YOUR APPLICATIONS. YOUR WAY.

The Tristar family of modular multimode plate readers

BERTHOLD

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

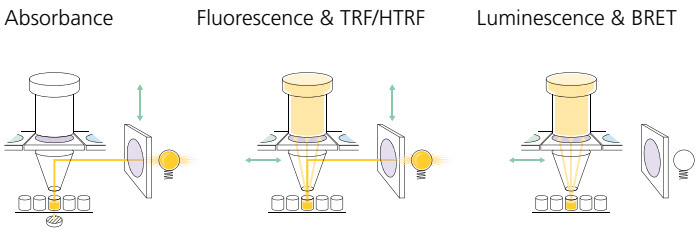
INNOVATIVE MULTIMODE READING DESIGN & TECHNOLOGIES

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

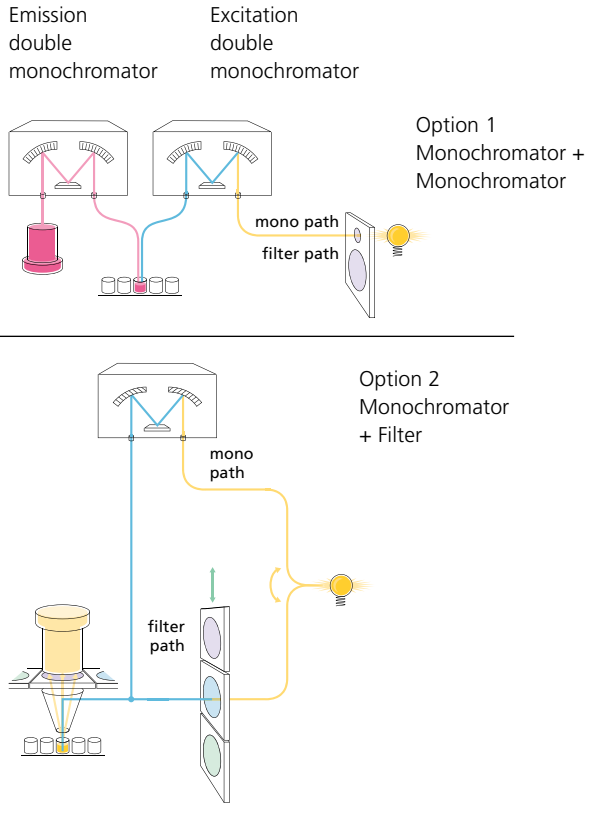
Best-in-class luminescence

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 multimodal 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.



FlexTec Optics providing maximum flexibility and sensitivity in a single system

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.

ADDITIONAL OPTIONS

Engineered to help you expand the boundaries of your research

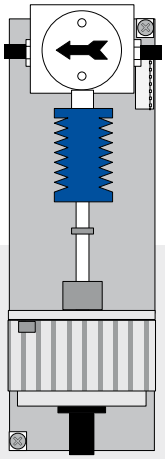
No matter what your application, the Tristar series offers you additional technical features to meet your advanced application needs, engineered to perform.

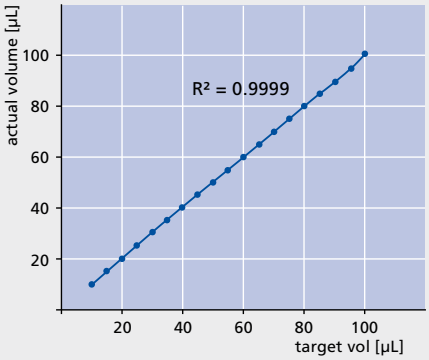
Ultra-fast injectors delivering highest precision

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.

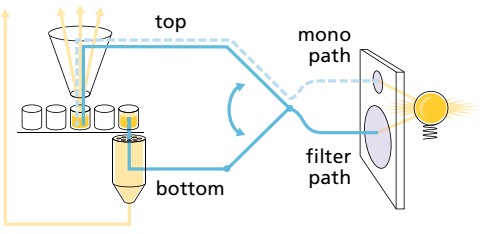
Berthold JET Injectors are made out of teflon and operate virtually friction-free, offering the following benefits

- Highest accuracy and reproducibility (< 2%)
- 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.





JET injectors enable the injection of liquids with an accuracy and precision better 2 %.



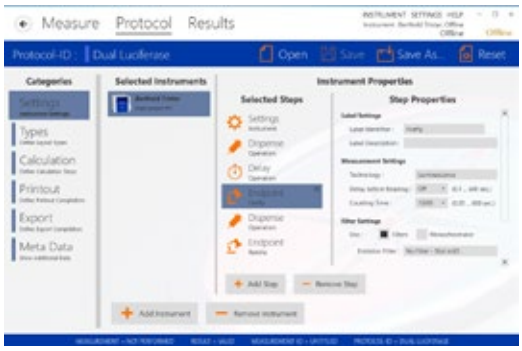
Advanced bottom reading technology

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 select-ed 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

Get productive right away



The LightCompass® Software

LightCompass® is a flexible software enabling easy data acquisition, analysis and reporting using Berthold Technologies' instruments. It has been optimized for different microplate and tube formats. LightCompass® features all the functions you can expect from an advanced scientific software, such as flexible creation of measurement protocols, curve fitting, qualitative analysis and compliance with FDA 21 CFR Part 11.

LightCompass® allows the flexible creation of measurement protocols, including dispensing of reagents, incubation and measurement with many different readout technologies. It supports all the measurement modes required by modern microplate readers, e. g. Endpoint, Kinetics and wavelength scans.

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		●		●
LightCompass® 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					●			●
LightCompass® 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	LightCompass® 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)	LightCompass® 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	70379-31
JET Injector #2, reading- or pre-position	70379-32
JET Injector #3, reading-position	70379-33
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 TR-FRET/HTRF	62772
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 × 250 ml)	45218

Software

LightCompass® Basic	37854-402
LightCompass® Professional	37854-403
LightCompass® Plus	37854-404

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
Detection Unit	Low-noise photomultiplier tube in dual mode, spectral range 280 – 650 nm (up to 850 nm with extended range PMT) Photo diode, spectral range 200 – 1000 nm	
Excitation Source	Xenon flash lamp: spectral range 200 – 1000 nm	
Wavelength Selection	High quality interference filters	2 Double Monochromators (in excitation and emission*) 3D design F number 2.7 (high transmission) Variable bandwidth 4 – 22 nm Increment 1 nm Stray light rejection 10^{-6} High quality interference filters
Measurement Technologies	Luminescence BRET/BRET2, NanoBRET™ Fluorescence (top) Absorbance UV & VIS	Luminescence BBRET/BRET2, NanoBRET™ Fluorescence (top & bottom) FRET Absorbance UV & VIS Time-Resolved Fluorescence TR-FRET / HTRF® FP (Fluorescence Polarization) AlphaScreen®
Performance:		
Luminescence	<6 amol/well ATP (96 well)	<6 amol/well ATP (96 well)
Fluorescence	<7 amol/well FITC (384sv)	<7 amol/well FITC (384sv)
Absorbance	Accuracy better 2 %, Precision better 0.6 %	Accuracy better 2 %, Precision better 0.6 %
TRF	Not available	<5 amol/well
Dynamic Range	6 orders of magnitude (photon counter) 0 – 3.5 OD (photodiode)	
Crosstalk	Low crosstalk due to crosstalk reduction design: 10^{-6} (black plates)	
Injection Unit	Up to 3 injectors, JET injection technology Variable volumes: 10 – 100 µL Speed 200 – 440 µL/sec Accuracy better 2 % Precision better 2 % Injections into microplates with up to 384 wells	

* monochromator configuration model dependent

	Tristar 3	Tristar 5
Shaking	3 modes, variable amplitude and speed	
Temperature Control	+5 °C above room temperature up to 45 °C	+5 °C above room temperature up to 45 °C
Microplate Formats	6 to 384 well, solid and strip, Dimensions 128 × 86 mm (L × W) height 14.0 – 21.0 mm (adapters necessary) Petri dishes 35 and 60 mm µDrop™ Plate for low sample volumes down to 2 µL Standard cuvettes (with cap)	
Interface	USB	
PC Operating System	Windows 10 (32/64 bit)	
PC Requirements	Pentium like CPU (2 GHz or better / Intel Core iX recommended), 1 free USB port	
Regulations	CE, NRTL	
Power Supply	100 – 240 VAC ±10 % 50 / 60 Hz Class I	
Operating Voltage	24 VDC ±5 %	
Power Consumption	140 VA	
Temperature Range	Storage: 0 – 40 °C Operation: 15 – 35 °C	
Humidity	10 – 80 % non-condensing Maximum relative humidity of 80 % for temperatures up to 31 °C Decreasing linearly to 50 % relative humidity up to 40 °C	
Altitude	Max. 2000 m (above sea level)	
Dimensions (W × D × H)	391 × 470 × 344 mm	391 × 470 × 395 mm
Weight	Approx. 20 kg	Approx. 32 kg
LightCompass® Software	Data acquisition: Endpoint, Kinetics, repeated and scanning Data analysis: quantitative (curve fitting), qualitative (cut-off) Result reporting: fully customizable Multi-user: different access levels	

TRANSFORMING SCIENCE INTO SOLUTIONS

Berthold Technologies is a global technology leader in life sciences. Our extensive range of analytical system solutions made in Germany has been trusted by scientists since 1949. These range from small standalone readers, such as microvolume spectrophotometer and luminometers to various dedicated and multimode readers, microplate washers, microplate workstations, RIA and ELISA automation products to high-end imaging systems, HPLC radio detectors and gamma-counters. It is our mission to create a healthier world, a safer environment and more efficient manufacturing processes.

Berthold Technologies GmbH & Co. KG

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Tristar · Id.-Nr. 6918SPR2 · Rev.05