

FLUOstar® Omega

The Microplate Reader  
for life science research



**BMG LABTECH**  
*The Microplate Reader Company*



“Our laboratory has used the FLUOstar Omega microplate reader for several years. We find that even weak fluorescence signals can be measured with **high accuracy.**”

*Prof. Stefan Rensing  
Department of Plant Cell Biology, University of Marburg, Germany*

The FLUOstar® Omega represents the best combination of performance and flexibility for all of your life science and R&D applications. Employing our 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, it fulfils all research needs.

Top and bottom plate reading, multi-colour detection, well scanning, precise temperature control, multi-mode shaking, and Atmospheric Control Unit (ACU) or gas vent all enhance its flexibility.

The addition of on-board smart injectors provides the ability to dispense reagents and initiate kinetic reactions. The instrument reads all plate formats from 6- to 1536-well in absorbance and up to 384-well in all other detection modes.

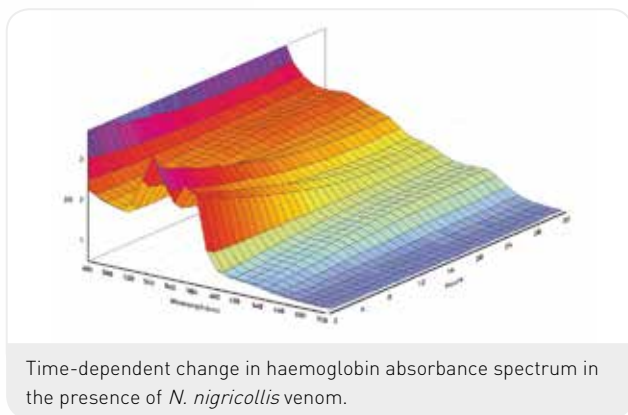
### Ideal for the following applications

DNA/RNA quantification	Reporter gene analysis
Protein quantification	Enzymatic reactions
Cell/bacterial growth	Real-time cell-based assays
ELISA	Aggregation studies
Signalling	Low-volume measurements

## Tandem Technology

The FLUOstar Omega multi-detection 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 spectrometer, and extremely sensitive filter-based detection, with advanced optics and a photomultiplier tube to provide superior sensitivity for all detection modes. Unlike conventional grating monochromators, the advanced grating spectrometer technology enables the acquisition of a full UV/vis absorbance spectrum at unsurpassed speed and with a resolution of 1 nm in a microplate reader. Alternatively to the spectrometer, filter-based absorbance detection is available as well.



## Spectrometer-based detection

The FLUOstar Omega is the first multi-mode 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.

## Filter-based detection

For fluorescence and luminescence assays, filters provide superior performance for both sensitivity and selectivity. In fluorescence and luminescence modes, the fast filter switching capability of the reader allows the use of multi-excitation and multi-emission applications, such as FRET, BRET, FURA-2 and other ratiometric methods. Filters offer higher 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 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.

## High-performance luminescence

This plate reader 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 time-resolved fluorescence

For superior TRF and TR-FRET detection, the reader can also be equipped with an advanced TRF optic head. 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®

Our 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.

## Advanced reagent injection and detection

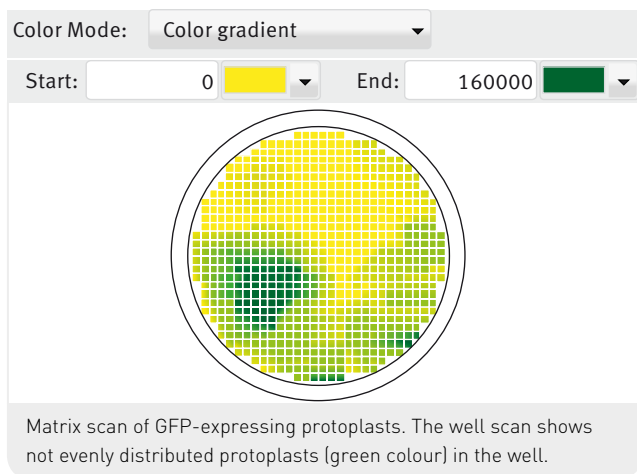
Two precise on-board injectors with exceptional low dead volume allow simultaneous reagent injection and detection. Users can adjust all parameters, such as injection speed, timing, shaking and the number of injections per well. Delivery volumes are adjustable for each well, so dilution schemes and concentration 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.

## 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. You 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 modes

The matrix scan mode can easily handle non-homogeneous 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. Alternatively, non-homogeneous samples can be measured with our unique spiral or orbital average features. These perform several measurements over an orbit, collect the data and calculate an average for each well.



## Control and MARS data analysis software

Our 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 favourite 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. Data can be processed with powerful

predefined templates or by using an extensive range of data calculation features. There are automatic calculations for enzymatic parameters (Michaelis-Menten or Lineweaver-Burk equations), as well as many standard curve fitting algorithms to calculate for example  $EC_{50}$ ,  $IC_{50}$ , and  $r^2$  values:

- Linear regression
- 4- and 5-parameter
- Hyperbola
- Segmental regression
- Cubic spline
- 2<sup>nd</sup> and 3<sup>rd</sup> polynomial
- User-defined fit

## Atmospheric Control Unit accessory

The Atmospheric Control Unit (ACU) independently regulates  $O_2$  and  $CO_2$  within the microplate chamber from 0.1 - 20 %. Applications include: hypoxia, cell migration and invasion, proliferation and cell viability, bacterial growth, angiogenesis, viral uptake, and more.

## LVis Plate accessory

Perfect for low-volume DNA/RNA/protein quantitation, cuvette-based measurements, and quality control checks, the LVis Plate has the following outstanding features:

- Sixteen microdrop well sites for 2  $\mu$ L 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 for reproducibility and wavelength accuracy tests



## Stacker and robot compatibility

Our 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.

## Applications center

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

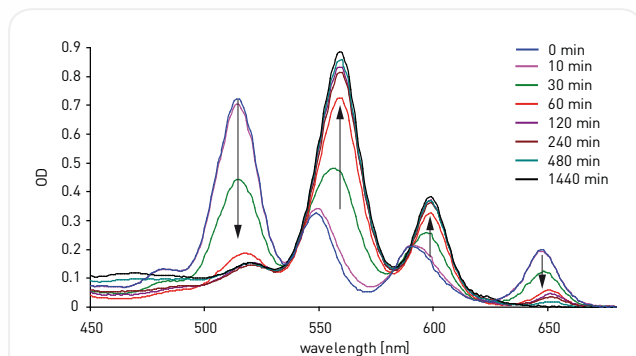
- Biomolecular interaction assays
- Cell-based assays
- Binding assays
- Enzyme activity assays
- Quantification assays

We continuously work 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:

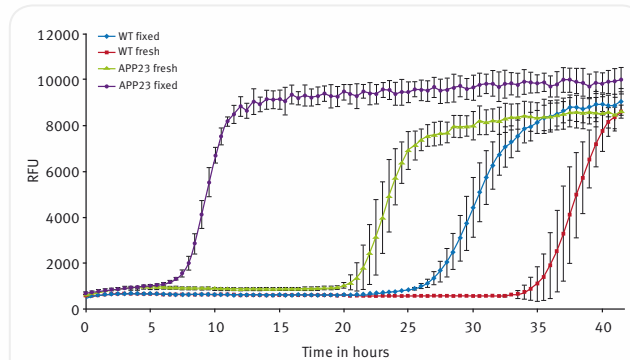


The reader's versatility and flexibility are illustrated by the following examples:

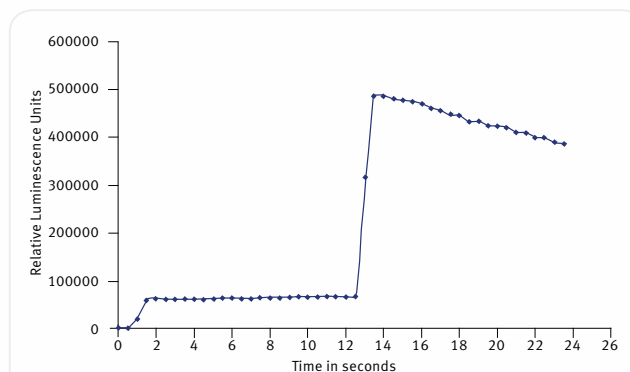
- Kinetic studies on the metallation of porphyrin
- Fluorescence detection of A $\beta$  amyloid fibril formation
- DLR™ assay to monitor early stage replication events of Hepatitis C virus (luminescence)



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



Signal curves for samples containing either fixed or fresh-frozen wild type or APP23 brain homogenates.<sup>2</sup>



DLR™ assay: the substrate for the Firefly and Renilla luciferases were injected after 1 and 13 seconds, respectively.<sup>3</sup>

BMG LABTECH's searchable applications database provides the expertise expected from a dedicated microplate reader company. With well over 4,000 published entries of scientific posters and peer-reviewed papers, there is extensive information on how to perform countless applications with our microplate readers.

Visit our Applications Center online to download all the leading application notes and to check a selection of peer-reviewed papers.

## Support and training

We operate globally through an extensive network of subsidiaries and well trained distributors.

Customers can rely on PhD level support and assistance with regards to software, assay development, or general enquiries related to the FLUOstar Omega and all other BMG LABTECH microplate reading solutions.

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	UV/vis absorbance Fluorescence intensity - including FRET Luminescence (flash and glow) - including BRET Time-resolved fluorescence - including TR-FRET AlphaScreen®/AlphaLISA®	
Measurement modes	Top and bottom reading Endpoint and kinetic Sequential multi-excitation Sequential multi-emission Ratiometric measurements Well scanning	
Microplate formats	Up to 384-well plates; 1536-well plates in absorbance, user-definable	
Light sources	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	
	Optional accessories	
Stacker	Plate handler for up to 50 microplates - continuous loading feature	
THERMOstar	Microplate incubator and shaker	
Atmospheric Control Unit (ACU)	Actively regulates O <sub>2</sub> and CO <sub>2</sub> - 0.1-20%	
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	
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.	

\*Limit of detection [sensitivity] was calculated according to the IUPAC standard:  $3 \times (SD_{blank}) / \text{slope}$   
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