

FLUOstar® Omega

The Microplate Reader

for life science research




BMG LABTECH
The Microplate Reader Company

FLUOstar® Omega

The multi-mode
microplate reader for
life science research



The FLUOstar® Omega represents the best combination of performance and flexibility for all of your life science and R&D applications. Using BMG LABTECH's unique Tandem Technology, it provides the perfect platform for a wide range of applications in basic research, life science studies, and assay development.

Flexibility

Backed by German engineering and technology, the FLUOstar Omega is a versatile, automated microplate reader offering the following detection modes:

- Ultra-fast UV/Vis absorbance spectra or filter-based absorbance
- Fluorescence intensity, including FRET
- Time-Resolved Fluorescence
- Time-Resolved FRET
- Luminescence (flash & glow), including BRET
- AlphaScreen®/AlphaLISA®

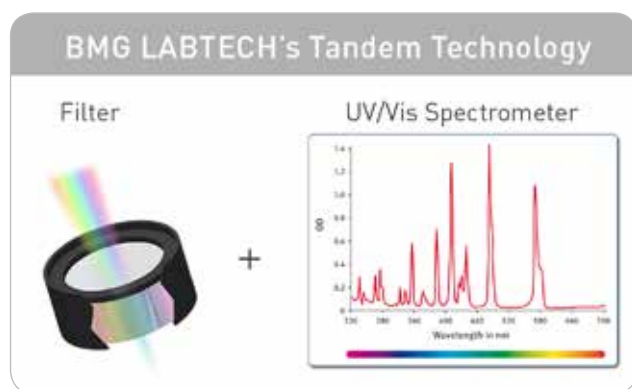
With its ability to capture fast, full UV/Vis absorbance spectra; to monitor rapid and slow kinetic reactions; and to perform FRET, BRET, TR-FRET and AlphaScreen®/AlphaLISA® detection, the FLUOstar™ Omega fulfills all research needs.

Top and bottom plate reading, multi-color detection, well scanning, precise temperature control, multi-mode shaking, and a gas vent all enhance the flexibility of the FLUOstar Omega. The addition of onboard "smart" injectors provides the ability to dispense reagents and initiate kinetic reactions, while an optional Atmospheric Control Unit (ACU) is ideal for cell-based assays. The FLUOstar Omega reads all plate formats from 6- to 1536-well in absorbance and up to 384-well in all other detection modes.

Tandem Technology

The FLUOstar Omega multidetection microplate reader is built upon BMG LABTECH's unique Tandem Technology. This is a combination of two technological concepts – an ultra-fast, full spectrum absorbance CCD spectrometer, and extremely sensitive filter-based detection with advanced optics and photomultiplier tubes to provide

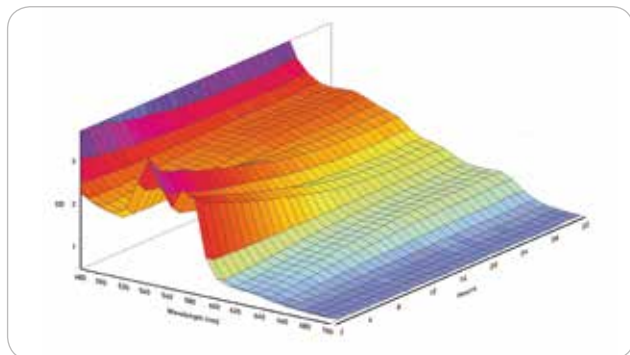
superior sensitivity for all detection modes. For the first time, spectrometer-based absorbance measurements with a high resolution of 1 nm can now be performed in a multimode microplate reader. Alternatively to the spectrometer, filter-based absorbance detection is available as well.



Tandem Technology is a combination of an ultra-fast UV/Vis spectrometer for absorbance measurements and filter-based optics for highest sensitivity in all other detection modes.

CCD spectrometer based detection

The FLUOstar Omega is the first multimode plate reader to use a CCD spectrometer for absorbance measurements. This new technology can capture a full UV/Vis absorbance spectrum from 220 to 1000 nm at resolutions from 1 to 10 nm. A full absorbance spectrum can be measured as quickly as one second per well, which is significantly faster than other current microplate reader methods. Alternatively, up to eight wavelengths can be measured simultaneously in a single pass with no wavelength switching.



*Time-dependent change in haemoglobin absorbance spectrum in the presence of *N. nigricollis* venom.*

Filter-based detection

For fluorescence and luminescence assays, filters provide precise and superior performance for both sensitivity and selectivity. In fluorescence and luminescence modes, the fast filter switching capability of the FLUOstar Omega allows the use of multi-excitation and multi-emission applications, such as FRET, BRET, FURA-2 and other ratiometric methods. Filters offer more light transmission and excellent blocking of undesired wavelengths, higher sensitivity, precise control over transmitted peak shape, and fast switching between wavelengths when more than one filter pair is employed. Filters are the most technically preferred and most cost-efficient technology in fluorescence- and luminescence-based detection.

BMG LABTECH offers a wide range of assay-specific filters from UV to NIR with various bandwidths.

Advanced Time-Resolved Fluorescence

The FLUOstar Omega also has an Advanced TRF capability utilizing an advanced optic head for TRF and TR-FRET measurements.

Assays such as HTRF®, LANCE®, Delfia®, and LanthaScreen® can now be performed with outstanding sensitivity. Combined with the high intensity xenon flash lamp, assay optimized filters and adjustable gain, the advanced TRF optic head allows the FLUOstar Omega to outperform any microplate reader in its class.

AlphaScreen®/AlphaLISA®

BMG LABTECH's engineers have developed a specialized optical system for the FLUOstar Omega to read AlphaScreen®/AlphaLISA® assays without having to use an expensive laser as a light source. For the first time, users can experience fantastic AlphaScreen®/AlphaLISA® performance normally only available on more costly microplate readers.

High-performance luminescence

The FLUOstar Omega has been designed with a dedicated luminescence detection system for both flash and glow based assays. It offers exceptional luminescence

performance that exceeds Promega's stringent Dual Luciferase® Reporter validation criteria for the DLReady™ certification in both 96- and 384-well plate formats.

Advanced reagent injection and detection

Two precise onboard injectors with an exceptional low dead volume allow simultaneous reagent injection and detection. Users can adjust all parameters, such as injection speed, timing, shaking and the number of injections per well. Delivery volumes are adjustable for each well, so dilution schemes and concentration gradients can be automatically produced across the microplate. The injectors are readily accessible and are housed within the instrument to safeguard any light sensitive reagents.



Simultaneous injection and reading with onboard reagent injectors.



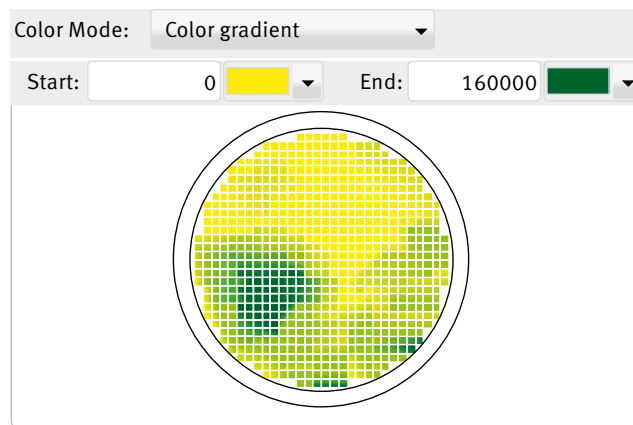
Endpoint, slow and fast kinetics

Kinetic data can be collected as fast as 50 reading points per second or as slow as one measurement every 2.5 hours. Users can capture, for example, a fast calcium signal that happens in seconds, or measure bacterial growth over a period of days. Data can also be collected at different rates within the same experiment, allowing users to collect more data when it is needed and less when it is not. Kinetic events can be conveniently initiated using the onboard reagent injectors.

Well scanning and orbital averaging

The FLUOstar Omega can easily handle nonhomogeneous samples such as adherent cells by taking multiple measurements in each well with up to 900 data points/well. The software displays each scan point graphically.

Another way to measure nonhomogeneous well content is BMG LABTECH's unique orbital averaging feature. This allows several measurements over a defined orbit, to collect data and to calculate an average for each well.



Well Scanning of GFP-expressing protoplasts. The well scan shows not evenly distributed protoplasts (green colour) in the well.

Stacker and robot compatibility

BMG LABTECH's standardized reader footprint and robotic software interface allow for easy integration into all robotic platforms. For medium level throughput, the 50-plate Stacker with an integrated barcode reader is also available.



Automated microplate handling with Stacker.

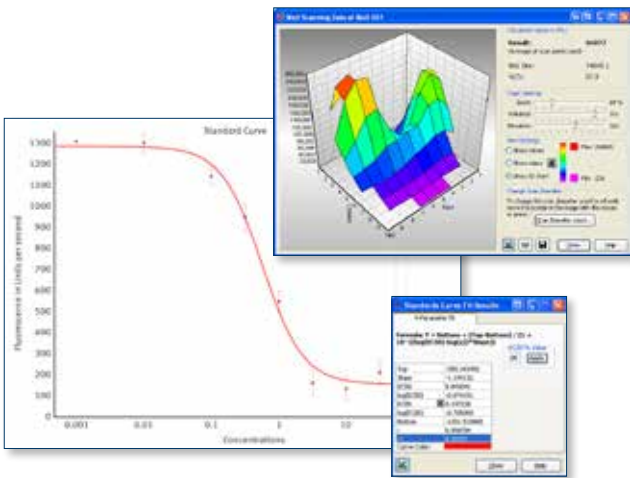
Control and MARS data analysis software

The FLUOstar Omega multi-user software package provides an extensive range of possibilities for both test protocol definitions and data analysis, and is fully compliant with FDA regulation 21 CFR Part 11.

The user-friendly interface of the control software has definable assay buttons for favorite applications. Just one click and the measurement begins



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.



The MARS Data Analysis Software provides sophisticated tools for automated data reduction.

Data can be processed with powerful predefined templates or by using an extensive range of data calculation features. There are automatic calculation for enzymatic parameters (Michaelis-Menten or Lineweaver-Burk equations), as well as many standard curve fitting algorithms to calculate for example EC₅₀, IC₅₀, and r² values:

- Linear regression
- 4- and 5-parameter
- Hyperbola
- Segmental regression
- Cubic spline
- 2nd and 3rd polynomial

Atmospheric Control Unit (ACU) accessory

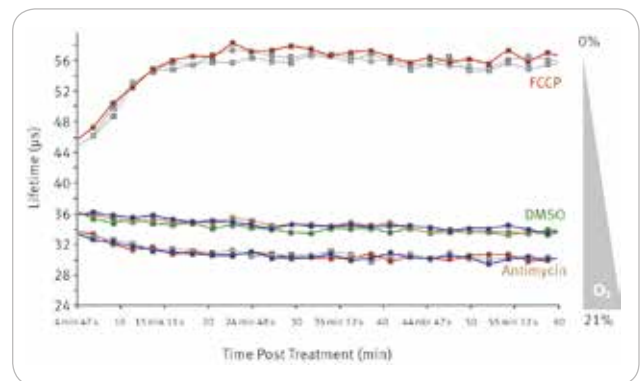
The Atmospheric Control Unit (ACU) is a module for independent control of both O₂ and CO₂ within the microplate chamber. The ACU is able to regulate O₂ from 1 - 19 % and CO₂ from 0 - 20 %.



Atmospheric Control Unit regulates both O₂ and CO₂ and is perfect for all types of cell based assays.

Applications include:

Hypoxia · Migration Studies · Cell Viability · Cell Proliferation · Intracellular pH · Mammalian Cell Assays · Bacterial Growth Studies · Invasion Assays · Angiogenesis · Viral Uptake · Stem Cell Assays · Ischemia/Reperfusion, and more.



ACU decreases ambient oxygen levels in HepG2 cells as monitored with a Luxcel MitoXpress™ probe. The effect of an electron transport chain inhibitor (FCCP) is seen.

Specifications for Atmospheric Control Unit (ACU)

Oxygen regulation	1 - 19% using nitrogen to purge
Carbon dioxide regulation	0 - 20% using 100% moisture-free carbon dioxide to purge
Dimensions (ACU only)	Width: 44 cm, height: 17 cm and depth: 19 cm; Weight: 5 kg

LVis Plate accessory

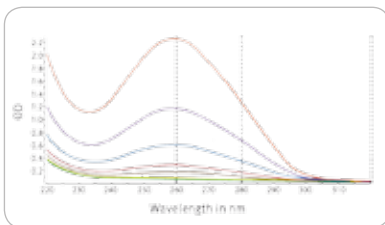
BMG LABTECH's LVis Plate is perfect for low-volume DNA/RNA/protein quantitation, cuvette-based measurements, and quality control checks.



Easy pipetting of up to sixteen 2 µL samples using the integrated multichannel pipette tip rest.

The LVis Plate has the following outstanding features:

- Sixteen microdrop well sites for 2 µL samples
- Horizontal position for a standard cuvette
- Left and right handed 8-channel pipette tip rest
- Quick-clean surface for repeat measurements
- Optional NIST-traceable O.D. filters and holmium oxide filter to assess instrument reproducibility and wavelength accuracy



DNA concentrations are automatically determined. Collect all wavelengths simultaneously.

Specifications for LVis Plate

Sample capacity	Sixteen separate microdrop wells for 2 µL samples. One standard cuvette position for up to 1 mL samples.
Quality control internal standards (optional)	Four NIST-traceable optical density filters (approximate values of 0.1, 0.3, 0.6 and 1.0 OD). One holmium oxide filter for wavelength accuracy.
Dimensions	Conforms to SBS standards for microplates.
Instrument/software compatibility	FLUOstar Omega requires software version 2.10 or higher. Please contact BMG LABTECH about a software update.

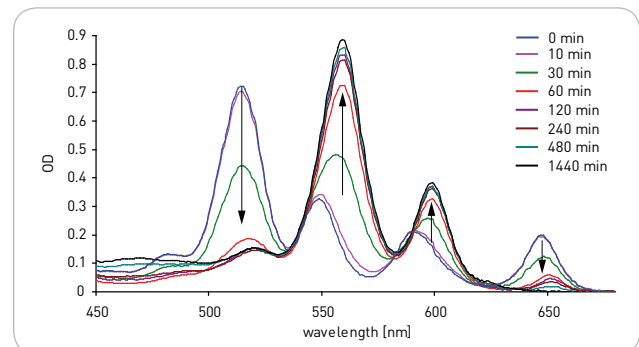
Applications center

The FLUOstar Omega has been cited in numerous publications, all of which clearly illustrate its versatility. A wide range of applications are possible, including:

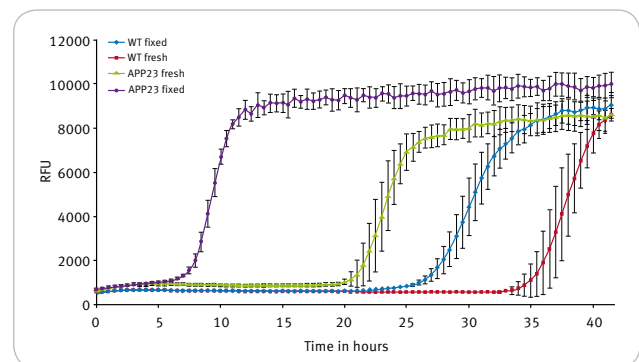
- Biomolecular interaction assays
- Cell-based assays
- Binding assays
- Enzyme activity assays
- Quantification assays

The FLUOstar Omega's versatility and flexibility are illustrated by the following examples:

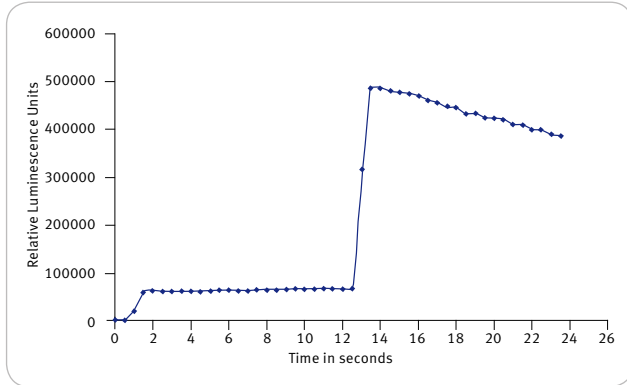
- Kinetic studies on the metallation of porphyrin (absorbance)
- G-protein activation measured via the change in intrinsic tryptophan (fluorescence intensity)
- DLR™ assay to monitor early stage replication events of Hepatitis C virus (luminescence)



Changes in visible spectrum accompanying zinc metallation of TPP. Arrows indicate the evolution of the absorption bands with time.¹



Signal curves for samples containing either fixed or fresh-frozen wild type or APP23 brain homogenates. Error bars represent deviation of replicate wells within one plate from mean.²



Signal curve for the DLR™ assay. The substrate for the Firefly luciferase was injected after 1 second, whereas the substrate for the Renilla enzyme was injected after 13 seconds.³

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. The FLUOstar Omega is certified for the following assays:



Visit BMG LABTECH's Applications Center online to download all the leading applications, listed as:

- Application notes
- Scientific posters
- Peer-reviewed papers

BMG LABTECH's searchable applications database provides the expertise expected from a dedicated microplate reader company. With well over 3,800 published entries of scientific posters and peer-reviewed papers, there is extensive information on how to perform countless applications with our microplate readers.

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 FLUOstar Omega and all other BMG LABTECH microplate reading solutions.

^{1,2,3}The graphs were taken from BMG LABTECH's Application Notes AN 178, AN 250 and AN 172.

Transcreener®
 FRET assays
 DNA/RNA quantifications
 Binding studies
 Kinase activity
 HTRF®
 DLR™
 Alpha Technology
 Protease activity
 SNP Genotyping
 LanthaScreen®
 Apoptosis
 ORAC
 HTS
 Enzyme activity
 Immunoprecipitation
 Dual luciferase assays
 Protein quantifications
 BRET assays
 Enzyme kinetics
 ROS detection
 Cell Viability
 PCR product quantifications
 NADH / NADPH assays
 DELFIA®
 LANCE®
 Solubility tests
 ATP and ADP detection
 Gene expression
 ELISA
 Reporter gene assays



FLUOstar® Omega - Technical specifications

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.

Detection modes	Fluorescence Intensity - including FRET AlphaScreen®/AlphaLISA® Luminescence (flash and glow) - including BRET Time-Resolved Fluorescence - including TR-FRET UV/Vis Absorbance Spectra	
Measurement modes	Top and bottom reading Endpoint and kinetic measurements Sequential multi-excitation measurements Sequential multi-emission measurements Ratiometric measurements Well scanning	
Microplate formats	Up to 384-well plates, 1536-well plates in absorbance, user-definable	
Light source	High energy xenon flash lamp	
Detectors	Side window photomultiplier tube	
Optical filters	Excitation and emission filter wheels for 8 filters each	
Spectral range	240 - 740 nm or 240 - 900 nm Absorbance spectrometer: 220 - 1000 nm	
Sensitivity	FI	< 0.2 fmol/well fluorescein
	TRF	< 30 amol/well europium
	High-End TRF for Omega	< 3 amol/well europium
	LUM	20 amol/well ATP DLReady™ certified
	AlphaScreen®	< 100 amol* (384)
ABS with Spectrometer	Spectral range: 220 - 1000 nm Full spectrum captured in < 1 s/well Selectable spectral resolution: 1 - 10 nm OD range: 0 to 4 OD Accuracy: < 1% at 2 OD Precision: < 0.5% at 1 OD and < 0.8% at 2 OD	
Read times	Flying mode: 9 s (96), 16 s (384)	
Reagent injection	Up to 2 built-in reagent injectors Injection at measurement position (6 to 384-well) Individual injection volumes for each well (3 to 500 µL) Variable injection speed up to 420 µL/s Up to four injection events per well Reagent back flushing	
Shaking	Linear, orbital, and double-orbital with user-definable time and speed	
Gas vent	System to inject an atmosphere or to pull a vacuum into the reader	
Incubation	+4°C above ambient up to 45°C or 65°C	
Software	Multi-user software package including Reader Control and MARS Data Analysis Software	
Dimensions	Width: 44 cm, depth: 48 cm, height: 30 cm; weight: 28 kg	
Accessories		
Atmospheric Control Unit (ACU)	Oxygen regulation: 1 - 19% using nitrogen to purge. Carbon dioxide regulation: 0 - 20% using 100% moisture free carbon dioxide to purge. Dimensions (ACU only): Width: 44 cm, height: 17 cm and depth: 19 cm; Weight: 5 kg	
Stacker	Plate handler for up to 50 microplates - continuous loading feature	
THERMOstar	Microplate incubator and shaker	
LVis Plate	Microplate designed to measure 16 low volume (2 µL) samples and standard cuvettes. Incorporating NIST filter and holmium oxide standards for instrument performance test. Sensitivity: 2 ng/µL dsDNA	
Filters	Optimized for dyes, fluorophores and specific assays Filters for all applications from UV to NIR Customized filters available upon request	
Upgrades	Upgrades to include options such as additional detection modes, reagent injectors, extended temperature control, etc. are available. Please contact your local representative for more information.	

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* Limit of detection < 100 amol of biotinylated and phosphorylated polypeptide (P-Tyr-100 assay kit, PerkinElmer, #6760620C), measured in white 384 small volume microplates (17 µL/well)

Limit of detection was calculated according to the IUPAC standard: $3 \times (SD_{blank}) / slope$
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Made in Germany