PHERAstar *Plus*

The Flagship for High-Throughput Screening

BMG LABTECH

The Microplate Reader Company

The **Flagship** for High-Throughput Screening

Whether you need sensitivity, speed or flexibility, the PHERAstar *Plus* from BMG LABTECH is the ultimate solution for your research and HTS applications.

Freedom to Perform All Your Assays

Whatever your application, the PHERAstar *Plus* will do it. This compact and versatile multidetection microplate reader is able to perform all the leading non-isotopic detection technologies such as:

- Fluorescence Intensity, including FRET
- Fluorescence Polarization / Anisotropy
- Time-Resolved Fluorescence, including TR-FRET
- AlphaScreen®
- Luminescence, including BRET
- Absorbance UV/Vis

The PHERAstar *Plus* provides uncompromising sensitivity, speed and dynamic range. Not only does it support endpoint readings, but it is also capable of kinetic measurements and well scanning. Assay flexibility is enhanced by precise temperature control and multi-mode shaking capabilities. Sequential dual excitation, Simultaneous Dual Emission detection and ratiometric calculations are important features for multichromatic applications such as FRET, TR-FRET, BRET, FP and anisotropy.
Pre-installed Optic Modules for specific applications can be activated by a simple mouse click and all the necessary components are selected automatically. The flexibility and sensitivity of the PHERAstar *Plus* are not compromised, even in 1536-well plates.

... any plate format up to 1536

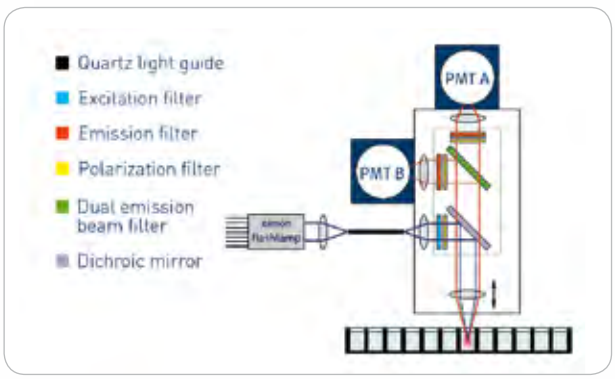
Advanced Detection Modes

Fluorescence polarization, anisoropy, Homogeneous Time-Resolved Fluorescence and BRET are powerful detection methods that benefit from the Simultaneous Dual Emission detection technology of the PHERAstar *Plus*. The sensitivity in fluorescence polarization mode allows you to work in the sub-nM concentration range.

The PHERAstar *Plus* is also optimized to perform AlphaScreen® measurements with high sensitivity due to the incorporation of a specific AlphaScreen® laser.

New Optical Design

The outstanding sensitivity of the PHERAstar *Plus* is based on a new, innovative lens-based optical design which incorporates Simultaneous Dual Emission detection technology for all measurement principles. The optical system of the PHERAstar *Plus* directs the energy of the excitation light to a small focal point in the center of the well, giving excellent sensitivity in all plate formats up to 1536. In order to reach the highest performance in all detection modes, the reader contains a high energy xenon flashlamp for excitation and two matched pairs of photomultiplier tubes (PMTs) for light detection. The first pair of PMTs is used for simultaneous luminescence and fluorescence detection, the second pair of PMTs is used for simultaneous time-resolved fluorescence detection.



Schematic layout of the Simultaneous Dual Emission (SDE) optical pathway incorporated in the PHERAstar Plus

Focal Height Adjustment

The PHERAstar *Plus* incorporates an automated focal height adjustment at a resolution of 0.1 mm. This feature eliminates the influence of microplate formats, sample volumes, surface tension and evaporation. Once determined, this optimized focal height setting is stored in the test protocol for future screenings.
The automated height adjustment of the focal point ensures the best signal-to-noise ratio for every plate, every application and every volume.

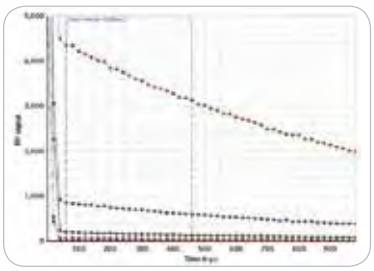
Optic Modules

The assay specific Optic Modules are the key of the new optical design. They contain all the necessary optical components including excitation and emission filters, dichroic mirrors, beam splitters and polarization filters. Up to five Optic Modules can be accommodated in the PHERAstar *Plus* and the user can easily replace them within seconds. All Optic Modules are bar-coded, and the PHERAstar *Plus* automatically selects the proper module for your assay.

Assay specific Optic Modules ... all inclusive, easy to use, fully automated

Decay Curve Monitoring

The PHERAstar *Plus* offers unique Decay Curve Monitoring in AlphaScreen® and TRF modes. This feature enables users to graphically visualize the time-resolved emission curve and to optimize test parameters of their assays.



Unique TRF decay curve monitoring feature

Simultaneous Dual Emission Detection

BMG LABTECH pioneered the technique of Simultaneous Dual Emission detection for microplate readers. Because numerous assays require detection of two wavelengths, Simultaneous Dual Emission offers a significant advantage by cutting read times in half. It corrects flash-to-flash variations, assay effects such as photobleaching, decaying kinetic signals, or fluctuating conditions like temperature, pH, and evaporation. Simultaneous Dual Emission detection can be used in any assay that measures two

wavelengths or polarization vectors, including FP, FRET, and HTRF®.

Sensitivity and Speed

The PHERAstar *Plus* combines fast read times necessary for High-Throughput Screening with the sensitivity to read small volumes. By choosing the number of flashes, the user can always find the best combination between sensitivity and speed. The PHERAstar *Plus* read times are among the fastest in the microplate reader industry.
In flying mode, the PHERAstar *Plus* can read a 1536-well plate in 37 seconds.
The unsurpassed sensitivity of the PHERAstar *Plus* detection system provides outstanding S/N and Z´ values, even at low concentrations and small assay volumes.

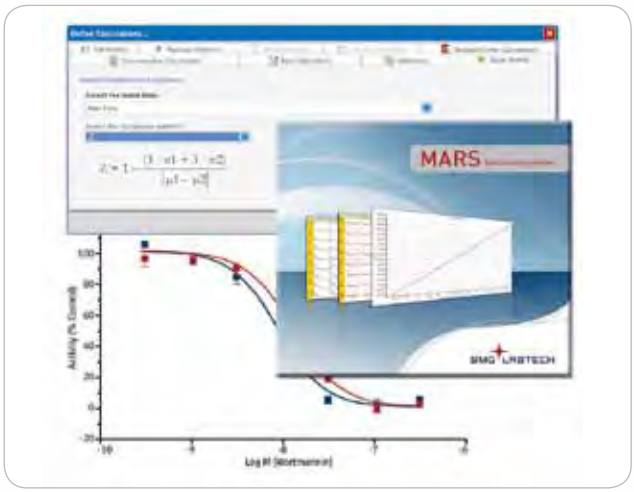
Stacker and Robot Compatibility

BMG LABTECH's standardized reader footprint and robotic software interface make it easy to integrate the PHERAstar *Plus* into all leading robotic systems.
For medium level throughput, BMG LABTECH offers the 50 plate Stacker that can be used with the PHERAstar *Plus*. The Stacker is an ideal solution for mid-throughput labs that wish to have the small footprint of an automated plate feeder along with the simplicity and reliability the Stacker offers.

Automated plate handling with Stacker

Control and MARS Data Analysis Software

The PHERAstar *Plus* software package provides an extensive range of possibilities for both test protocol definitions and data analysis. It is fully compliant with FDA regulation 21CFR Part 11. The control software allows users to define instrument parameters and test protocols. For assay development, kinetic measurements can be interrupted at any time in order to change reaction conditions.



The MARS Data Analysis Software for automated data reduction

MARS allows the user to display and process the data using predefined templates. One example is 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.
The software is also capable of creating standard curves based on curve fitting algorithms to calculate values such as EC_{50}, IC_{50} and r^2:

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

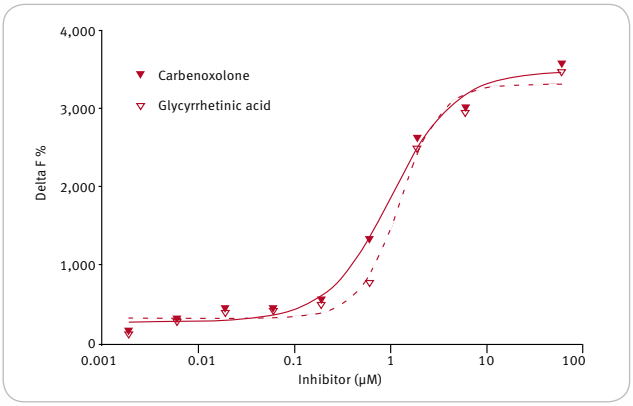
The MARS standard curve wizard creates a step-by-step calculation of a standard curve and important parameters such as S/N, Delta F % and Z' are easily obtained.

Applications Center

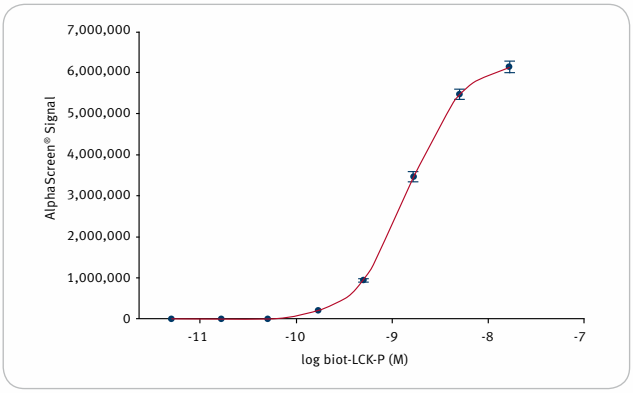
A perfectly engineered microplate reader is only part of the solution. The reader's ability to effectively perform all of the leading applications is the final piece of the puzzle. With the PHERAstar *Plus*, BMG LABTECH offers a unique combination of features to support all major existing applications as well as future needs. Applications include:

- Protein-protein interactions
- Genotyping
- Molecular binding assays
- Receptor-ligand binding
- DNA and protein quantification
- Enzyme activity and kinetic assays
- Cell-based assays
- Reporter gene assays

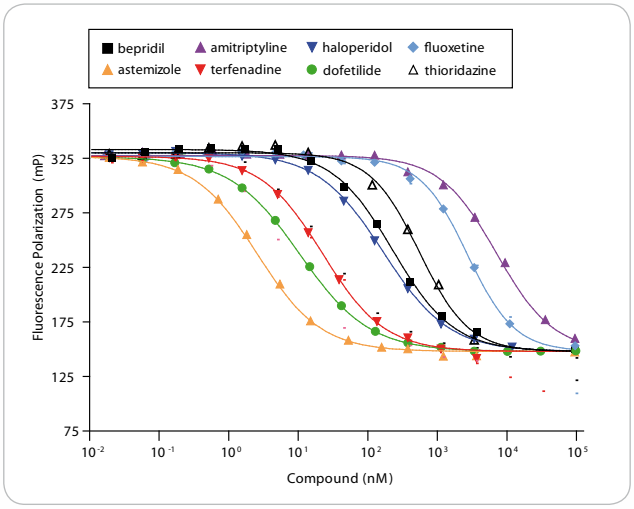
The PHERAstar *Plus* provides excellent performance in all HTS applications, as illustrated in the following graphs for HTRF®, AlphaScreen® and FP assays.



HTRF® assay showing inhibitor response curves of cortisol inhibitors



Biot-LCK-P titration curve measured in AlphaScreen® mode



Competitive binding assay of known hERG blockers using the Predictor™ hERG FP assay

BMG LABTECH continuously works with all the leading reagent companies to optimize instrument settings for their existing assays and their newest chemistries.

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

- Peer-reviewed papers
- Application Notes
- Scientific Posters

BMG LABTECH's searchable applications database provides the expertise expected from a dedicated microplate reader company. With well over 1,700 entries of peer-reviewed articles, application notes and scientific posters, there is information on how to perform countless applications on our microplate readers.

Support and Training

BMG LABTECH operates globally through an extensive network of subsidiaries and trained distributors. Customers can rely on PhD level support and assistance with regard to software, assay development, or general enquiries related to the PHERAstar *Plus* and all other BMG LABTECH microplate reading solutions.

PHERAstar *Plus* - 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 Fluorescence Polarization / Anisotropy High-End AlphaScreen® Luminescence - including BRET Time-Resolved Fluorescence - including TR-FRET UV/Vis Absorbance	
Measurement Modes	Top reading Endpoint and Kinetic measurements Sequential Multi Excitation measurements Sequential Multi Emission measurements Simultaneous Dual Emission measurements Real-time ratiometric measurements Well Scanning	
Microplate Formats	Up to 1536-well plates, user-definable	
Light Sources	High energy xenon flashlamp Solid state Laser for AlphaScreen®	
Detectors	Four photomultiplier tubes, optimized for different detection modes	
Optic Modules Capacity	Up to five application specific Optic Modules built in	
Z-Adjustment	Automatic focal height adjustment (0.1 mm resolution)	
Spectral Range	230 - 750 nm or 230 - 900 nm for ABS, FI, FP, TRF, TR-FRET 230 - 750 nm for LUM	
Sensitivity	FI:	0.5 pM Fluorescein (10 amol / well) (384) 2.0 pM Fluorescein (16 amol / well) (1536)
	FP:	1.0 mP SD at 1 nM Fluorescein (384) 3.0 mP SD at 1 nM Fluorescein (1536)
	TRF:	25 fM Europium (0.5 amol / well) (384) 100 fM Europium (0.8 amol / well) (1536)
	HTRF®:	Reader Control Kit (Eu) after 18h (384) Delta F > 1100 % (High Calibrator) Delta F > 25 % (Low Calibrator) LUM:10 amol / well ATP (384)
	AlphaScreen®:	< 100 amol* (384)
	ABS:	Dynamic range: ±0.000 - 4.000 OD ± 0.005 OD for OD range 0.0 to 2.0 (384) ± 0.010 OD for OD range 2.0 to 3.0 (384)
Read Times	1 flash:	19 s (384), 37 s (1536)
	10 flashes:	41 s (384), 1 min 53 s (1536)
	50 flashes:	1 min 35 s (384), 5 min 29 s (1536)
Shaking	Linear, orbital, and double-orbital with user-definable time and speed	
Incubation	+5°C above ambient up to 45°C	
Software	License-free software package including Reader Control and MARS Data Analysis Software	
Dimensions	Width: 44 cm, depth: 48 cm, height: 42 cm; weight: 36 kg	
	Accessories	
Stacker	Magazines for up to 50 plates - continuous loading feature	
THERMOstar	Microplate incubator and shaker	
Optic Modules	Available for all applications	
Upgrades	Upgrades to include options such as additional detection modes, etc. are available. Please contact your local representative for more information.	

HTRF is a registered trademark of Cisbio international.
AlphaScreen is a registered trademark of PerkinElmer, Inc.
Predictor is a trademark of Invitrogen Corp.

* 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)

Sensitivity is calculated according to the IUPAC standard: 3 x (SD_{blank}) / slope.
Specifications are subject to change without notice.

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