SPECTROstar® *Nano*

Ultra-fast absorbance spectrometer for microplates and cuvettes

SPECTROstar *Nano*

BMG LABTECH

BMG LABTECH

The Microplate Reader Company

SPECTROstar *Nano*

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Your benefits at a glance:

· Microplate and cuvette reader in one instrument
· Wavelength flexibility from 220 to 1000 nm
· Full absorbance spectra in <1 sec/well
· All microplate formats up to 1536 well
· Temperature incubation and shaking options
· Multi-user software can be installed on as many computers as needed
· Automatic calculations: with 1 click to your results
· Made-in-Germany dependability

The SPECTROstar® *Nano* represents the next evolution in absorbance microplate reader technology.
Equipped with BMG LABTECH's proprietary ultra-fast UV/vis spectrometer, it 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 features

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

·   Ultra-fast UV/vis spectrometer
·   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 45ºC
·   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.

UV/vis spectrometer

Why would you detect only a single wavelength if you could acquire a full UV/vis spectrum in the same amount of time? Spectral detection improves many absorbance assays. It can highlight the presence of contaminants or shifting peaks in enzymatic reactions.

The SPECTROstar *Nano* is equipped with a full UV/vis spectrometer that can capture absorbance spectra from 220 - 1000 nm at resolutions of 1 - 10 nm. Significantly faster than any conventional absorbance monochromator, our spectrometer can capture a full UV/vis spectrum in less than 1 second/well – no scanning needed.

Alternatively, you can simultaneously measure up to 8 discrete wavelengths in less than 1 second/well. For DNA quantification, for example, 260-, 280- and 340-nm measurements are all captured with a single flash.

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. Full spectra 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 and be used as a flow-through cell, allowing readings to be taken before, during, and after manual addition of reagents.
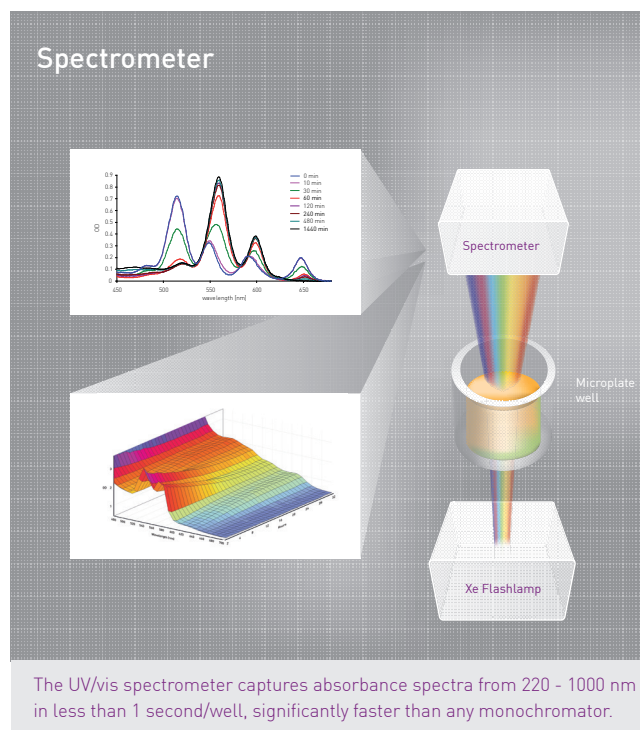
Spectrometer

The UV/vis spectrometer captures absorbance spectra from 220 - 1000 nm in less than 1 second/well, significantly faster than any monochromator.

The integrated cuvette port fits several cuvette types with sample sizes from 0.3 μL to 5 mL.

Assay-specific buttons

The Control and MARS data analysis software have predefined assay-specific buttons and protocols which enable sample measurement and data analysis with a single mouse click. This user-friendly feature enables you to carry out experiments quickly and easily. New detection protocols or data reduction calculations can be assigned to specific assay buttons.

Incubation, shaking and gas vent

On the SPECTROstar ^{Nano}, the built-in incubator uniformly heats up to 45°C both the microplate chamber and the cuvette port, thereby providing the optimal temperature required for specific assays such as bacterial growth. The incubator can also be used for protein denaturation studies by combining full spectrum readings with incrementally increasing temperature.
Linear, orbital, and double orbital shaking options increase 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.
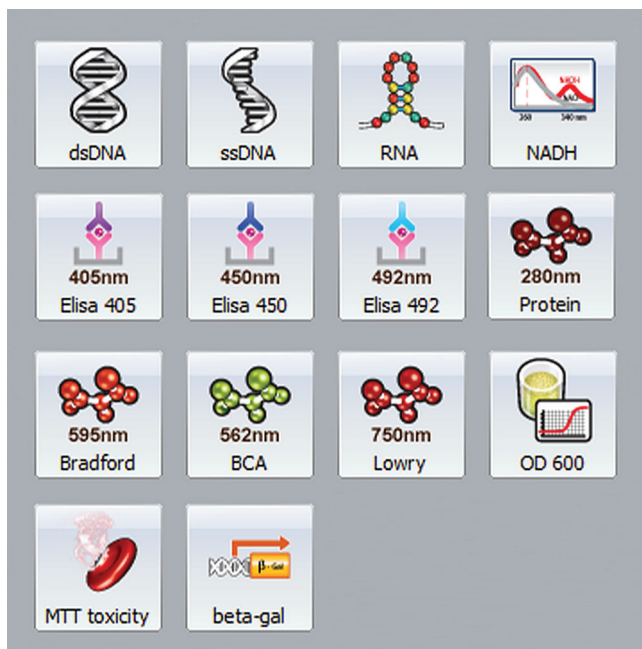
Assay-specific buttons for the most common absorbance assay enable a quick and effortless detection

The gas vent can be used to purge the microplate chamber with a specific gas or gas mixtures.

For cell-based assays requiring a specific environment, the gas vent can be used to purge the microplate chamber with different gases. For example, a mixture of O_2/CO_2 can be used to run kinetic assays with eukaryotic cells.

Endpoint, kinetics and well scanning

With the SPECTROstar ^{Nano} you can detect both endpoint assays, as well as kinetics such as bacterial growth or enzymatic reactions over time.
Three different well scan modes enable robust data acquisition even from non-homogeneous samples such as adherent cells, bacteria or precipitates. Orbital and spiral averaging automatically perform multiple measurements over an orbit, collect the data and calculate an average for each well.
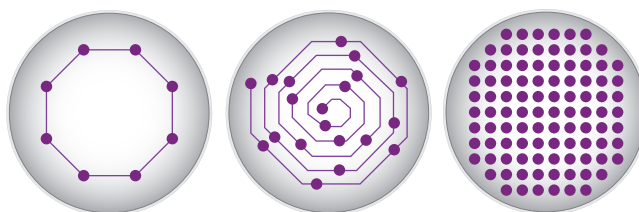For higher resolution, matrix scan acquires up to 900 data points/well, displays each scan point graphically and creates a map for each well. Single scan points or entire sections can be easily removed upon detection.

Orbital averaging, spiral averaging and matrix scanning simplify the detection of non-homogeneous samples such as adherent cells or bacteria.

LVis Plate

For the quantification of precious DNA or RNA samples, the use of the least possible amount of material is often mandatory. With the LVis Plate, our low-volume microplate, sixteen individual samples of 2 µL can be measured. The LVis Plate has a tip rest for easy sample loading when using an eight channel pipettor. In addition, it can be equipped with NIST-traceable optical density filters and a holmium oxide filter for instrument quality control and performance testing. A horizontal cuvette position can hold standard rectangular cuvettes for kinetic or endpoint studies.

The LVis Plate enables the detection of up to sixteen 2 µL samples.

Automation

Small footprint, multiple robotic software interfaces and an automation-friendly plate carrier guarantee an easy integration into all leading robotic platforms. For GxP requirements, the multi-user software includes digital signature and FDA 21 CFR part 11 compliance.
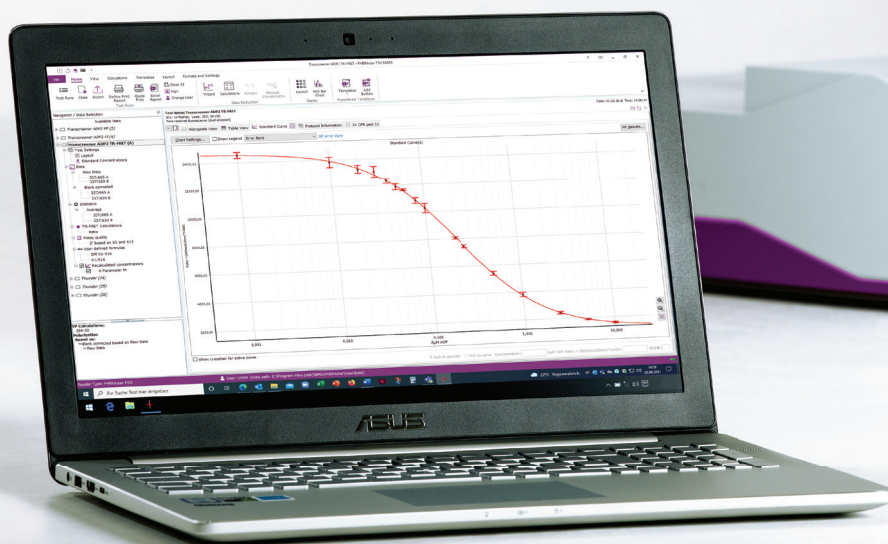
Control and MARS data analysis software

Our software package includes the Reader Control and MARS data analysis interfaces. This multi-user software can be installed on as many computers as you require, without the need to purchase additional licenses. The Reader Control software allows to define measurement protocols and acquire data. It is an extremely versatile interface for the straightforward execution of routine tasks, as well as the optimisation of complex operations. MARS is designed to make data analysis simple and effective, and offers multiple data reduction possibilities such as:

· Standard Curve Wizard for a step-by-step standard curve calculation
· Automatic DNA/RNA concentration determination
· Data display as bar charts, box plots, violin plots etc.
· UV/vis spectral view and analysis
· Background and baseline correction
· Signal interpolation: linear or cubic spline
· Various curve fit models including linear, 4- / 5-parameter, polynomial and user-defined fit models
· Enzyme kinetic analysis using various models
· EC_{50} calculation with confidence intervals
· ANOVA, Student's t-test or multiple comparisons
· Performance evaluation: signal-to-blank, signal-to-noise, %CV, Z-prime, etc.
· Automatic data processing using predefined templates
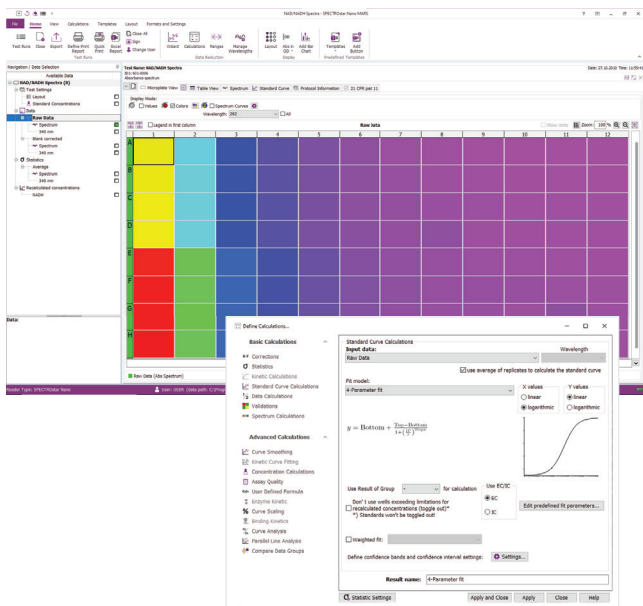
The MARS data analysis software covers various curve fit models such as linear, 4-/ 5-parameter, polynomial and user-defined.

The software package comes with flexible data export (Excel, ASCII) and integration capabilities, and is fully compliant with FDA regulation 21 CFR Part 11.

Applications hub

A perfectly engineered instrument is only part of the solution, it needs to effectively perform all of the leading applications. We continuously work with all major reagent companies to develop protocols and improve instrument settings for their existing assays and their newest kits. The SPECTROstar *Nano* is a user-friendly and flexible instrument that supports all your existing and future applications, including:

· DNA and RNA quantification
· Protein quantification
· ELISA immuno-assays
· Bacterial growth (OD_{600})
· Cell-based assays
· Enzymatic activity

Our comprehensive online application database reflects more than 30 years of expertise and innovations. Over 6,000 published entries of peer-reviewed articles and application notes demonstrate the flexibility and versatility of our readers, and their use in chemical and biological sciences. 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 upon treatment

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.
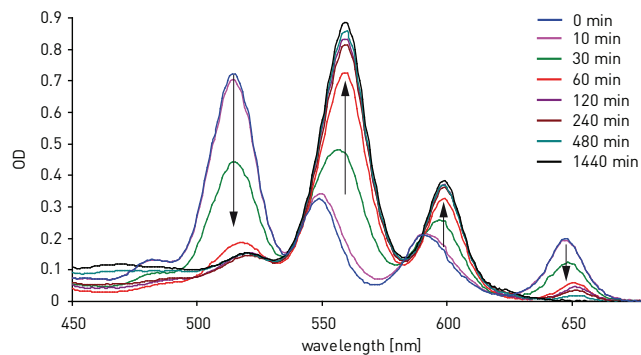
Changes in visible spectrum accompanying zinc metallation of TPP. Arrows indicate the evolution of the absorption bands with time.
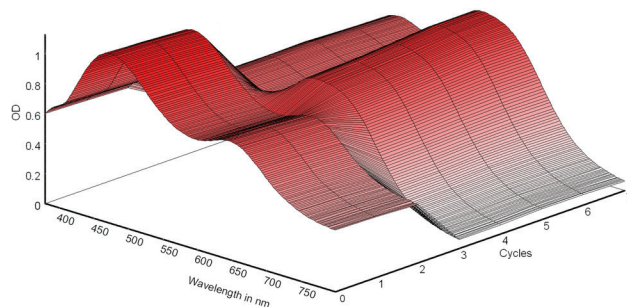
3D well map of a Bradford absorbance spectrum taken over 60 seconds. The 475 nm peak decreases and the 595 nm peak increases.
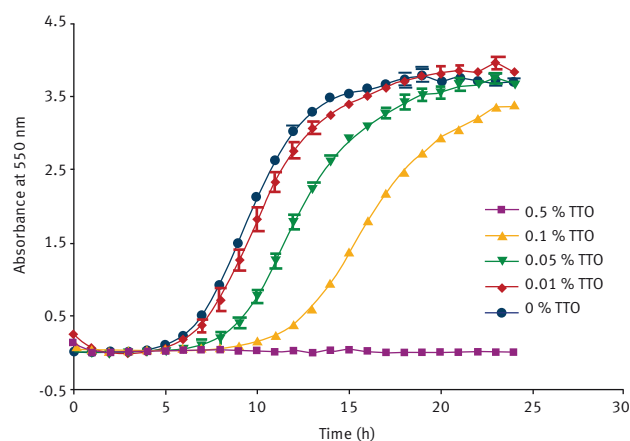
Dose dependant growth curves of Candida albicans in Tree Tea Oil (TTO). The mean of the quadruplicate data was taken and standard error bars presented.

The SPECTROstar *Nano* can include all or any combination of features/options/accessories listed below at purchase. Upgrading with additional features/options/accessories may be possible after purchase. Contact your local representative for more details or a quote.

Detection mode	UV/vis absorbance
Measurement modes	Endpoint and kinetic Spectral scanning Well scanning
Microplate formats	6 to 1536-well plates, user-definable LVis Plate with 16 low-volume microspots (2 µL)
Microplate carrier	Robot compatible
Light source	High energy xenon flash lamp
Detector	CCD spectrometer
Wavelength selection	UV/vis absorbance spectrometer Full spectra or 8 discrete wavelengths in < 1 sec / well
Spectral range	220 - 1000 nm; wavelength precision: ≤ 0.5 nm
Sensitivity	Selectable spectral resolution: 1, 2, 5, and 10 nm OD range: 0 to 4 OD; photometric resolution: 0.001 OD Accuracy: < 1% at 2 OD Precision: < 0.5% at 1 OD and < 0.8% at 2 OD Linearity: ≤ 0.8% at 2.0 OD
Read times	Full spectrum from 220 to 1000 nm in < 1 sec/well
Shaking	Linear, orbital, and double-orbital with user-definable time and speed
Purge gas vent	System to inject an atmosphere or to pull a vacuum into the reader
Incubation	+3°C above ambient up to 45°C Minimum condensation concept: the upper heating plate of the incubation chamber operates at 0.5°C more than the lower plate. This prevents condensation build-up on the lid or sealer.
Software	Multi-user Reader Control and MARS data analysis software included FDA 21 CFR Part 11 compliant
Dimensions	Width: 36 cm, depth: 50 cm, height: 16 cm; weight: 10 kg
	Accessories
THERMOstar	Microplate incubator and shaker
LVis Plate	Microplate designed to measure 16 low volume (2 µL) samples and standard cuvettes. Incorporating NIST-traceable filters and holmium oxide standards for instrument performance test. Sensitivity: 2 ng/µL dsDNA

*Limit of detection (sensitivity) was calculated according to the IUPAC standard: 3x(SDblank) / slope
Specifications are subject to change without notice.
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