

FLUOstar Omega

The Multidetector **Microplate Reader**
for Research & Life Science



**BMG LABTECH**

The Microplate Reader Company



The Multidetector Microplate Reader for Research & Life Science

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 instrument 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 main detection modes:

- Ultra fast UV/Vis absorbance spectra
- Fluorescence intensity, including FRET
- Time-resolved fluorescence
- Time-resolved FRET
- Luminescence (flash & glow), including BRET
- AlphaScreen®

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® detection, the FLUOstar Omega will confidently fulfill all assay needs.

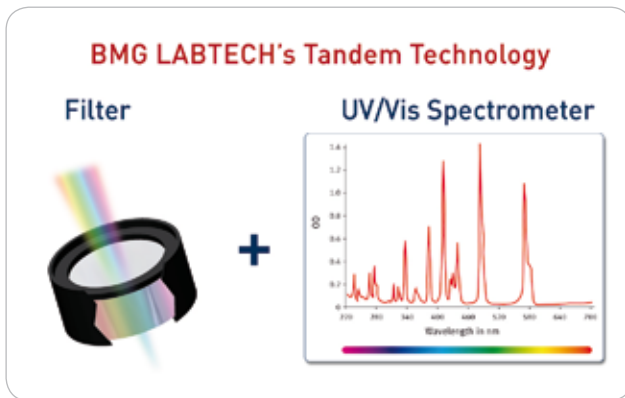
Top and bottom plate reading, multi-color detection, well scanning, precise temperature control, multi-mode shaking capabilities and a gas vent all enhance the flexibility of the FLUOstar Omega. The addition of onboard "smart" injectors provides the ability to dispense reagents and initiate kinetic reactions. 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 UV/Vis full spectrum absorbance spectrometer, and extremely sensitive filter based detection incorporating advanced optics and photomultiplier tubes to provide superior sensitivity. For the first time, full spectrum absorbance with high resolution at 1 nm can now be performed in a multidetection microplate reader.

Tandem Technology enables researchers to use the FLUOstar Omega for all assays utilising the most effective detection mode.

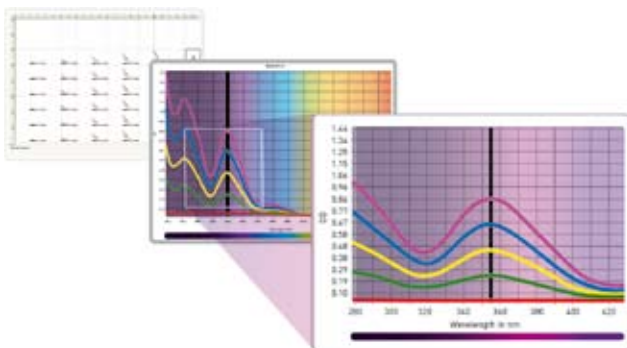
The FLUOstar Omega with Tandem Technology incorporates an ultra-fast UV/Vis spectrometer for absorbance measurements and filter-based optics for highest sensitivity in all other detection modes.



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.

Spectrometer-Based Detection

The FLUOstar Omega is the first multidetection plate reader to use a spectrometer for absorbance measurements. This new technology can capture a full UV/Vis absorbance spectrum (220 to 850 nm) at resolutions from 1 to 10 nm. Full absorbance spectrum can be measured as fast as one second per well, significantly faster than any conventional method. Alternatively, up to eight wavelengths can be measured simultaneously in a single pass with no wavelength switching.



...from a single spectrum per well to spectra overlay plots.

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 technically preferred and most cost efficient technology for non-absorbance based assays. BMG LABTECH offers a wide range of assay specific filters from UV to NIR with various bandwidths.

Advanced Time-Resolved Fluorescence

New to the FLUOstar Omega is Advanced TRF capability utilizing an advanced optic head for TRF and TR-FRET. Assays such as homogeneous TRF (e.g. HTRF®, LANCE®, 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®

BMG LABTECH's engineers have developed a specialized measurement mode and optical system for the FLUOstar Omega to read AlphaScreen® assays without using an expensive laser as a light source. For the first time users can experience fantastic AlphaScreen® performance normally only available on more costly instruments.

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

Two precise onboard injectors 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.

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 a fast calcium signal that happens in a few 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

In well scanning mode, the FLUOstar Omega can easily deal with nonhomogeneous samples such as adherent cells by taking multiple measurements in each well with up to 30 x 30 data points. The software displays each scan point graphically and creates a map for each well. Another way to measure nonhomogeneous well contents is BMG LABTECH's unique orbital averaging feature. This allows several measurements over a defined orbit, to collect data and calculate an average for each well.



... automated microplate handling with Stacker.

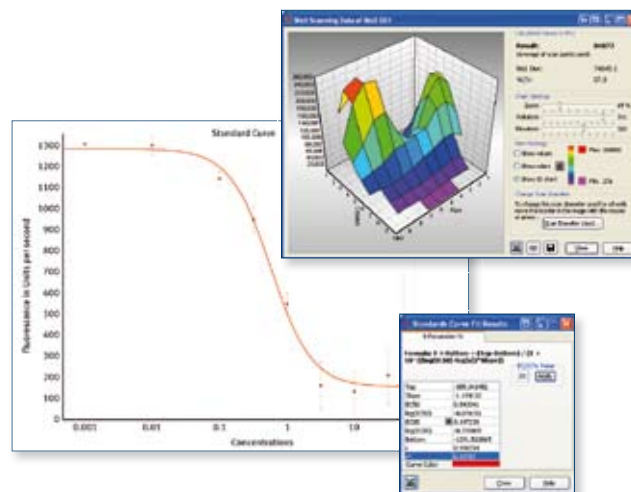
Stacker and Robot Compatibility

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.

Control and MARS Data Analysis Software

The FLUOstar Omega 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 part of the software allows users to define instrument parameters and test protocols.

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.



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. For example the automatic calculation of enzyme kinetic parameters (V_{max} and K_m) 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. EC_{50} , IC_{50} , and r^2 values:

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

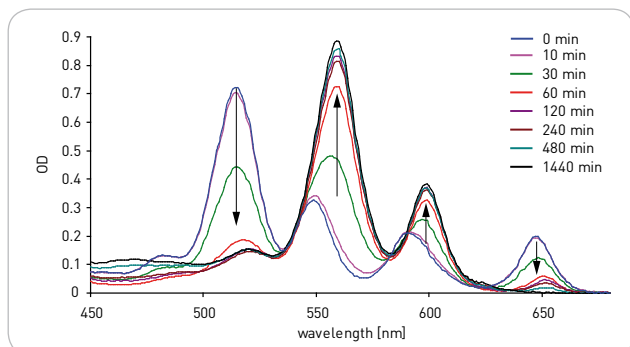
Applications Center

The FLUOstar Omega has been cited in numerous publications such as application notes, posters, and scientific papers exemplifying the versatility of the FLUOstar Omega. The following main categories are amongst a wide range of possible applications:

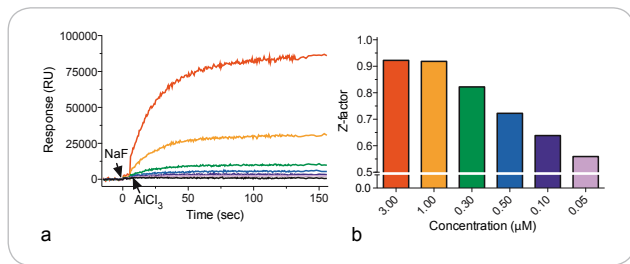
- Biomolecular interaction assays
- Cell-based assays
- Binding assays
- Enzyme activity assays
- Quantification assays

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

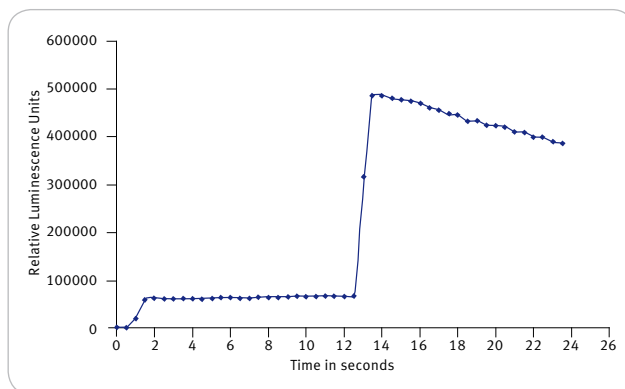
- Kinetic studies on the metallation of porphyrin (absorbance)
- G-protein activation measured via the change in intrinsic tryptophan (fluorescence intensity)
- DLR™ assay to monitor early stage replication events of Hepatitis C virus (luminescence)



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



(a) Signal intensities at varying concentrations of Ga₁₁ as activated by aluminum tetrafluoride addition [sequential application of NaF and AlCl₃]. (b) Z'-factors of the assay at varying Ga₁₁ concentrations.²



Signal curve for the DLR™ assay. The substrate for the Firefly luciferase was injected in cycle 1, 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 1,700 published entries of peer reviewed articles, application notes and scientific posters, there is ample 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 196 and AN 172.

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® 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	6 to 1536-well plates, user-definable												
Light Source	High energy xenon flashlamp												
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 - 850 nm												
Sensitivity	<table border="1"> <tr> <td>FI</td> <td>< 0.2 fmol/well Fluorescein</td> </tr> <tr> <td>TRF</td> <td>< 30 amol/well Europium</td> </tr> <tr> <td>High-End TRF for Omega</td> <td>< 3 amol/well Europium</td> </tr> <tr> <td>LUM</td> <td>20 amol/well ATP DLReady™ certified</td> </tr> <tr> <td>AlphaScreen®</td> <td>< 100 amol* (384)</td> </tr> <tr> <td>ABS with Spectrometer</td> <td>Spectral range: 220 - 850 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</td> </tr> </table>	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 - 850 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
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 - 850 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 350 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	+5°C above ambient up to 45°C or 60°C												
Software	License-free software package including Reader Control and MARS Data Analysis Software												
Dimensions	Width: 44 cm, depth: 48 cm, height: 30 cm; weight: 28 kg												
Accessories													
Stacker	Plate handler for up to 50 microplates - continuous loading feature												
THERMOstar	Microplate Incubator and Shaker												
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.												

Headquarters

Germany

BMG LABTECH GmbH
Hanns-Martin-Schleyer-Str. 10
77656 Offenburg
Tel. +49 781 96968 -0
Fax +49 781 96968 -67
germany@bmglabtech.com

Australia

BMG LABTECH Pty. Ltd.
2/24 Carbine Way
Mornington, Victoria, 3931
Tel. +61 3 5973 4744
Fax +61 3 5973 4711
australia@bmglabtech.com

France

BMG LABTECH SARL
7, Rue Roland Martin
94500 Champigny s/Marne
Tel. +33 1 48 86 20 20
Fax +33 1 48 86 47 07
france@bmglabtech.com

Japan

BMG LABTECH JAPAN Ltd.
2F TS-1 Building
1-6-2, Shimo-cho
Omiya-ku
330-0844 Saitama City
Tel. +81 48 647 7217
Fax +81 48 647 7218
japan@bmglabtech.com

UK

BMG LABTECH Ltd.
P.O. Box 73
Aylesbury Bucks HP20 2QJ
Tel. +44 1296 336650
Fax +44 1296 336651
uksales@bmglabtech.com

USA

BMG LABTECH Inc.
13000 Weston Parkway
Suite 109
Cary, NC 27513
Tel. +1 877 264 5227
Fax +1 919 678 1640
usa@bmglabtech.com

AlphaScreen and LANCE are registered trademarks of PerkinElmer, Inc.

DLR is a trademark of Promega Corporation.

HTRF is a registered trademark of Cisbio International.

LanthaScreen is a registered trademark of Invitrogen Corporation.

* 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: $3 \times (SD_{blank}) / slope$

www.bmglabtech.com