# Microtrac Bluewave

## Microtrac Bluewave 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 Bluewave is the latest in a long line of ground-breaking solutions applying state-of-art technology to deliver unsurpassed resolution in particle size distribution measurement, especially in the sub-micron range.

Utilizing Microtrac's patented Tri-Laser Technology the Bluewave provides accurate, reliable and repeatable particle size information for applications ranging from research and development to production, process and quality control. Through the introduction of two Blue Lasers (not Blue LEDS) at off axis angles of incidence to the sample, the Bluewave significantly enhances the sensitivity and resolution of distribution measurements.

By increasing the number of light sources incident on the material being measured and by varying the wavelength of the incident light, the Bluewave Tri-Laser system makes more effective use of photo-detection devices while maintaining maximum stability and alignment of the optical system.

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

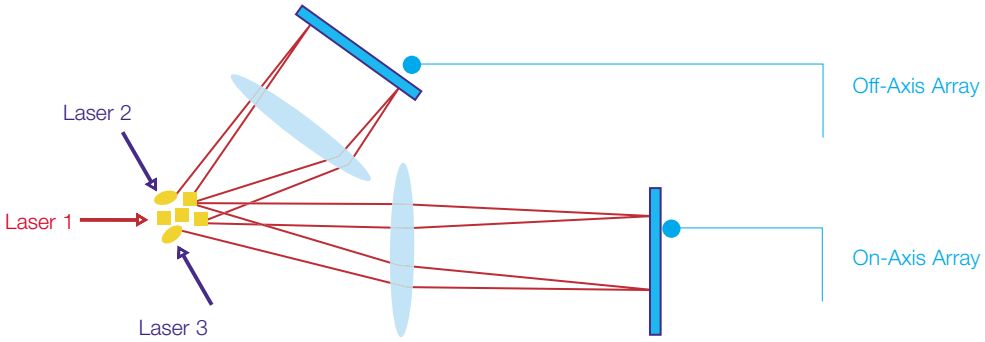
Main features of the Bluewave Particle Size Analyzer are

- **Resolution.** The patented Tri–laser, multi-wavelength, multi-detector optical system delivers unsurpassed resolution over the entire measuring range of the instrument. This is achieved through the use of both Red and Blue lasers (not LEDS)
- **Accuracy.** As well as Fraunhofer diffraction, Microtrac Bluewave 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 complete 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 0.010 to 2000 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 Bluewave 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 Bluewave system is easily up-gradable to meet future requirements.
- **Calibration.** Internal uniform light source utilized for testing and calibrating detector segments.
- **Validation**. Full IQ/OQ/PQ support documentation available.
- **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.


**The Bluewave meets or exceeds 21 CFR Part 11 security requirements.**

# Bluewave Tri Laser Technology

The Bluewave 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 (one red and two blue) and two detector arrays, all in fixed positions. The primary Red 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 Blue laser (off-axis) is positioned to produce scatter beyond the 60 degree level which is detected using the same detector arrays. The third Blue 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.




As particles become smaller they scatter light at higher angles but at significantly varying intensities. The power or intensity of scattered light has an inverse relationship to the fourth power of the wavelength of the incident light ( $\mathbf{I} = 1/\lambda^4$). By reducing the wavelength of the incident light by almost half from 780nm to 405nm, the amount of light scattered by the same particle is increased almost 16 times. In the TRI-LASER arrangement, lasers two and three are directed at the sample in such a way as to detect light scattered by smaller particles (if present) in angles between 60 and 160 degrees. By using Blue lasers in these positions the detected signals are enhanced to give unsurpassed sensitivity and resolution in the sub-micron region. The intensity of the incident light supplied by a Blue laser is significantly higher than that supplied by a Blue LED and the sensitivity of the measurement is increased accordingly.

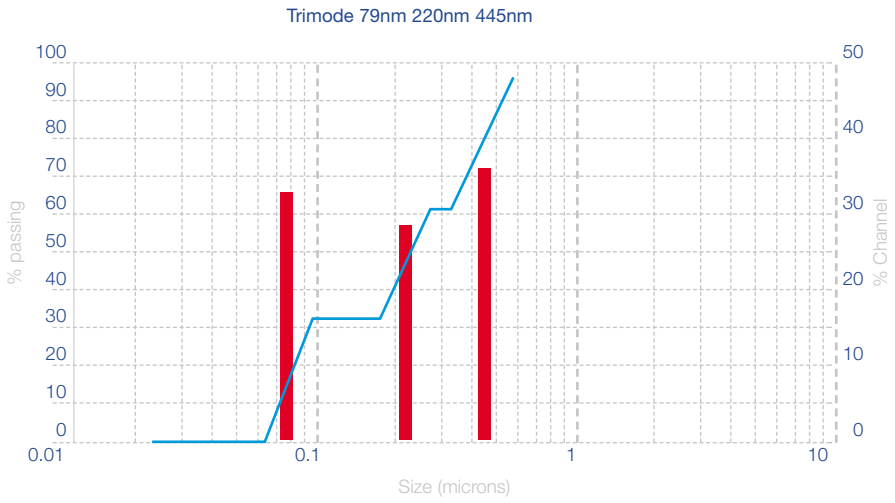
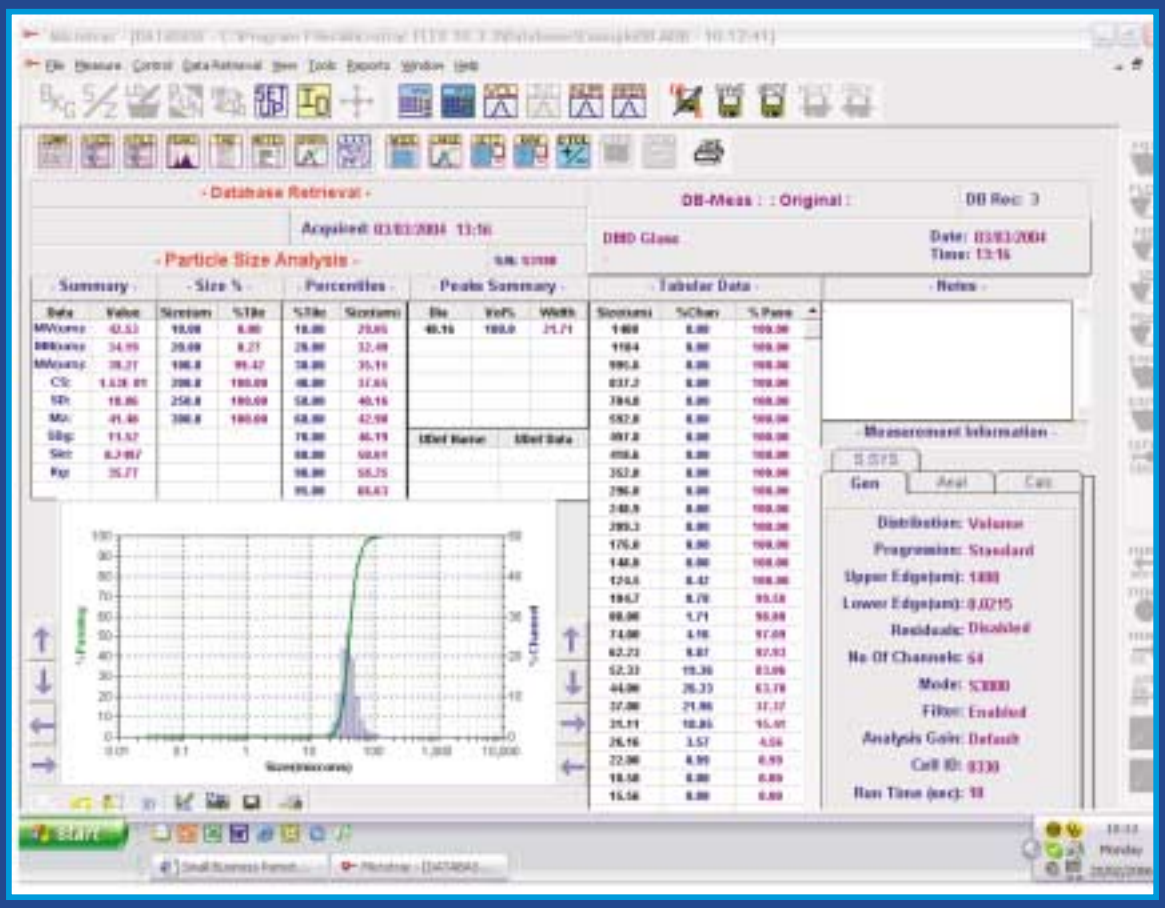



Figure indicates the resolution of a Bluewave measurement for a mixture of 79nm, 220nm and 445nm polystyrene standards.

# The Software

The Microtrac Bluewave 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 Bluewave:** Specifications

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|---|---|
| Measuring Range | 0.01to 2000 microns |
| Lasers | Wavelength Red 780nm , Blue 405 nm |
| 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<br>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 | |
| Finishes | Case Material Steel and impact resistant plastic<br>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<br>5 CFM at 50 psi (345 kPa) minimum flow rate<br>Free of dry contaminants, moisture and oil. |
| Vacuum | No greater than 50 CFM |


Contact Details

For more information on the Bluewave 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