Ultra-fast absorbance spectrometer for microplates and cuvettes

SPECTROstar® Nano

BMG LABTECH
The Microplate Reader Company
The SPECTROstar® Nano represents the next evolution in absorbance microplate reader technology.

Equipped with BMG LABTECH’s proprietary ultra-fast UV/Vis spectrometer, the SPECTROstar™ Nano can measure full spectrum absorbance (220 - 1000 nm) in less than 1 second per well in microplates, cuvettes, and low-volume samples.

Unique technology and new features
Backed by German engineering and technology, the SPECTROstar™ Nano is a versatile, automated absorbance reader for microplates, cuvettes, and low-volume samples. New and unique features include:

- Ultra-fast UV/Vis spectrometer
- Measures all microplate formats up to 1536-wells
- Standard cuvette port for individual samples
- Low-volume samples with BMG LABTECH’s LVis Plate (2 µL)
- Multi-mode shaking: linear, orbital, and double orbital
- Incubation up to 45°C
- Gas vent
- Robotic compliant software interface
- Powerful MARS Data Analysis Software

Other features include: automated path length correction, well scanning, kinetic readings, assay-specific buttons, and predefined calculation templates for data analysis.

Perfect for all absorbance assays
The SPECTROstar™ Nano is the ideal instrument to read all absorbance assays in a microplate or cuvette. Its rapid full-spectrum analysis allows for absorbance assays never before possible on a microplate reader. The most common absorbance assays such as ELISAs, DNA, RNA, protein (Bradford, BCA, Lowry), and beta-galactosidase have predefined quick run assay-specific protocols and buttons. More complex or user specific assays are programmable.
**Assay-specific buttons**
The Control and MARS Data Analysis Software have predefined assay-specific protocols. This user-friendly feature enables researchers to carry out experiments with the SPECTROstar Nano quickly and easily. Measurement and analysis are performed with a single mouse click, and the user can assign a new test run or data analysis to a specific assay button.

**UV/Vis spectrometer**
The SPECTROstar Nano is equipped with BMG LABTECH's proprietary UV/Vis spectrometer. This spectrometer instantaneously captures full absorbance spectra from 220 - 1000 nm at resolutions of 1 - 10 nm. Full absorbance spectra can be measured in less than one second per well - significantly faster than any conventional method. Alternatively, partial spectra or up to eight discrete wavelengths can be measured simultaneously.

The spectrometer incorporates a highly efficient optical grating and a solid state array detector. This allows the measurement of light intensity throughout the UV and visible parts of the spectrum.

Similar to a monochromator, but much faster, the spectrometer can capture the entire UV/Vis spectrum of a sample within a second – no scanning needed.

**Standard cuvette port**
More than just a microplate reader, the SPECTROstar Nano has a standard cuvette port for single sample absorbance measurements. A range of sample sizes (0.3 µL to 5 mL) can be easily measured with several special cuvettes. The SPECTROstar Nano redefines cuvette-based kinetic assays. Full spectrum data can be collected in one second, allowing for polychromatic evaluation over the whole UV to visible spectrum. The cuvette port door can be kept open during measurements, which is ideal for a flow-through cell. This advantage also allows readings to be taken before, during, and after manual addition of reagents.

**LVis Plate**
When quantitating DNA or RNA, using the least amount of sample is always preferable. With the LVis Plate, BMG LABTECH’s low-volume microplate, sixteen individual samples of 2 µL can be measured. The LVis Plate contains a tip rest for easy sample loading when using an eight channel pipettor. The LVis Plate also contains NIST traceable optical density filters and a holmium oxide filter for instrument quality control and performance testing. In addition, a horizontal cuvette position can hold standard rectangular cuvettes for kinetic or endpoint studies.
**Incubation, shaking, and gas vent**
The SPECTROstar Nano has incubation, multi-mode shaking capabilities, and a gas vent. Since all cell-based assays require the correct environment to be properly measured, the gas vent can be used to purge the microplate chamber with different gases. For example a mixture of O₂/CO₂ can be used to measure mammalian tissue cells. The built-in incubator uniformly heats the microplate chamber and the cuvette port up to 45°C, thereby allowing the optimal temperature to be used for all cellular growth assays.

The built-in incubator can also be used for protein denaturation studies by incrementally increasing the temperature followed by full spectrum readings. Multi-mode shaking - linear, orbital, and double orbital - permits flexibility when designing assays. Linear shaking allows for the fastest and most intense shaking conditions for cells that tend to clump. Double orbital shaking allows for the slowest and mildest conditions for sensitive cells. Orbital shaking is a cross in between the two.

**Endpoint, kinetics, and well scanning**
Users can capture an endpoint signal that happens in seconds, or measure the kinetics of bacterial growth over time. In well scanning mode, the SPECTROstar Nano can easily deal with nonhomogeneous samples such as adherent cells by taking multiple measurements in each well with up to 900 data points/well. The MARS software displays each scan point graphically and creates a map for each well.

**Automation**
All BMG LABTECH microplate readers have similar dimensions and plate in/out locations. This minimizes the cost of automation solutions. Small footprint, automation-friendly plate carrier, and multiple robotic software interfaces allow for easy integration into all robotic platforms. Furthermore, having 1536-well capability allows for high-throughput full spectrum analysis.

**Control and MARS data analysis software**
BMG LABTECH’s software package provides an extensive range of possibilities for both test protocol definitions and data analysis. It is fully compliant with FDA regulation 21 CFR Part 11. The Control software defines instrument parameters and test protocols; the MARS software offers various tools for data analysis. Well-organized, versatile, easy to use, and powerful are just a few of the ways the MARS Data Analysis Software package is described by users. MARS provides several options to display data in a clear and concise format.

Data can be processed with powerful predefined templates or by using an extensive range of data calculation features. Examples include the automatic calculation of enzyme kinetic parameters (Vₘₐₓ and Kₘ) with a variety of fits based on Michaelis-Menten or Lineweaver-Burk equations, or the generation of standard curves based on the following curve fitting algorithms to calculate e.g. EC₅₀, IC₅₀, and r² values:

- Linear regression fit
- 4 and 5 parameter fit
- Point to point fit
- Segmental regression fit
- Cubic spline fit
- 2nd and 3rd polynomial fit
- Enzyme kinetic (e.g. Michaelis-Menten)
Applications center

Numerous publications for absorbance measurements such as application notes, posters, and scientific papers exemplify the versatility of the SPECTROstar Nano. A wide range of possible applications include:

- 260/280 ratio for DNA and RNA
- Protein quantitation
- ELISA
- Cell-based assays
- Enzyme activity assays

The versatility and flexibility of the SPECTROstar Nano spectrometer are illustrated by the following examples:

- Kinetic studies on the metallation of porphyrin
- Protein determination with the Bradford assay
- Monitoring of bacterial growth at elevated hydrostatic pressure

BMG LABTECH continuously works with all major reagent companies to develop protocols and to optimize instrument settings for their existing assays and their newest kits. Visit the online Applications Center to download all the leading applications, listed as:

- Application notes
- Scientific posters
- Peer-reviewed papers

The applications database reflects the expertise acquired by BMG LABTECH in more than 25 years. Over 4,000 published entries of peer-reviewed articles, application notes, and scientific posters demonstrate the flexibility and versatility of our readers, and their use in chemical and biological sciences.

Support and training

BMG LABTECH operates globally through an extensive network of subsidiaries and well-trained distributors. Customers can rely on PhD-level support and assistance with regard to software, assay development, or general enquiries related to the SPECTROstar Nano and all other BMG LABTECH microplate reading solutions.
The 475 nm peak decreases and the 595 nm peak increases.

A 3D well map of a Bradford absorbance spectrum taken over 60 seconds.

Changes in visible spectrum accompanying zinc metallation of TPP exemplify the versatility of the SPECTROstar Nano.

Such as application notes, posters, and scientific papers, hydrostatic pressure monitoring of bacterial growth at elevated pressures, protein determination with the Bradford assay, and enzyme activity assays, cell-based assays, ELISA, and protein quantitation.

The 260/280 ratio for DNA and RNA illustrates the versatility and flexibility of the SPECTROstar Nano.

A wide range of possible applications include: OD determinations, reagent companies to develop protocols, and to optimize detection modes such as UV/Vis absorbance spectrum.

Monitoring of bacterial growth at elevated temperatures, enzyme activity assays, cell-based assays, ELISA, and protein quantitation.

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Dose dependant growth curves of Candida albicans in Tree Tea Oil (TTO).

Enquiries related to the SPECTROstar Nano and all other BMG LABTECH products can be directed to BMG LABTECH's network of subsidiaries and well-trained distributors.

Customers can rely on PhD-level support and assistance worldwide through BMG LABTECH's extensive network of subsidiaries and distributors.

Support and training that provides the flexibility and versatility of our readers, and their use of BMG LABTECH's instruments is reflected in the applications database.

Over 4,000 published entries of peer-reviewed articles, acquired by BMG LABTECH in more than 25 years.

The applications database reflects the expertise of BMG LABTECH's customers and the comprehensive applications database available at BMG LABTECH's online Applications Center.

BMG LABTECH continuously works with all major reagent companies to develop protocols and to optimize detection modes such as UV/Vis absorbance spectrum.

Due to the modularity of BMG LABTECH's instruments, all or combinations of the features below can be installed at purchase or upgraded at any time. Please contact your local representative for more details or a quote.

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Specifications are subject to change.

Limit of detection (sensitivity) was calculated according to the IUPAC standard: 3x(SDblank)/slope

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Go Green Policy

The SPECTROstar new power supply uses less than 0.5 watts of power when the instrument is in standby mode (Efficiency Level V). With EU RoHS construction standards, this instrument complies with the EU Restriction of Hazardous Substances Directive (RoHS) and has the smallest impact on the environment.