



**TriStar<sup>2</sup> LB 942**  
Multimode Microplate Reader\*

*detect and identify*



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### Multimode Microplate Reader\*

#### The More-Value-For-Money Multimode Microplate Reader

With TriStar<sup>2</sup> the multi-technology microplate reader platform has developed into its second generation setting new standards in modularity, performance and user-friendliness.

Offering the reading technologies

- Absorbance
- Fluorescence
- FRET
- Luminescence
- BRET

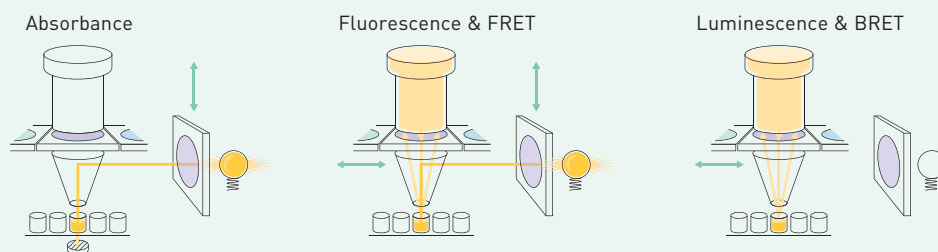
TriStar<sup>2</sup> is a perfect fit for life sciences research covering all important assays currently conducted in academic research.

# ONE-4-ALL optics

The optical system ONE-4-ALL with a new revolutionary design is the first time a single optical system has been employed in a multi-technology reader that matches the performance of individual dedicated optical devices.

The registered design combines crosstalk reduction and most efficient light-collecting efficiency, mandatory for luminescence measurements, with lowest light scattering and best separation of excitation and emission light needed for top fluorescence performance.

It is a real ONE-4-ALL system with the highest intrinsic security as the correct device is always inserted and selected and the highest lifetime as there are no moving parts.



## Sensitivity

### Low level detection

True photon counting technology coupled with selected low noise photomultipliers is the only accepted way to achieve a low and stable background. Together with an optimised optical design this is the major parameter for high sensitivity in a measurement device enabling detection of extremely low amounts of analyte.

- less than 6 amol ATP per well
- less 0.3 fmol Fluorescein per well

### Save money and time

The high sensitivity provides additional benefits when detecting the lowest signal levels is not the key to an assay. In those cases the consumption of expensive reagents or valuable cells can be greatly reduced.

Similarly, you can significantly reduce the reading time per sample and save valuable total operation time.

## Large Dynamic Range

Photon counting technology is characterised by a large dynamic range defined at the lower end by the low noise of the selected photomultiplier. The upper end is defined by the ability of the counting electronics to record and differentiate single pulses out of an avalanche of pulses. The TriStar<sup>2</sup> works with a dynamic range spanning 7 orders of magnitude without the need for any adjustments (like gain and high voltage) guaranteeing maximum convenience and security.

## Reliability & Precision

### Get the same from the same

Precise mechanics and the intrinsic stability of photon counting technology guarantee unrivalled repeatability of measurements. The instrument's performance is stable over years. Time-consuming daily calibration is thus unnecessary and you can concentrate on other and more important duties.

## Accuracy

### The real value counts

Like all Berthold Technologies instruments the TriStar<sup>2</sup> comes to your laboratory checked against a certified light source. With this reassurance you are able to work with accurate, traceable and comparable results.

## Robustness

### A companion for years

Berthold Technologies instruments are known for their quality and longevity providing a working life of decades. This is a feature gaining in importance with today's limited budgets and environmental awareness.

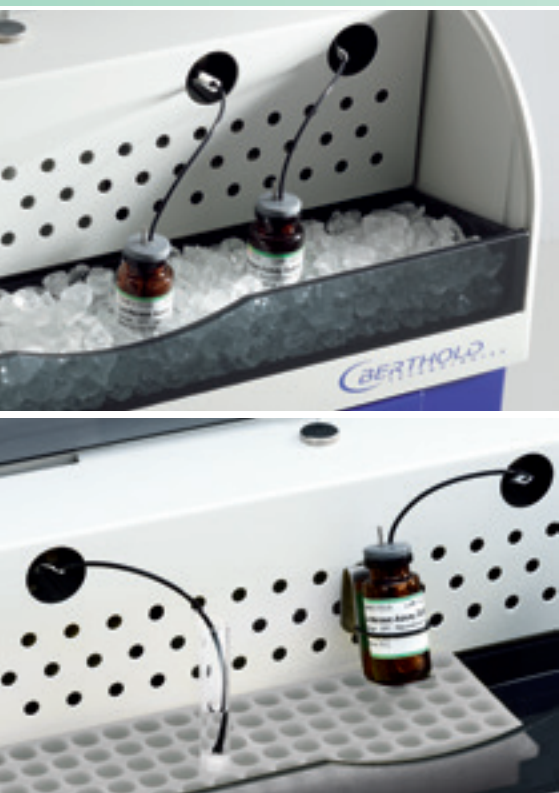
## Filters – the better choice

The TriStar<sup>2</sup> is using high-quality interference filters to extract the greatest benefits from the optical ONE-4-ALL design as only filters with high transmission characteristics (bigger than 80 %) ensure best sensitivity.

Especially BRET/BRET<sup>2</sup> and other colour luminescence applications are only possible with an extremely efficient optical system together with appropriate filters.

Up to 30 different excitation and emission filters can be easily mounted on exchangeable filter carriers. These carriers are software-driven enabling quick filter changes within one run, especially important for applications with ratio-metric read-out, e.g. Indo-1, Fura 2 or BRET.





## Versatility and User-Friendliness

### Choice of reagent injectors

The TriStar<sup>2</sup> can be equipped according to needs with up to 3 reagent injectors with variable volume. Up to 2 injectors can be used to inject in measurement position for both, 96 and 384 well plates.

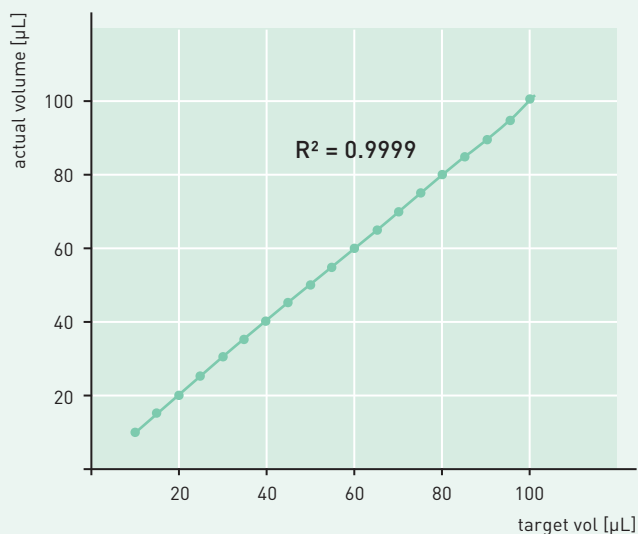
### Reagent trough and holder

Space for reagent vials is placed at the front of the instrument providing easy access and visibility. A removable trough can be filled with ice to keep the reagents at lower temperatures.

A special reagent holder keeps small tubes filled with valuable reagents safely in place and enables using up the volume to the last droplet.

## JET injectors

Berthold JET injectors are based on a proprietary technology using Teflon bellows for accurate and fast injections guaranteeing most efficient mixing and ensure extreme longevity.



- **Accuracy and precision** of better than 98 % over the entire volume range
- **Frictionless** operation for extended lifetime
- **Cell-friendly materials** and negligible shear forces enable injection of cell suspensions, e.g. in Aequorin-based Calcium assays
- **Sophisticated Prime mode** reduces reagent consumption while ensuring homogeneous filling



# ICE Software

## Wizard guidance

Instrument Control and Evaluation software has been designed with the requirements of today's researchers in mind: The ease of use during protocol creation, measurement and data export has been achieved with the wizard-guided and clearly structured ICE software.

## Intuitive Dialogues and Displays

Starting a measurement, displaying results and exporting data is straight forward due to clearly structured screens and intuitive dialogues. During the routine operation you simply select the required protocol, load the microplate and start the measurement.

## Measurement and Operation Modes

The software offers a manifold of settings and combinations of operation sequences. A protocol file can be well adjusted to the respective needs of an assay.

- Single endpoint
- Multiple endpoint
- Ratio endpoint
- Kinetics
- Repeated (long-term kinetics)
- Scanning
- Delay
- Shaking

## Report and Export

For documentation and sharing of results the data can be exported as XLS file format with multiple selection options as well as the choice of an individual directory per measurement protocol.

Detection Mode	Assay																					
	ATP Measurement	Ca <sup>++</sup> Monitoring	Caspase	Cell Proliferation	Cell Viability	Cyclic AMP	Cytokine Quantification	Cytotoxicity	DNA/RNA Quantification	Dual Reporter Gene	Enzyme Activities	GPCRs with β-arrestin	Immunoassay / ELISA	Kinase	Protease	Protein - Protein Interactions	Protein Quantification	Reactive Oxygen Species (ROS)	Receptor - Ligand Binding	Receptor Dimerisation	Reporter Gene	
Absorbance / Colorimetric			•	•	•	•	•	•	•		•		•	•	•		•	•				•
BRET / BRET <sup>2</sup>			•									•		•	•	•			•	•		
Luminescence	•		•	•	•	•	•	•	•	•	•		•	•	•		•	•				•
Luminescence Flash with Injection	•	•		•	•			•		•	•		•					•				•
Fluorescence		•	•		•	•	•		•		•		•	•	•		•	•	•			•
Fluorescence Flash with Injection		•									•							•				
FRET			•			•						•			•	•			•	•		

# Applications

## ELISAs and Immunoassays [1]

Horse radish peroxidases and phosphatases can be used with colorigenic, luminogenic or fluorogenic substrates. Using a luminescent substrate the sensitivity can be increased up to a 100-fold.

## Caspase Assays [2]

Monitoring the activity of caspases – a group of cysteine-aspartic acid peptidases – is a key method in apoptosis research. The assays are designed around specific peptide substrates for Caspase 3, 7, 8, and 9 respectively which will be cleaved when caspases are present.

## Reporter Gene Assay [3]

In basic research of gene regulation as well as in drug discovery the use of luciferases,  $\beta$ -glucuronidases,  $\beta$ -galactosidases and secreted alkaline phosphatases as well as GFP has become a standard tool.

## GPCR Monitoring [4]

Especially in the field of G-protein coupled receptor research the BRET technology offers the opportunity to establish a homogeneous and universal functional assay.

## Kinase Assays

The luciferase reaction can be used as well for monitoring kinases through a coupled reaction correlated by the amount of ATP.

## Calcium Assays

Intracellular  $\text{Ca}^{++}$  levels are important indicators for the functioning of ion channels and G-protein coupled receptors as well as for the phases of apoptosis and cell injury. Aequorin and Fura 2 have become established detection agents.

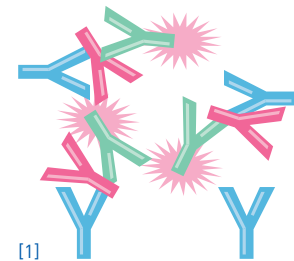
## DNA Quantification

The use of specific fluorescent labels provides lowest detection limits and widest dynamic range.

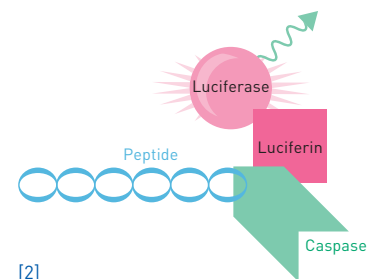
## Protein Quantification

Traditional Lowry and Bradford methods as well as fluorescent labels are well suited.

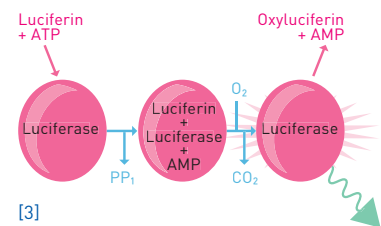
... and many other applications.



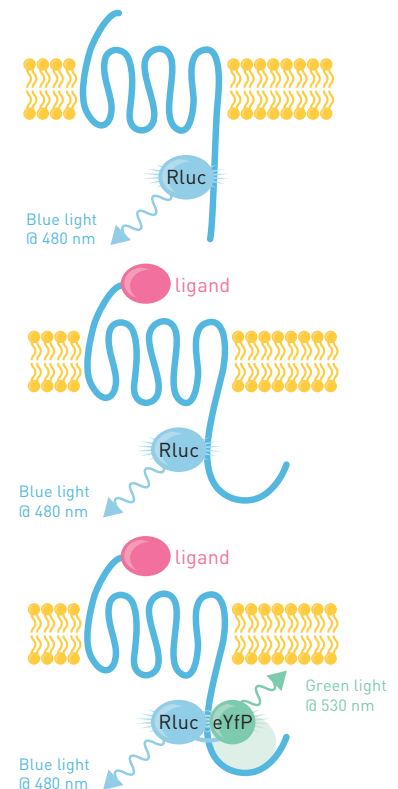
[1]



[2]



[3]



[4]

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## Technical Specification

Detection unit	Low-noise photomultiplier tube in single photon counting mode, spectral range 380 – 650 nm Photo diode, spectral range 200 – 1000 nm
Excitation Source	Halogen lamp, 75 W, spectral range 340 – 700 nm
Measurement Technologies	Luminescence BRET, BRET <sup>2</sup> Fluorescence (top) FRET Absorbance
Performance	Luminescence < 6 amol ATP Fluorescence < 0.3 fmol Fluorescein Absorbance Accuracy better 2 %, precision better 0.6 %
Dynamic Range	> 6 order of magnitude 0 – 3.5 OD
Crosstalk	Low crosstalk due to crosstalk reduction design: $5 \times 10^{-6}$
Injection Unit	Up to 3 injectors Volume: 10 – 100 $\mu$ L JET injection technology Accuracy better 2 % Precision better 2 %
Temperature Control	+5 °C above RT to 42 °C (option), includes cooled photomultiplier
Microplate Formats	6 to 384 well Plate heights 15 $\pm$ 1 mm and 20 $\pm$ 1 mm
Interface	USB
PC Operating System	Win XP, Win Vista, Win 7
PC Requirements	Pentium Processor, 500 MHz (or better), CD ROM drive, display 1024 x 768 (or better), USB
Regulations	CE, UL
Power Supply	110 – 240 V, 50/60 Hz, 220 VA External auto-ranging mains adaptor
Temperature Range	Storage: 0 – 40 °C Operation: 15 – 35 °C
Humidity	10 – 85 % non-condensing
Dimensions	391 x 470 x 344 mm (W x D x H)
Weight	21 kg

### ICE Software

- Wizard guided operation
- Single and multiple endpoint
- Kinetics and Repeated
- Scanning
- Ratio calculation
- Display of kinetic curves incl. zoomed view
- Data export to EXCEL

## Order Information

	Order Number
TriStar <sup>2</sup> Base Unit incl. ICE software	57947
TriStar <sup>2</sup> Absorbance module	57950
TriStar <sup>2</sup> Fluorescence module	57949
TriStar <sup>2</sup> Luminescence module	57948
Temperature Control	57613
Cooled photomultiplier	50835
Injector #1, pre-position	54116-11
Injector #2, reading position	54116-12
Injector #3, reading position	54116-13
Mount for reagent vials	58267
BRET/BRET <sup>2</sup> package	39350
BRET "High Efficiency" package	53431
BRET <sup>2</sup> "High Efficiency" package	53432
Chroma-Glo package	43544
Luminescence QC test plate	40105-10
Luminescence QC test reagents	43345
Luminescence QC test label	43346
Absorbance QC test plate	43513
Cleanit Daily, injector cleaning solution	45218
Microplates 96 well, white	23300
Microplates 96 well, black	23302
Microplates 96 well, white, cell culture	51838
Microplates 96 well, black, cell culture	51839
Microplate, 96, white, clear bottom, cell culture	24910
Microplates, 96, black, clear bottom, cell culture	38840
Microplates 384, white	32505

BERTHOLD TECHNOLOGIES reserves the right to implement technical improvements and/or design changes without prior notice. Patents: DE 20 2008 009 859.9 (pending), EU 8021417.4 (pending), US 12341573 (pending)  
Registered Design 20 2008 009 859.9

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