

## Modulus Single Tube Instrument Specifications

**Detection Modes:** Luminescence, Fluorescence, Absorbance  
**Read Type:** Glow, Kinetic, Repeat  
**Sample Format:** 10 x 10 mm cuvette, 100 - 200 µl minicell vial (optional), 1.5 ml microfuge tube (Luminescence)  
**User Interface:** Touch screen navigation and operation  
**Data Output:** Data displayed on screen or connect to PC (not included) via serial cable to download. Optional thermal printer available.  
**External PC Requirements (optional):** Windows 98 or Windows XP  
**Computer Interface:** 100% ASCII format through a 9-pin RS-232 serial cable at 9600 baud rate  
**Power:** 12 V 0.84 A Max  
**Auto Shutoff:** Touch screen hibernates after 15 min of inactivity  
**Dimensions:** 12.92" D x 10.44" W x 8.42" H (32.82 cm D x 26.52 cm W x 21.39 cm H)  
**Weight:** ~6.5 lbs (2.95 kg)  
**Operating Temperature:** 60 - 105 °F (15 - 40 °C)  
**Warranty:** One year  
**Approvals:** CE

## Luminescence Module Specifications (Factory Installed)

**Detector:** Photomultiplier tube (PMT)  
**Spectral Range:** 350 - 650 nm  
**Peak Wavelength:** 420 nm  
**Detection Limit:** 1 x 10<sup>-16</sup> moles ATP or 1 x 10<sup>-20</sup> moles Luciferase  
**Linear Dynamic Range:** 5 logs  
**Sample Format:** 1.5 ml microfuge tubes

## Fluorescence Module Specifications (User Installable)

**Light Source:** Wavelength-matched LED  
**Detector:** Photodiode  
**Wavelength Selection:** Snap-in Fluorescence Modules  
**Fluorescence Modules:**  
 P/N 9200-040 Blue (Ex 460 nm, Em 515 - 570 nm)  
 P/N 9200-041 UV (Ex 365 nm, Em 410 - 450 nm)  
 P/N 9200-042 Green (Ex 525 nm, Em 580 - 640 nm)  
 P/N 9200-043 Red (Ex 625 nm, Em 660 - 720 nm)  
 P/N 9200-044 UV-GFP (Ex 365 nm, Em 515 - 570 nm)  
**Detection Limit:** 6 ppt fluorescein, 4.5 pg/100 µl DNA with PicoGreen® Dye  
**Linear Dynamic Range:** 6 logs, assay dependent  
**Sample Format:** 10 x 10 mm cuvette, 100 - 200 µl minicell vial (optional)  
**Read Out:** Direct concentration or raw fluorescence  
**Calibration:** 1 - 5 point calibration  
**Discrete Sample Average:** Sample readings are averaged over 5 seconds to improve accuracy

## Absorbance Module Specifications (9200-050 User Installable)

**Light Source:** LED  
**Detector:** Photodiode  
**Spectral Range:** 400 - 800 nm  
**Wavelengths for Installed Filters:** 560, 600, 750 nm  
**Photometric Measuring Range:** 0 - 4.0 OD  
**Linear Dynamic Range:** 0 - 2.5 OD, assay dependent  
**OD Accuracy:** ±0.7%  
**OD Precision:** <±0.5% at 1.0 OD



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For the most up-to-date specifications, visit [www.turnerbiosystems.com](http://www.turnerbiosystems.com)

# Modulus™

Single Tube Multimode Reader



## Overview

The Modulus™ Single Tube Multimode Reader is designed to provide the utmost flexibility. In addition to high performance, the Modulus™ blends user-friendly operation and a small footprint with flexible purchasing options. The result of this design is an instrument with superior performance that is easy to use, affordable, and can be customized to your laboratory's needs.

## Performance

The Modulus™ combines the superior performance expected from single-mode instruments with the functionality of multiple modes. To achieve high performance, the Modulus™ is designed with optical channels dedicated to each individual technology. Unlike other multimode systems, readings taken with the Modulus™ are not degraded by indirect fiber-optic transmission or crowded optical channels. Dedicated optical channeling ensures that the Modulus™ provides sensitivity and dynamic range on par with single-mode instruments.

## Ease of Use

The Modulus™ is designed to be put into use straight from the box without the need to read a manual or obtain special training. To achieve this plug-and-play usability, the Modulus™ combines a color touch screen with an intuitive user interface. The interface makes running samples and viewing data fast and simple while also maintaining the flexibility needed for advanced or custom protocols.

## Affordable Modularity

The Modulus™ is a modular instrument that fits easily into most budgets. Purchase the technology or modes that you need now and add onto the system later as your needs expand. For example, the Modulus™ can be purchased as a Luminometer, then Fluorescence and/or Absorbance Modules can be purchased and added later. There's no service call or downtime. With the modular design, changing technologies is as easy as snapping in a module and restarting the instrument.

## Luminescence

The Modulus™ with a Luminescence Module is designed to deliver performance equivalent to dedicated single-tube luminometers while also offering the flexibility of a multimode reader. To achieve sensitivity on par with that of a dedicated luminometer, the luminescence channel is separated from other measurement technologies and positioned directly below the sample well. These conditions maximize light capture for the best possible sensitivity. In conjunction, a low-noise photomultiplier tube ensures that collected light is not compromised. The Modulus™ also has greater than 5 logs of dynamic range. This dynamic range is more than adequate to cover common luminescence applications, thus reducing the need to dilute samples.



## Fluorescence

The Modulus™ with a Fluorescence Module is designed to deliver both high performance and user flexibility. To achieve high performance, each Fluorescence Module utilizes powerful light-emitting diodes (LEDs) as excitation sources. LEDs have very specific light-output profiles which closely match the excitation profile of commonly used fluorescent molecules. LED usage increases sensitivity by fully exciting the fluorophore and reducing non-specific light leakage, a problem often found when using broad-spectrum light sources. Additionally, the highly-sensitive Modulus™ uses a 90-degree fluorescent design to minimize light scatter and lower background resulting in high sensitivity.



The Modulus™ as a fluorometer utilizes four easily exchangeable modules to measure the most popular fluorophores. In addition, custom modules can be made for non-standard applications.

Fluorescence Module	Typical Fluorophores
UV (Ex 365 nm, Em 410 - 450 nm)	Hoechst Dye, 4-methyl-umbelliferone (4-MU)
Blue (Ex 460 nm, Em 515 - 570 nm)	EGFP, rAcGFP, PicoGreen®, RiboGreen®, Fluorescein, Quant-iT™ Protein
Green (Ex 525 nm, Em 580 - 640 nm)	Rhodamine, Cy3, RFP
Red (Ex 625 nm, Em 660 - 720 nm)	Cy5, Quant-iT™ RNA

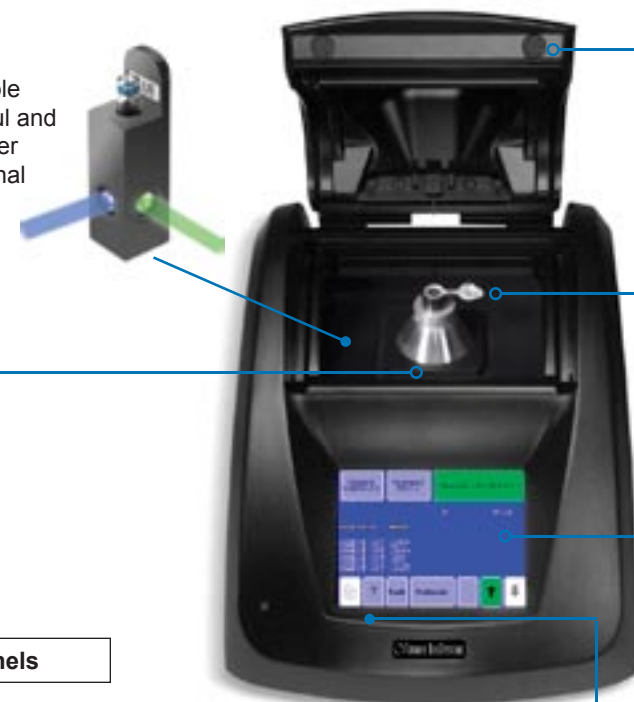
## Absorbance

The Modulus™ with the Absorbance Module provides measurements that are highly sensitive and cover a wide dynamic range. Because the optics are not shared with any other detection technology, the focused absorbance measurements yield outstanding performance. The absorbance channel has a large reading range of 0 - 4 OD with an accuracy that deviates less than 0.7%. The Modulus™ comes with three filter paddles with factory-installed filters for measuring 560, 600, and 750 nm. These filters accommodate the most common protein assays. Filter paddles can be easily exchanged in seconds. In addition, custom filter paddles can be readily made for non-standard applications.



## Minicell Adapter

For fluorescence measurements of sample volumes between 100 µl and 200 µl, a minicell adapter is available as an optional accessory.



## Lid Start

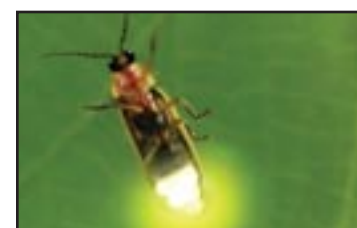
Adjust settings to start measurement immediately after the lid is closed.

## Sample Formats

For luminescence measurements, the Modulus™ accepts 1.5-ml microcentrifuge tubes. For fluorescence and absorbance measurements, the Modulus™ accepts standard 10 x 10 mm cuvettes.

## Separate Channels

### Luminescence Channel



### Luminescence Applications

- Luciferase Assays
- ATP Assays
- Chemiluminescent Immunoassays
- Kinetics Assays

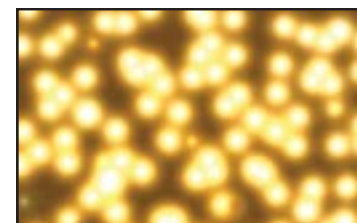
### Fluorescence Channel



### Fluorescence Applications

- DNA/RNA Quantitation
- Gene Expression Assays
- Enzyme Assays
- Protein Quantitation

### Absorbance Channel



### Absorbance Applications

- Protein Quantitation
- Cell Turbidity, OD 600

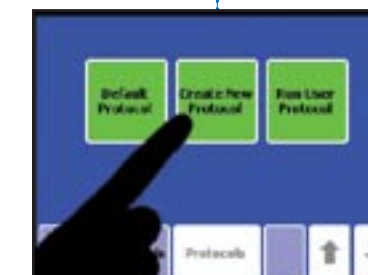
## Touchscreen

The touchscreen allows simple navigation between screens for setting parameters, setting calibrations, and starting runs.



## Troubleshooting

Easy access to HELP with the touch of a button.



## Data Handling

The Modulus™ stores up to 18 calibrations. Data from the last 20 measurements are displayed on the color LCD screen. Optional accessories for easy data exportation include Spreadsheet Interface Software or thermal printer.

