.00	0.00	100
0.12	14.70	87.84	2.64	0.00	100	57.23	0.00	100	1242.00	0.00	100
0.14	7.97	95.81	2.98	0.00	100	64.73	0.00	100	1404.00	0.00	100
0.16	3.19	99	3.37	0.00	100	73.21	0.00	100	1589.00	0.00	100
0.18	0.87	99.87	3.82	0.00	100	82.80	0.00	100	1797.00	0.00	100
0.20	0.13	100	4.32	0.00	100	93.65	0.00	100	2032.00	0.00	100
0.22	0.00	100	4.88	0.00	100	105.90	0.00	100	2298.00	0.00	100
0.25	0.00	100	5.52	0.00	100	119.70	0.00	100	2600.00	0.00	100

Bettersize Instruments Ltd. www.bettersizeinstruments.com Email:info@bettersize.com Tel:+86 (415) 618 4440

System Status A:0-0-0-0-0-0-0-0 0-10-0-25-0-75-0-90 1-1 E:87-0-0-7-3 J:1-8-0-10-0-5 K:1-12-1-1-0-1 L:1-59-1-60000-0.1 M:0.3-1-1-0-7.5-1.1-2-1.03-1-30-16-0.025-0-0-85

SW:01.01.0810.00 A10811 Printing time: 2021-05-24 15:23:12 Project Name: 20200830 Record No.: 30 PMT: poly Test Method: Laser

System status

Advantages of Bettersizer 2600 reports

- **Complete and detailed data:** Frequency and cumulative distribution curves, simplified and complete distribution table, etc.
- **Editability:** Users can easily edit the reports and change the font, layout, format, etc.
- **Convertibility:** Users can switch the formats of report freely among PDF, Excel, Text, etc.

"Bettersizer 2600 has a superior performance on drug quality control with its rapid measurement and easy operation."

SINOWAY Pharmaceutical

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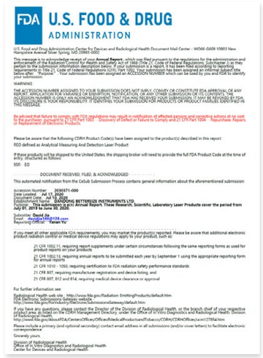
SPECIFICATION

Parameters measured	
Particle size distribution	Suspensions, emulsions, dry powders
General	
Principle	Laser diffraction technology
Analysis	Mie scattering theory and Fraunhofer diffraction theory
Typical measurement time	Less than 10 seconds
Measurement performance	
Measuring range	0.02 - 2600 μm (wet) * 0.1 - 2600 μm (dry) *
Accuracy error	≤ 0.5% *
Repeatability	≤ 0.5% *
Number of size classes	100 (user adjustable)
Feeding mode	Automatic circulation or micro cuvette (wet) Gas transportation (dry)
Special functions	SOP settings, refractive index measurement, sample ratio calculation
Main device	
Optical system	Combined Fourier and inverse Fourier & Tilted sample cell
Laser	High-power optical fiber laser (10 mW / 635 nm)
Laser class	Class 1 laser product
Detector	92 detectors (forward, lateral and backward arrangements)
Measuring angle	0.016 - 165°
Wet dispersion module	
Measurement method	One-click operation (automated measurement, cleaning, saving, printing, etc.)
Dispersion medium	Water or organic solvents (sample dependent)
Circulation speed	500 - 2500 r / min
Ultrasonication	Dry burning prevention，50 W
Dry dispersion module	
Dispersion medium	Air / Nitrogen / Noble gas
Air pressure	0.1 - 0.8 MPa (Air compressor dependent)
Software	
Conformity	21 CFR Part 11, ISO 13320, USP <429>, CE
Reports	Customizable reporting
System parameters	
Dimensions (L x W x H)	70.5 x 31.8 x 29.5 cm
Weight	23 kg
Supply voltage	100 / 240 V, 50 / 60 Hz
Computer configuration (recommended)	
Computer interface	At least one high-speed USB 2.0 or USB 3.0 port required
Operating system	Windows 7 (32 bit and 64 bit) or higher
Hardware specification	Intel Core i5 Processor, 4GB RAM, 250GB HD, Wide screen monitor

*Sample and sample preparation dependent

QUALIFICATIONS

FDA 21 CFR Part 11



ISO 9001



CE Certification



GMP



The Bettersizer 2600 has passed the certification of FDA 21 CFR Part 11, which ensures that the result of each test is objective and not being modified artificially, guaranteeing the authenticity and reliability of the test results. In addition to that, it has acquired European CE, ISO 9001 and GMP certifications. The superior and stable performance of this analyzer has been unquestionably recognized.

CERTIFIED SERVICE

Quality is the core of how Bettersize conducts business, and is constantly verified by our customers and partners around the world. The latest technology and strict quality control system enable our instruments to operate error-free for more than 1,000 days on average.

Over the past decades, Bettersize has provided every customer with product demonstration, installation, product training, software upgrade, spare parts replacement, and maintenance services. We also offer regular workshops and repair services to our business partners and distributors globally. Our mission is to provide the best-in-class particle sizing and characterization instruments and comprehensive solutions to our customers.





European Representative:

3P INSTRUMENTS

Characterization of
particles · powders · pores

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BETTER PARTICLE SIZE SOLUTIONS

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Visit Our Official YouTube Channel:

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