

# Luminometer Overview **2010**

Your Partner for Luminescence Measurement







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Berthold Detection Systems is specialized in the development, manufacturing and distribution of high performance instruments for the measurement of bio- and chemiluminescence. We provide high-quality, sensitive and easy-to-use luminometers for worldwide biomedical, pharmaceutical, biotechnological and fundamental research communities.

Berthold Detection Systems established a new generation of luminometers covering two innovative product lines which accommodate single sample formats and microplate formats. We offer comprehensive system solutions including stand-alone instruments, instruments for routine applications as well as sophisticated and flexible instruments which meet specific research needs. Flexible and intuitive software, specifically designed and developed for our products, provides user friendly operation.

## EN ISO 13485 Certification

Berthold Detection Systems obtained the certification according to quality standard ISO 13485:2003 + AC:2007. In addition, the certification according to ISO 9001 was renewed. This achievement underlines the strong commitment to quality, by all company activities, in serving our customers in diagnostic and life science markets.

Committed to be your partner in luminescence measurement, we continue to expand our product line in order to meet the requirements of existing, as well as future applications based on luminescence technology.

www.berthold-ds.com



# FB12 Single Tube Luminometer

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The FB12 single tube luminometer combines outstanding sensitivity with ease of use, and sample versatility. Due to the unique design, the FB12 does not have minimum sample volume limitation. The sample is loaded into a retractable drawer with interchangeable sample adapters. The luminometer is equipped with a sensor, which will start the measurement cycle automatically upon complete closing of the drawer. The FB12 single tube luminometer is also available in a version with temperature control.



- Applications
- Reporter Gene Assays
  - ATP Assays
  - Bioluminescence Studies
  - Cell Culture Contamination (Mycoplasma)

Technical Data	Detector	Photon counting PMT, spectral range: 300–600 nm.
	Sensitivity	better than 1000 molecules of firefly luciferase.
	Dynamic Range	6 decades.
	Sample Format	12 mm diam. tubes, microfuge tubes, 35 mm culture dishes, liquid scintillation vials up to 20 ml.
	On-board Software	Raw Data. Continuous measurement mode.
	PC Software	Quick Measurement Single Assay, Dual Assay, Kinetics, Cut-off Assay.
	Data Port	RS-232 (serial interface), USB (optional).
	Power Requirements	12 Vdc, 600 mA, supplied through AC/DC adapter (included).
	Dimensions	H: 9" (22 cm) x W: 9" (22cm) x D: 8" (20 cm).
	Weight	5.5 LB (2.5 kg).
	External Printer	optional.



- Ordering Info
- |            |   |
|------------|---|
| 110 101 02 | FB12 Luminometer.   |
| 155 200 11 | FB12/Sirius PC software: Protocol Manager, Quick Measurement and all protocols. |

# Sirius Single Tube Luminometer

The Sirius is a high sensitivity single tube luminometer with built-in printer and on-board software. It is upgradeable with up to 2 injectors. The Sirius does not have a minimum sample volume requirement. The sample is loaded into a retractable drawer with interchangeable sample adapters. The luminometer is equipped with a sensor, which will initiate the measurement cycle automatically upon complete closing of the drawer. Another sensor will detect the sample to prevent injection in empty chamber. The Sirius single tube luminometer is also available in a version with temperature control.



Applications

- Single and Dual Reporter Gene Assays
- ROS Assays
- ATP Assays
- DNA Probe Assays
- $\text{Ca}^{++}$  Measurements
- Toxicity Assays

Technical Data

Detector	Photon counting PMT, spectral range: 300–600 nm.
Sensitivity	2 attomole ATP.
Dynamic Range	6 decades.
Sample Format	12 mm diam. tubes, microfuge tubes, 35 mm culture dishes, liquid scintillation vials up to 20 ml.
Injection Volume	20–300 $\mu\text{l}$ in increments of 10 $\mu\text{l}$ .
Injection Precision	100 $\mu\text{l}$ < 0.5%.
On-board Software	Raw Data Single Assay, Dual Assay, Cut-off Assay.
PC Software	Quick Measurement Single Assay, Dual Assay, Kinetics, Cut-off Assay.
Data Port	RS-232 (serial interface), USB (optional).
Printer	Thermal matrix printer 40 characters per line.
Power Requirements	12 Vdc, 2.5 A supplied through AC/DC adapter (included).
Dimensions	H: 9.8" (25 cm) x W: 11" (32cm) x D: 6.5" (20 cm).
Weight	8.6 LB (3.9 kg).



Ordering Info

- |            |   |
|------------|---|
| 110 400 10 | Sirius Single Tube Luminometer with built-in printer, injector-upgradeable.               |
| 110 400 11 | Sirius Single Tube Luminometer with one automatic reagent injector and built-in printer.  |
| 110 400 12 | Sirius Single Tube Luminometer with two automatic reagent injectors and built-in printer. |
| 155 200 11 | FB12/Sirius PC software: Protocol Manager, Quick Measurement and all protocols.           |

# Sirius L Single Tube Luminometer

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The Sirius L is a fully computer operated single tube luminometer of highest sensitivity. It is upgradeable with up to 2 injectors. Interchangeable sample adapters allow injection into different sample formats. The sample is loaded into a retractable drawer. The luminometer is equipped with a door close sensor to initiate automatic measurement start after complete closing of the drawer as well as a sample presence detector to prevent injection into an empty measurement chamber.



Applications

- Single and Dual Reporter Gene Assays
- ROS Assays
- ATP Assays
- DNA Probe Assays
- Ca<sup>++</sup> Measurements
- Toxicity Assays

Technical Data

Detector	Photon counting PMT, spectral range: 300–600 nm.
Sensitivity	1 amol ATP.
Dynamic Range	6 decades.
Sample Format	12 mm x 75 or 55 mm tubes, 1.5 and 2 ml microfuge tubes, 35 mm culture dishes, liquid scintillation vials up to 20 ml. Injection operation with tubes 12 mm x 75 or 55 mm and microfuge tubes 1.5 and 2 ml.
Injection Volume	20–500 µl in steps of 1 µl.
PC Software	Protocol Manager, Quick Measurement (basic package). Single Assay, Dual Assay, Kinetics, Cut-off Assay (optional).
Data Port	RS-232 (serial interface), USB
Power Requirements	Desktop power supply and power cord. 100–240 V AC, 24 V/2.5 A DC.
Dimensions	H: 9.5" (24.1 cm) x W: 13.7" (34.9 cm) x D: 5.9" (15 cm) (without injection tubings).
Weight	Approx. 7.9 LB (3.6 kg), 11.9 LB (5.4 kg) with 2 injectors).



Ordering Info

- |            |   |
|------------|---|
| 110 401 10 | Sirius L Single Tube Luminometer, PC software basic package.                    |
| 110 401 11 | Sirius L Single Tube Luminometer with one injector, PC software basic package.  |
| 110 401 12 | Sirius L Single Tube Luminometer with two injectors; PC software basic package. |
| 155 200 15 | Sirius L licence for FB12/Sirius PC software for Microsoft Windows.             |
| 181 000 26 | Sirius L sample holder for microfuge vials.                                     |



# Smart Line TL Tube Luminometer for Routine Use

The Smart Line TL is a stand-alone workstation designed to measure qualitative and quantitative immunoassays in luminescent format. It utilizes Assay Card technology that allows pre-programming of protocols on the smart card and then introduction of the ready to use protocol to the luminometer. The Smart Line TL can be equipped with up to two high precision, automatic injectors. A variety of algorithms for qualitative and quantitative data processing are supported.



Applications

- Qualitative Luminescent Immunoassays
- Competitive Luminescent Immunoassays (LIA) (bound + free fraction)
- Immuno-Luminometric Assays (ILMA)
- DNA/RNA Probe Assays

Technical Data

<b>Detector</b>	Photon counting PMT, spectral range: 300–600 nm.
<b>Sensitivity</b>	better than 10 attomole ATP
<b>Dynamic Range</b>	6 decades.
<b>Sample Format</b>	12 mm diam. tubes, microfuge tubes, 35 mm culture dishes, liquid scintillation vials up to 20 ml.
<b>Injection Volume</b>	20–300 $\mu$ l in increments of 10 $\mu$ l.
<b>Injection Precision</b>	100 $\mu$ l <0.5%.
<b>Data Reduction</b>	Qualitative evaluation: Cut-off; Quantitative evaluation: regression, smoothed cubic spline, Four-Parameter Logistics (4PL).
<b>Data Port</b>	RS-232 (serial interface).
<b>Printer</b>	Thermal matrix printer 40 characters per line.
<b>Power Requirements</b>	12 Vdc, 2.5 A supplied through AC/DC adapter (included).
<b>Dimensions</b>	H: 9.8" (25 cm) x W: 11" (32cm) x D: 6.5" (20 cm).
<b>Weight</b>	8.6 LB (3.9 kg).

Ordering Info

- |                   |   |
|-------------------|---|
| <b>110 400 30</b> | Smart Line TL without injectors.                      |
| <b>110 400 31</b> | Smart Line TL with one injector.                      |
| <b>110 400 32</b> | Smart Line TL with two injectors.                     |
| <b>110 491 10</b> | Smart Card Drive with PC software and 10 smart cards. |

# MPL1 and MPL2 Microplate Luminometer

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The MPL1 is a high quality microplate luminometer with basic functionality. It incorporates all important functions to perform glow-type luminescence measurements.

The MPL2 is a high sensitivity photon counting microplate luminometer. It incorporates all important functions necessary to perform glow type luminescence measurements. The advanced PC software allows creation of a variety of customized protocols.



Applications

- Immunoassays (LIA)
- Reporter Gene Assays
- DNA Probe Assays
- ATP Assays
- PCR Quantification
- Phagocyte Function Assays
- Cellular Luminescence
- Toxicity Assays

Technical Data

Sample Format	96-well microplate, in solid or strip, opaque (black or white).
Detector	Low noise PMT, spectral range 300–600 nm.
Sensitivity	1 fmole ATP (MPL1), 100 amole ATP (MPL2)
Crosstalk	less than $3 \times 10^{-5}$ .
Dynamic Range	6 decades.
Measurement Time	1 s per well (MPL1), 0.1 s–99.9 s per well (MPL2).
Scan Pattern	Random selectable single well.
Data Port	RS-232 (serial interface).
PC Software	MPL1: Quick Measurement, Slow Kinetics (repeated measurements). MPL2: Raw Data, Dual Assay, Single Kinetics, Batch Protocol.
Power Requirements	100–120 V; 220–240 V; 50–60 Hz.
Dimensions	H: 5.6" (13.9 cm) x W: 16"(40 cm) x D: 20" (49 cm).
Weight	32 LB (14.6 kg).

Ordering Info

112 000 10	MPL1 96-well microplate luminometer with PC software and accessories. 230 V 50 Hz.
112 000 11	MPL1 96-well microplate luminometer with PC software and accessories. 115 V 60 Hz.
112 200 10	MPL2 96-well microplate luminometer with PC software and accessories. 230 V 50 Hz.
112 200 11	MPL2 96-well microplate luminometer with PC software and accessories. 115 V 60 Hz.

# Orion L Microplate Luminometer

The Orion L Microplate Luminometer is a compact, very affordable and user-friendly instrument, which uses high quality materials and advanced technologies. The built-in USB port is an added feature allowing lab users to keep up with ever changing PC demands. This advanced luminometer will plug and play with any Windows PC. Being very easy to maintain, it will be an asset to every laboratory. With the optional validation tools, verification of full functionality is performed automatically. Generic data format for result output ensure integrity of your original measurement data.



Applications

- Reporter Gene Assays (Single and Dual Reading e.g. Dual Luciferase® Reporter Assay)
- ATP Assays
- Kinase Assays
- Cell Proliferation, Cytotoxicity and Biomass Assays, Apoptosis Assays
- Nucleid Acid Probe Assays
- Ca<sup>2+</sup> Assays
- Luminescent Immunoassays (LIA and ILMA)
- Enzyme Assays (ATP or NAD(P)H)
- Mycoplasma Contamination (MycAlert®)

Technical Data

Sample Format	96-well microplate, opaque in solid or strip format.
Detector	Photon counting low noise PMT, spectral range 300–600 nm.
Sensitivity	10 attomole ATP.
Crosstalk	Less than $3 \times 10^{-5}$ .
Dynamic Range	6 decades.
Measuring Time	0.1–100 s per well.
Scan Pattern	Random selectable single well.
Injectors	Maximum 2 injectors, one injector in pre-position, one in measurement position.
Injection Volume	10–150 $\mu$ l per pump in 1 $\mu$ l increments.
Data Port	RS-232 (serial interface) and USB.
PC Software	Raw Data, Dual Assay, Single Kinetics.
Power Requirements	100-240 V; 50-60 Hz.
Dimensions	H: 11.4" (29.0 cm) x W: 15.2" (38.5 cm) x D: 16.1" (41.0 cm).
Weight	48.5 LB (22 kg).



Ordering Info

- 112 900 50** Orion L 96-well luminometer, PC software and accessories.
- 112 900 51** Orion L 96-well luminometer with one automatic reagent injector, PC software and accessories.
- 112 900 52** Orion L 96-well luminometer with two automatic reagent injectors, PC software and accessories.

# Orion II High Sensitivity Microplate Luminometer

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The Orion II is the top instrument for luminescence detection. It combines the highest performance with configuration flexibility and easy maintenance. The luminometer is designed to provide easy access to the injection system and detector assembly. Several interchangeable detector configurations are available. The Orion II can be easily upgraded with additional injectors. The PC software allows the user to create virtually any measurement protocol. The built-in shaking mode and optional temperature control can be used for additional optimization of measurement protocol. The luminometer's plate carrier is designed for compatibility with microplate handling devices. The PC software can easily be interfaced with robotic systems.



- Applications**
- Reporter Gene Assays including Dual-Reporter Assays
  - ATP Assays
  - Kinase activity Assays
  - Cell Proliferation, Cytotoxicity and Biomass Assays, Apoptosis Assays
  - Nucleic Acid Probe Assays
  - Ca<sup>2+</sup> Measurements and Aequorin-based Assays
  - Luminescent Immunoassays (LIA)
  - Cellular Luminescence
  - Environmental Toxicity and Mutagenicity Assays

<b>Technical Data</b>	<b>Sample Format</b>	96-well microplate, or 384-well microplate in solid or strip, opaque (black or white).
	<b>Detector</b>	Photon counting low noise PMT, spectral range 300–600 nm.
	<b>Sensitivity</b>	10 attomole ATP.
	<b>Crosstalk</b>	Less than $3 \times 10^{-5}$ .
	<b>Dynamic Range</b>	6 decades.
	<b>Measurement Time</b>	0.1–100 s per well.
	<b>Scan Pattern</b>	Random selectable single well.
	<b>Shaker</b>	Linear, orbital or cross shaking.
	<b>Sample Incubation</b>	From RT +5°C to 42°C or 50°C.
	<b>Injectors</b>	Maximum 4 injectors, two injectors in preposition, two in measurement position.
	<b>Injection Volume</b>	10–150 µl in 1 µl increments.
	<b>Data Port</b>	RS-232 (serial interface), USB.
	<b>PC Software</b>	Raw Data, Dual Assay, Single Kinetics, Batch Protocol.
	<b>Power Requirements</b>	100–240 V; 50–60 Hz.
	<b>Dimensions</b>	H: 10.2" (25.5 cm) x W: 15.4" (38.5 cm) x D: 16.4" (41.0 cm).
	<b>Weight</b>	48.5 LB (22 kg).



- Ordering Info**
- 113 000 10** Orion II 96-well luminometer, PC software and accessories.
  - 113 000 14** Orion II 96-well luminometer, 42°C incubation, PC software and accessories.
  - 113 000 15** Orion II 96-well luminometer, 50°C incubation, PC software and accessories.
  - 113 000 20** Orion II 384-well luminometer, PC software and accessories.
  - 221 000 51** Injector for Orion II microplate luminometer.



# Luminometer Validation Tools

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Berthold Detection Systems provides complete validation solutions for today's cGMP/GLP regulated laboratories. This includes reference light sources, evaluation software, and complete manuals for the performance and documentation of IQ/OQ/PQ validation.



The Luminescence TestPlate utilizes 14 highly stable light sources, which simulate luminescence samples with various levels of light emission. All light sources emit in the 540–590 nm range (green light). The intensities of the light sources are spread over 6 orders of magnitude. The TestPlate has the outer dimensions of a standard 96 well microplate. A built-in rechargeable battery with smart charge management ensures reliable function of the device. The surfaces of the TestPlate are chemical resistant and easy-to-clean. The closed exterior surface eliminates the risk of contamination. A yearly manufacturer recertification service is available and recommended.



The IQ/OQ/PQ documentation packages consider all the luminometer-specific technical functions which should be validated to ensure reliable operation. They include procedures, guidelines for periodic maintenance, as well as several types of checklists, schedules and logbooks.

Ordering Info	140 001 30	TestTube for validation of tubes luminometers.
	140 001 10	TestPlate for validation of microplate luminometers.
	135 001 00	IQ/OQ/PQ Qualification Package for tube luminometers.
	135 001 10	IQ/OQ/PQ Qualification Package for microplate luminometers.

# Software Packages

## FB12/Sirius PC Software

Compatible with FB12 and Sirius tube luminometers. Requires Windows PC. Quick Measurement, Single Assay, Dual Assay, Single Kinetics, Multiple Kinetics and Cut-off Assay protocols.

## FB12/Sirius PC Software for Sirius L

Compatible with Sirius L. Requires Windows PC. Quick Measurement, Single Assay, Dual Assay, Single Kinetics, Multiple Kinetics and Cut-off Assay protocols.

## Simplicity Software for MPL1, MPL2, Orion microplate luminometers

Raw Data and Slow Kinetics protocols (MPL1), Raw Data, Fast Kinetics, Dual Measurement and Batch protocol (MPL2 and Orion).

## KIM Software for MPL1, MPL2 and Orion microplate luminometers

Data reduction for immunoassays. Six curve fitting options.

## MikroWin 2000 Software for MPL1, MPL2 and Orion microplate luminometers

Quantitative and qualitative evaluation for all routine luminescent assays.



# Applications and Sources for Reagents





Applications and Sources





Application*	Reagent Source*
Reporter Gene Assay	<a href="http://www.appliedbiosystems.com">www.appliedbiosystems.com</a> <a href="http://www.biothema.com">www.biothema.com</a> <a href="http://www.biosynth.com">www.biosynth.com</a> <a href="http://www.clontech.com">www.clontech.com</a> <a href="http://www.pjk-gmbh.de">www.pjk-gmbh.de</a> <a href="http://www.promega.com">www.promega.com</a> <a href="http://www.roche.com">www.roche.com</a>
ATP Assay	<a href="http://www.biothema.com">www.biothema.com</a> <a href="http://www.lonza.com">www.lonza.com</a> <a href="http://www.promega.com">www.promega.com</a>
Mycoplasma Assay	<a href="http://www.lonza.com">www.lonza.com</a>
Endotoxin Assay	<a href="http://www.spectraldx.com">www.spectraldx.com</a>
CLIA Substrates	<a href="http://www.pjk-gmbh.de">www.pjk-gmbh.de</a>
Diabetes Assays	<a href="http://www.invitron.co.uk">www.invitron.co.uk</a>
Food Safety	<a href="http://www.promicol.nl">www.promicol.nl</a> <a href="http://www.europrobe.com">www.europrobe.com</a>
ROS Reagents	<a href="http://www.knightscientific.com">www.knightscientific.com</a>

\*This is not a complete list of applications and reagent suppliers.

# Overview & Feature Comparison

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Products	Tube Luminometers				
	FB12	Sirius	Sirius L	Smart Line TL	
					
Features	12 mm Tube	Y	Y	Y	Y
	Various Formats	Y	Y	Y	
	Injectors (max.)		2	2	2
	Injection vial formats		2	4	2
	Injection volume [µl]		25–300	20–500	25–300
	Stand-alone Operation	Y	Y		Y
	PC-Operation	Y	Y	Y	
	Sensitivity	++++	++++	++++	++++
	DLReady	Y	Y		
	Validation Tool	Y	Y	Y	Y

Products	Microplate Luminometers				
	MPL1	MPL2	Orion L	Orion II	
					
Features	96-well Microplate	Y	Y	Y	Y
	384-well Microplate				Y
	Injectors (max.)			2	4
	PC-Operation	Y	Y	Y	Y
	Sensitivity	+	++	+++	+++
	DLReady			Y	Y
	Temperature Control				Y
	Shaking				Y
	Validation Tool	Y	Y	Y	Y

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