

Microtrac S3500

Microtrac S3500 Series Particle Size Analyzer with Tri-laser Technology

Since the early 1970's Microtrac has a tradition of delivering innovative solutions in Particle Size Analysis through light scattering technology. The S3500 series is a continuation of that tradition. Utilizing the patented Tri-Laser Technology the S3500 provides accurate, reliable and repeatable particle size information for applications ranging from research and development to production, process and quality control. By increasing the number of light sources incident on the material being measured the S3500 Tri-Laser system makes more effective use of photo-detection devices while maintaining maximum stability and alignment of the optical system.

The Microtrac S3500 complies with or exceeds ISO 13320-1 particle size analysis – light diffraction methods.

Main features of the S3500 Particle Size Analyzer are

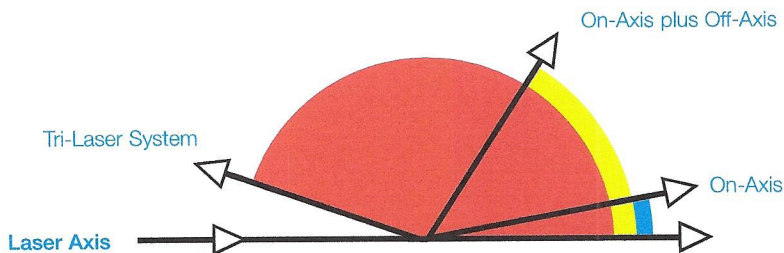
- **Resolution.** The patented Tri-laser, multi detector optical system delivers unsurpassed resolution over the entire measuring range of the instrument.
- **Accuracy.** As well as Fraunhofer diffraction, Microtrac S3500 utilizes full Mie compensation for spherical particles. It also applies proprietary Modified Mie calculations for non-spherical materials – the majority of real life materials. This feature is unique to Microtrac!
- **Stability.** Optical bench design incorporating fixed detectors and lasers provides a rugged platform for consistently repeatable measurements. The enclosed optical path ensures protection of the optical components leading to little or no operator intervention.
- **Alignment.** Laser alignment is automatic. The overall optical bench stability ensures that auto-alignment is not routinely required.
- **Range.** Measurement capability is from 0.024 to 2800 microns covering most particle size analytical requirements.
- **Detector Activity.** Non-scanning , simultaneous parallel channel integration provides full constant signal accumulation to maximize signal acquisition.
- **Wet and Dry Measurements.** Using a selection of wet and dry sample delivery systems the S3500 can be converted from wet to dry mode in under 2 minutes.
- **Flexibility.** The modular design allows the user selectable configurations based on application requirements. The S3500 system is easily up-gradable to meet future requirements.
- **Automation.** Microtrac FLEX software allows programming, saving and recalling of Standard Operating Procedures (SOP's). This facilitates increased precision in sample preparation and operation through automated, multi sample accessories.
- **Calibration.** Internal uniform light source utilized for testing and calibrating detector segments.
- **Validation.** Full IQ/OQ/PQ support documentation available. The S3500 system meets or exceeds 21 CFR Part 11 security requirements.



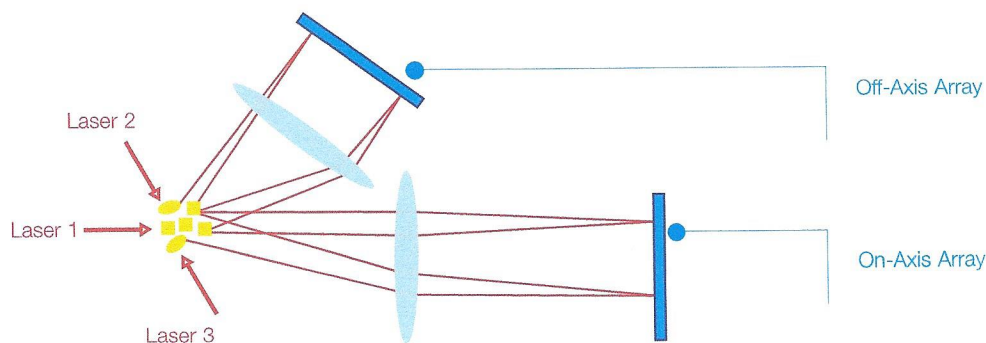
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Tri Laser Technology

The TRI-LASER System developed by MICROTRAC allows light scattering measurements to be made from the forward low angle region to almost the entire angular spectrum (approximately zero to 160 degrees). It does so by a combination of three lasers and two detector arrays, all in fixed positions. The primary laser (on-axis) produces scatter from nearly on-axis to about 60 degrees, detected by a forward array and a high-angle array, both of which have logarithmic spacing of the detector segments. The second laser (off-axis) is positioned to produce scatter beyond the 60 degree level which is detected using the same detector arrays. The third laser (off-axis) is positioned to produce backscatter, again using the same detector arrays. This technique effectively multiplies the number of sensors that are available for detection of scattered light.



During a measurement cycle, Laser 1 is switched on while Lasers 2 and 3 remain inactivated. The sample to be measured scatters light in an angular pattern depending on the material size. The scattered light from Laser 1 is detected by the on axis, forward detector and the off axis, high angle detector. Laser 1 is then switched off and Laser 2 is activated. Laser 2 is directed at the sample at a different angle of incidence providing a different optical axis. Light scattered by the sample is detected by the same fixed detectors. Laser 2 is then switched off and Laser 3 is activated. Again the angle of incidence and optical axis is different. In this case the fixed detectors detect light that is back-scattered by the sample. The resultant scattered light information from all three lasers is combined to generate particle size distributions with unsurpassed resolution. Tri laser technology is proprietary and is patented by Microtrac.



The Software

The Microtrac S3500 Series is operated through the versatile Microtrac FLEX software package. The primary functions of making measurements, saving and retrieving data are easily achieved through intuitive menu driven software which combines flexibility and ease of use.



The main features of Microtrac FLEX software are

Measurement Criteria. Particle and carrier optical properties such as refractive index and shape are easily programmed for different materials. Other criteria like sample analysis time, sample ID and data presentation options are easily accessed through the SETUP icon.

Automatic Measurements. Automated measurement sequences can be programmed in combination with a selection of sample delivery systems. Levels of automation can be selected by the user.

Standard Operating Procedures (SOPS). FLEX software facilitates the programming, saving and recall of measurement setups in accordance with standard operating procedures.

Database Management. Measurements are saved in Microsoft Access Encrypted Database Format. Analyses are easily recalled through a comprehensive search function for either review or comparison.

Export functions. Data can be automatically or manually exported in either ASCII, excel or HTML formats. The user decides the export destination.

Data Tolerance. Pass/Fail function. The operator can set upper and lower size limitations for material specifications. Useful in quality control applications.

Statistical Analysis Package. Live display of analyses as they are performed providing statistical analysis on an ongoing basis.

Trending. Ability to trend individual size parameters over a specific time period or material type.

Report Generation. Microtrac FLEX software provides the user with the ability to design custom reports.

Security. FLEX software incorporates a comprehensive security administration facility allowing password access and electronic signature allocation.

21 CFR Part 11. FLEX software is fully validatable with audit tracking in compliance with 21 CFR Part 11.

Microtrac S3500: Specifications

Measuring Range	0.02 to 2800 Microns	
Basic Range	Wet: 0.7 to 1000 um	Dry: 0.7 to 1000 um
High Range	Wet: 2.75 to 2800 um	Dry: 2.75 to 2800 um
Standard Range	Wet: 0.24 to 1400 um	Dry: 0.24 to 1400 um
Special Range	Wet: 0.086 to 1400 um	Dry: 0.24 to 1400 um
Extended Range	Wet: 0.021 to 2000 um	Dry: 0.24 to 2000 um
Enhanced Range	Wet: 0.021 to 2800 um	Dry: 0.24 to 2800 um
Precision	Spherical Glass Beads D50 = 642 micron, Precision as CV = 0.7%	
	Spherical Glass Beads D50 = 56 micron, Precision as CV = 1.0%	
	Spherical Latex Beads D50 = 0.4 micron, Precision as CV = 0.6%	
Lasers	Wavelength	780nm
Power	3mW nominal	
Detection System	Two fixed photo-electric detectors with logarithmically spaced segments placed at correct angles for optimal scattered light detection. 0.02 to 163 degrees using 151 detector segments.	
Data Handling	Volume, Number and Area distributions as well as percentile and other summary data. Data is stored in ODBC format in encrypted Microsoft Access Databases to ensure compatibility with external statistical software applications. Data integrity may be ensured using FDA 21 CFR Part 11 compliant security features including password protection, electronic signatures and assignable permissions.	
Typical Analysis Time.	10 to 30 seconds	
Electrical.	AC input: 90 – 132 VAC, 47 - 63 Hz, single phase 200 to 265 VAC, 47 – 63 Hz, single phase	
Power Consumption	25 VA maximum	
Environmental	Temperature:	10 to 35 Degrees C.
	Humidity:	90% RH, non condensing maximum
	Storage Temperature:	-10 to 50 Degrees C (Dry only)
	Pollution	Degree 2
Physical Specifications	Case Material	Steel and impact resistant plastic
Finishes	Exterior Surfaces finished with corrosion resistant paint or plating	
Dimensions	14H x 22W x 18D in (360H x 560W x 460D mm)	
Weight	60 lbs (27 kg)	
Dry Operation		
Eductor Air Supply	100 psi (689 kPa) maximum pressure 5 CFM at 50 psi (345 kPa) minimum flow rate Free of dry contaminants, moisture and oil.	
Vacuum	No greater than 50 CFM	

Contact Details

For more information on the S3500 as well as other Microtrac products contact Microtrac Inc at (+1) 727 507 9770 or contact your local Microtrac Representative or log on to our website at www.microtrac.com

Your local Microtrac Representative is