



# YOUR APPLICATIONS. YOUR WAY.

The Tristar family of modular multimode plate readers

## YOUR APPLICATIONS. YOUR WAY.

Application flexibility you can count on



Today's research is in constant change. Assay technologies, including ELISA, luminescence, fluorescence and interaction chemistries don't stop to progress. The same applies to the continuously developing applications. Perhaps you are looking to perform ultra-fast injections for reliable flash-kinetics today. Maybe your project requires studying protein:protein interactions tomorrow.

Your research is unique. That's why you deserve a multimode plate reader that provides you with the

technologies you need to master your research today and upgrade when you need it. The Tristar series provides you with application flexibility for today, tomorrow, and beyond to master your changing plate reading applications.

With over 70 years experience in developing sensitive and reliable analytical systems we continue to support you on your mission to optimise your work processes and to improve life in meaningful ways.

## THE TRISTAR 3

Simplicity and sensitivity for all levels of experience

The Tristar 3 is a user-friendly and affordable filter-based multimode plate reader that offers the high-performance analysis you expect from Berthold Technologies instruments. Equipped with ONE-4-ALL Optics for uncompromised performance of all detection modes, the system is ready to perform absorbance, luminescence and fluorescence measurements.



### Tristar 3 benefits at a glance

- High performance filter system for optimal sensitivity
- ONE-4-ALL Optics for uncompromised performance of all detection modes
- JET injector technology (optional) for highest accuracy, speed and cell-friendliness
- Broad wavelength range selection from UV through the visible range
- BRET/BRET2 and NanoBRET™ upgradeable

## THE TRISTAR 5

Flexibility and sensitivity whenever you need it

The Tristar 5 is a modular high-performance reader equipped with independent, user-selectable filters and monochromators on both, the excitation and emission side for any measurement. This guarantees both, flexibility and sensitivity whenever you need it. The system supports advanced detection modes such as HTRF®, TRF, TR-FRET & FP as well as specific assays like BRET/BRET2, NanoBRET™, LanthaScreen®, AlphaScreen® or Transcreener®.



### Tristar 5 benefits at a glance

- Independent, user-selectable filters and monochromators on both, the excitation and emission side for any measurement – when flexibility counts
- ONE-4-ALL Optics for uncompromised performance of all detection modes
- JET Injection technology (optional) for highest accuracy, speed and cell-friendliness
- Broad wavelength range selection from UV through the visible range
- FP, TRF, TR-FRET, HTRF®, BRET/BRET2, NanoBRET™, LanthaScreen® and AlphaScreen® upgradeable\*

\* Configuration dependent

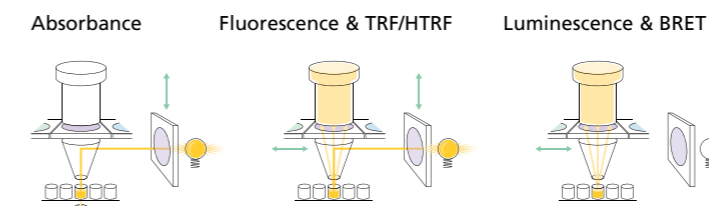
## INNOVATIVE MULTIMODE READING DESIGN & TECHNOLOGIES

Superior performance for both, routine and challenging applications

The Tristar series readers enable you to move from application to application with ease. Designed to perform, Tristar readers are equipped with various technologies to support your work and are ideal for labs with multiple applications.

### Designed to support your work

The ergonomic design of the system provides full front access for all key operations (e.g. plate loading, filter change and connecting reagents). Reagent vials can be placed in the integrated front compartment, providing easy access and visibility. It contains a removable trough that can be filled with water or ice to keep all reagents cooled. The system has a flat surface on its top, providing enough space to put down a laptop.



ONE-4-ALL Optics – no compromises in performance in any mode

### Best-in-class luminescence

Berthold's highly-sensitive dual mode PMT detectors in combination with the optimised ONE-4-ALL optical path design provide best-in-class luminescence detection of less than 6 amol ATP per well.

### ONE-4-ALL Optics for uncompromised performance

Berthold's patented ONE-4-ALL Optics have been optimised to combine the stability and user-friendliness of a multi-modal optical system with the sensitivity and versatility of dedicated optical devices.

ONE-4-ALL Optics work for both filter- and monochromator-based applications, so there's never a compromise in performance in any mode.



## High performance filter system – when sensitivity counts

The quick-change filter technology of the Tristar series provides you with the flexibility required to meet your application needs: up to 40 different excitation and emission filters can be easily mounted on exchangeable filter sliders.

The filters are characterized by high transmissions properties which can be up to 25-fold that of monochromators. Technologies like Time-Resolved Fluorescence (TRF) can be measured more efficiently with filters.

Furthermore, filters with a large bandwidth are available to analyse fluorophores with wide spectra and all luminescence-based assay that require filters, e.g. BRET, BRET2 or NanoBRET™ assays.

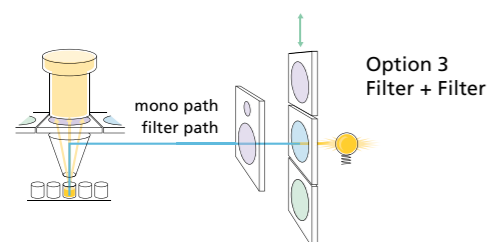
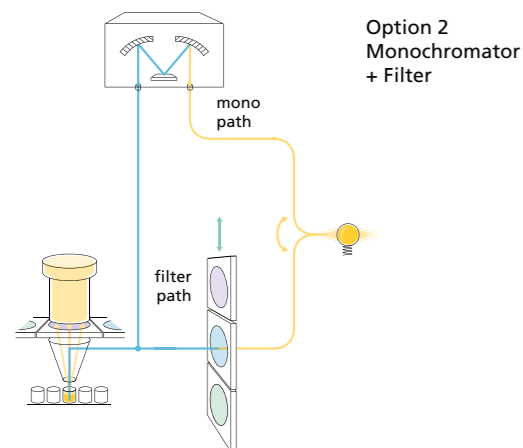
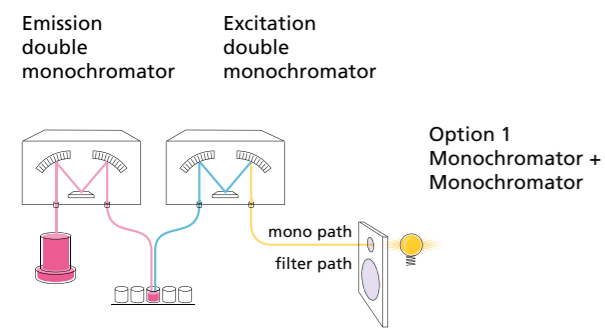
## FlexTec Optics – when flexibility AND sensitivity counts

The Tristar 5 system is equipped with FlexTec Optics, offering you the best of two worlds – benefit from the flexibility to easily select a discrete wavelength and perform spectral scans for both, excitation and emission using its built-in monochromator technology. Or optimise your assays' sensitivity by utilizing the system filter sliders for excitation and emission. Or mix both technologies if required: the Tristar 5 delivers both, flexibility and sensitivity in a single system.

The Tristar 5 employs up to two double monochromators providing blocking properties needed in sensitive fluorescence assays.

Both monochromators are equipped with software driven continuous bandwidth variation to optimise the instrument for the specific demands of different assay conditions.

Berthold's flexible monochromator technology offers you variable bandwidths from 4–12 nm in excitation and 8–22 nm for emission, selectable in 1 nm increments.



FlexTec Optics providing maximum flexibility and sensitivity in a single system

## ADDITIONAL OPTIONS

Engineered to help you expand the boundaries of your research

No matter what your application, the Tristar series offers you additional technical features to meet your advanced application needs, engineered to perform.

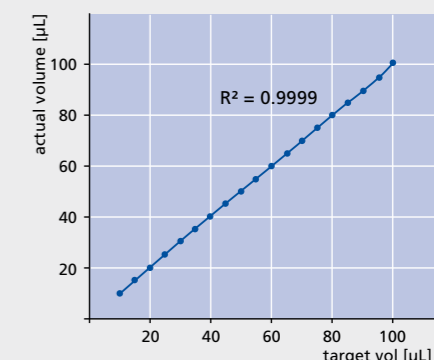
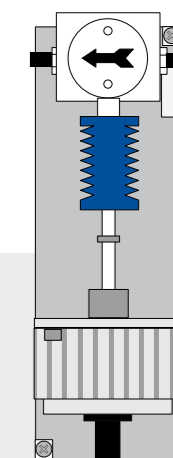
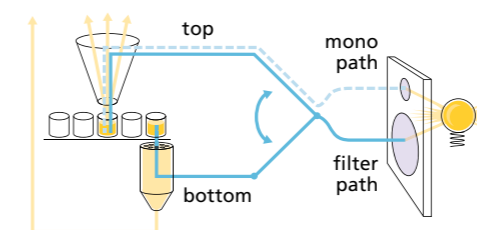
## Ultra-fast injectors delivering highest precision

Tristar series readers can be equipped with up to 3 injectors. Two injectors each can be installed in measurement position as well as in pre-position, to support different assay requirements and formats.

Berthold **JET Injectors** are made out of teflon and operate virtually friction-free, offering the following benefits

- Highest accuracy and reproducibility – 98 % accuracy over the entire volume range
- Low reagent consumption – Low dead volume. Recovers up to 60 % of the reagent in the injector line. A single priming sequence is sufficient to achieve a 99 % homogeneous mix at the tip.
- Low maintenance costs – friction-free operation enables more than 3 million injections without mechanical failure.
- Optimal performance in flash-kinetics – ultra-fast injection enables the measurement of the first 150 ms of a kinetic assay (e.g. Fura-2 or Acridinium ester-assays).
- Worry-free injection of cell suspensions – negligible shear forces ideal when working with living cells, e.g. in Aequorin-based Calcium assays.

Advanced bottom reading technology



JET injectors enable the injection of liquids with an accuracy and precision exceeding 98 % over the entire volume range

## Advanced bottom reading technology for enhanced cell-based assay performance

The Tristar 5 enables you to read both, from below as well as from the top with high-performance. The advanced bottom-reading technology of the system can be easily selected via the software to help you analyse e.g. adherent cells and obtain best sensitivity and a superior signal-to-background ratio for cell migration assays.

## SOFTWARE OPTIONS

Get productive right away

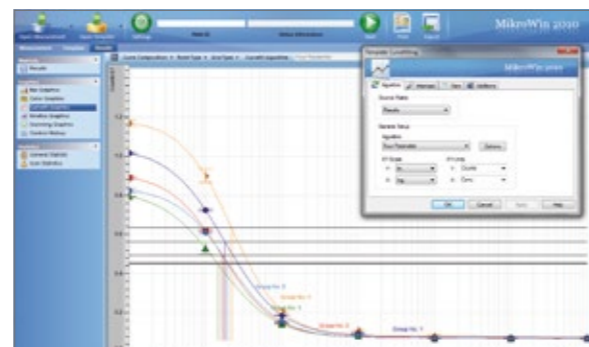
Choose between different software options according to your application needs.



### ICE Software

The ICE software is an intuitive, wizard-guided software that walks you through the entire process of setting up your system, collecting your data and reporting the results.

The software package is as flexible as your research thanks to the many setting options and freely configurable combinations of operating sequences.



### MikroWin Software

The MikroWin software is a complete software solution providing instrument control, data collection, analysis and reporting.

The software is available in different versions, reflecting different user needs. The complete Advanced version of the software provides 21 CFR Part 11 compliance and additional QC features like audit trail or configurable user hierarchies.

## APPLICATIONS

Whatever you need, there's a Tristar multimode reader just right for your research

The Tristar family provides the technology required to perform a broad range of applications. Simply choose the technologies that best support your research – or upgrade your system whenever it becomes necessary.

#### Applications

Biomarkers quantification  
Cell viability/proliferation/toxicity  
Drug discovery  
Environmental testing  
Epigenetics  
Food monitoring  
Gene expression  
Pathway analysis  
Protein:protein interaction  
Receptor panning

...and many more

#### Assay Formats

Binding  
Biochemical  
Colorimetric assays  
Cell-based  
ELISA/Immunoassay  
Flash luminescence  
Kinases  
Kinetics  
Quantification (DNA/RNA, protein)  
Reporter gene/GFP

## VALIDATION TOOLS, SERVICE & SUPPORT

For more productivity and better reproducibility

For many laboratories, validation, qualification and ensuring compliance with a number of GMP and GLP requirements is essential. We offer a range of tools and services to help you ensure that your system runs at peak performance.

### Validation Tools



We provide a variety of tools to help you check and confirm the performance of your products over time.

- Absorbance test plates
- Luminescence test plates
- QC luminescence performance kit

### Service



Berthold Expert Services provide a team of dedicated and factory-trained engineers and experts to optimise your productivity. We and our local partners are always at your disposal.

- Maintenance & repair services
- IQ / OQ / PQ services
- Calibration certification & more

### Support



Our team of technical support scientists is your partner to overcome the unique challenges your application brings. Contact our team to discuss

- Your assay or experiment design
- Data analysis questions
- Troubleshooting

## PRECONFIGURED MODELS

Meet your application needs today and customise your device whenever required

The Tristar family offers you a growing number of models and possible configurations to meet your current and future application requirements.

## Tristar 3 models

| Functions  | Tristar 3 Research 69173-10 | Tristar 3 Research Plus 69173-20 | Tristar 3 Research FL 69173-30 | Tristar 3 Research Plus FL 69173-40 |
|--|-----------------------------|----------------------------------|--------------------------------|-------------------------------------|
| Absorbance                                       | ●                           | ●                                | ●                              | ●                                   |
| Luminescence                                     | ●                           | ●                                | ●                              | ●                                   |
| Fluorescence Intensity (incl. FRET)              | ●                           | ●                                |                                |                                     |
| Fluorescence Intensity (incl. FRET) up to 850 nm |                             |                                  | ●                              | ●                                   |
| BRET/BRET2/NanoBRET™                             | ○                           | ○                                | ○                              | ○                                   |
| Temperature Control                              |                             | ●                                |                                | ●                                   |
| ICE Software                                     | ●                           | ●                                | ●                              | ●                                   |
| MikroWin Software                                | ○                           | ○                                | ○                              | ○                                   |

## Tristar 5 models

| Functions  | Tristar 5 Research 69185-10 | Tristar 5 Research Plus 69185-30 | Tristar 5 Research FL 69185-45 | Tristar 5 Research Plus FL 69185-50 | Tristar 5 Research Performance FL 69185-25 | Tristar 5 Advanced 69185-35 | Tristar 5 Advanced Plus 69185-55 | Tristar 5 Advanced Performance 69185-15 |
|--|-----------------------------|----------------------------------|--------------------------------|-------------------------------------|--|-----------------------------|----------------------------------|---|
| Absorbance                                       | ●                           | ●                                | ●                              | ●                                   | ●  | ●                           | ●                                | ●                                       |
| Luminescence                                     | ●                           | ●                                | ●                              | ●                                   | ●  | ●                           | ●                                | ●                                       |
| Fluorescence Intensity (incl. FRET)              | ●                           | ●                                |                                |                                     |  | ●                           | ●                                | ●                                       |
| Fluorescence Intensity (incl. FRET) up to 850 nm |                             |                                  | ●                              | ●                                   | ●  |                             |                                  |   |
| Fluorescence Polarization (FP)                   | ○                           | ○                                |                                |                                     |  | ○                           | ○                                | ○                                       |
| Time-Resolved Fluorescence (TRF/TR-FRET)         | ○                           | ○                                | ○                              | ○                                   | ○  | ○                           | ○                                | ○                                       |
| BRET/BRET2/NanoBRET™                             | ○                           | ○                                | ○                              | ○                                   | ○  | ○                           | ○                                | ○                                       |
| HTRF® / TR-FRET                                  |                             |                                  | ○                              | ○                                   | ○  |                             |                                  |   |
| AlphaScreen® / AlphaLISA®                        | ○                           | ○                                | ○                              | ○                                   | ○  | ○                           | ○                                | ○                                       |
| Wavelength selection – excitation                | monochromator or filter     | monochromator or filter          | monochromator or filter        | monochromator or filter             | monochromator or filter                    | monochromator or filter     | monochromator or filter          | monochromator or filter                 |
| Wavelength selection – emission                  | filter                      | filter                           | filter                         | filter                              | filter                                     | monochromator or filter     | monochromator or filter          | monochromator or filter                 |
| Temperature Control                              |                             | ●                                |                                | ●                                   | ●  |                             | ●                                | ●                                       |
| Bottom Reading                                   |                             |                                  |                                |                                     | ●  |                             |                                  | ●                                       |
| ICE Software                                     | ●                           | ●                                | ●                              | ●                                   | ●  | ●                           | ●                                | ●                                       |
| MikroWin Software                                | ○                           | ○                                | ○                              | ○                                   | ○  | ○                           | ○                                | ○                                       |

○ optional ● installed

| Standard Features  | Optional Features  |
|--|--|
| Xenon flash lamp (200 – 1000 nm)                             | 1 – 3 ultra-fast JET Injectors delivering highest precision              |
| ONE-4-ALL optics for uncompromised performance               | High-performance filters to meet your specific application needs         |
| High-performance filter system                               | MikroWin software providing 21 CFR Part 11 compliance and other features |
| Ergonomic design including integrated front compartment      |  |
| Top reading for plate formats up to 384-wells                |  |
| Shaker with three modes (linear, orbital and double orbital) |  |

| Standard Features  | Optional Features  |
|--|--|
| Xenon flash lamp (200 – 1000 nm)   | 1 – 3 ultra-fast JET Injectors delivering highest precision  |
| ONE-4-ALL Optics for uncompromised performance   | High-performance filters to meet your specific application needs   |
| High-performance filter system   | Upgrade paths for FP, TRF/TR-FRET, HTRF®, BRET/BRET2, NanoBRET™, LanthaScreen™ and AlphaScreen® / AlphaLISA® |
| Advanced monochromator technology for high transmission and best blocking properties (model depending) | MikroWin software providing 21 CFR Part 11 compliance and other features                                     |
| Ergonomic design including integrated front compartment  |  |
| Top reading for plate formats up to 384-wells  |  |
| Shaker with three modes (linear, orbital and double orbital)   |  |

## Ordering Information

| Optional Features                      |           |
|--|-----------|
| JET Injector #1, pre-position          | 54116-31  |
| JET Injector #2, reading-position      | 54116-32A |
| JET Injector #2, pre-position          | 54116-32B |
| JET Injector #3, reading-position      | 54116-33  |
| BRET/BRET2 Package                     | 39350     |
| BRET High Efficiency Package           | 53431     |
| BRET2 High Efficiency Package          | 53432     |
| nanoBRET™ Package                      | 63140     |
| Chroma-Glo Package                     | 43544     |
| Measurement technology TRF             | 62771     |
| Measurement technology FP, Fluorescein | 63546     |
| Measurement technology FP, TAMRA & Cy3 | 64245     |
| Measurement technology LanthaScreen™   | 68492     |
| Measurement technology AlphaScreen®    | 69651     |

### Accessories

|                         |       |
|-------------------------|-------|
| µDrop Microvolume Plate | 64154 |
| Gas connection, cpl.    | 55408 |

### Consumables

|   |       |
|---|-------|
| Reagent filter set (10 pieces)                          | 43193 |
| Cleanit Daily – Injector cleaning solution (2 x 250 ml) | 45218 |

### Software

|                               |           |
|-------------------------------|-----------|
| MikroWin 2010 Advanced        | 37854-303 |
| MikroWin 2010 Lite            | 37854-304 |
| MikroWin 2010 Advanced Office | 37854-313 |

### Validation Tools

|  |          |
|--|----------|
| LB 9515 luminescence test plate for QC                   | 40105-10 |
| LB 9516 test plate for absorbance check (VIS validation) | 50895-10 |
| Luminescence Performance Kit                             | 55101    |

# TECHNICAL SPECIFICATIONS

|                                 | Tristar 3   | Tristar 5   |                               | Tristar 3  | Tristar 5                                |
|---------------------------------|---|---|-------------------------------|--|--|
| <b>Detection Unit</b>           | Low-noise photomultiplier tube in dual mode, spectral range 280 – 650 nm (up to 850 nm with extended range PMT)<br>Photo diode, spectral range 200 – 1000 nm  |   | <b>Shaking</b>                | 3 modes, variable amplitude and speed  |  |
| <b>Excitation Source</b>        | Xenon flash lamp: spectral range 200 – 1000 nm  |   | <b>Temperature Control</b>    | +5 °C above room temperature up to 45 °C   | +5 °C above room temperature up to 45 °C |
| <b>Wavelength Selection</b>     | High quality interference filters   | 2 Double Monochromators (in excitation and emission*)<br>3D design<br>F number 2.7 (high transmission)<br>Variable bandwidth 4 – 22 nm<br>Increment 1 nm<br>Stray light rejection 10 <sup>-6</sup><br>High quality interference filters | <b>Microplate Formats</b>     | 6 to 384 well, solid and strip, Dimensions 128 × 86 mm (L × W) height 14.0 – 21.0 mm (adapters necessary)<br>Petri dishes 35 and 60 mm<br>µDrop™ Plate for low sample volumes down to 2 µL<br>Standard cuvettes (with cap)   |  |
| <b>Measurement Technologies</b> | Luminescence<br>BRET/BRET2, NanoBRET™<br>Fluorescence (top)<br>Absorbance UV & VIS  | Luminescence<br>BBRET/BRET2, NanoBRET™<br>Fluorescence (top & bottom)<br>FRET<br>Absorbance UV & VIS<br>Time-Resolved Fluorescence<br>TR-FRET / HTRF®<br>FP (Fluorescence Polarization)<br>AlphaScreen®                                 | <b>Interface</b>              | USB  |  |
| <b>Performance:</b>             |   |   | <b>PC Operating System</b>    | Windows 10 (32/64 bit)   |  |
| <b>Luminescence</b>             | <6 amol/well ATP (96 well)  | <6 amol/well ATP (96 well)  | <b>PC Requirements</b>        | Pentium like CPU (2 GHz or better / Intel Core iX recommended), 1 free USB port  |  |
| <b>Fluorescence</b>             | <7 amol/well FITC (384sv)   | <7 amol/well FITC (384sv)   | <b>Regulations</b>            | CE, NRTL   |  |
| <b>Absorbance</b>               | Accuracy better 2 %, Precision better 0.6 %   | Accuracy better 2 %, Precision better 0.6 %   | <b>Power Supply</b>           | 100 – 240 VAC ±10 %<br>50 / 60 Hz<br>Class I   |  |
| <b>TRF</b>                      | Not available   | <5 amol/well  | <b>Operating Voltage</b>      | 24 VDC ±5 %  |  |
| <b>Dynamic Range</b>            | 6 orders of magnitude (photon counter)<br>0 – 3.5 OD (photodiode)   |   | <b>Power Consumption</b>      | 140 VA   |  |
| <b>Crosstalk</b>                | Low crosstalk due to crosstalk reduction design: 10 <sup>-6</sup> (black plates)  |   | <b>Temperature Range</b>      | Storage: 0 – 40 °C<br>Operation: 15 – 35 °C  |  |
| <b>Injection Unit</b>           | Up to 3 injectors, JET injection technology<br>Variable volumes: 10 – 100 µL<br>Speed 200 – 440 µL/sec<br>Accuracy better 2 % (over entire range of volume)<br>Precision better 2 % (over entire range of volume)<br>Injections into microplates with up to 384 wells |   | <b>Humidity</b>               | 10 – 80 % non-condensing<br>Maximum relative humidity of 80 % for temperatures up to 31 °C<br>Decreasing linearly to 50 % relative humidity up to 40 °C  |  |
|                                 |   |   | <b>Altitude</b>               | Max. 2000 m (above sea level)  |  |
|                                 |   |   | <b>Dimensions (W × D × H)</b> | 391 × 470 × 344 mm   | 391 × 470 × 395 mm                       |
|                                 |   |   | <b>Weight</b>                 | Approx. 20 kg  | Approx. 32 kg                            |
|                                 |   |   | <b>ICE Software</b>           | Wizard support for parameter entries<br>Single and multiple endpoint<br>Kinetics and repeated<br>Spectral scanning<br>Ratio calculation or subtraction<br>Display of kinetic curves incl. zoomed view<br>Raw data assays (e.g. dual reporter genes)<br>Delay (up to 600 second)<br>Data export: EXCEL<br>Touchscreen-enabled |  |

\* monochromator configuration model dependent

## Berthold Technologies GmbH & Co. KG

Calmbacher Straße 22  
75323 Bad Wildbad  
GERMANY  
phone: +49 7081 177 0  
email: bio@berthold.com

[www.berthold.com/bio](http://www.berthold.com/bio)

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