

TECHNICAL MANUAL

GloMax[®]-Multi Jr Operating Manual

Instructions for Use of Products
E6070 and E6080



GloMax[®]-Multi Jr Operating Manual

All technical literature is available at: www.promega.com/protocols/
 Visit the web site to verify that you are using the most current version of this Technical Manual.
 E-mail Promega Technical Services if you have questions on use of this system: techserv@promega.com

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1. Introduction

1.A. Description

The GloMax[®]-Multi Jr is a multimode single-tube laboratory instrument that can be used to measure luminescence, fluorescence or absorbance. The instrument is modular, and each detection mode can be purchased separately. The Luminescence Module is a factory-installed option (Cat.# E6080); the Fluorescence and Absorbance Modules can be either factory-installed or user-installed (Cat.# E6070 plus one or more of the Fluorescence Optical Kits listed below or Cat.# E6070 plus one of the Absorbance products listed below). Fluorescence measurements are taken using one of five different optical filter kits, depending on the detection wavelengths needed. Absorbance measurements are taken using one of three different filters inserted into the Absorbance Module.

1.B. Product Components

PRODUCT	QUANTITY	CAT.#
GloMax[®]-Multi Jr Base Instrument with Luminescence Module	1 each	E6080

For Research Use. Includes:

- 1 GloMax[®]-Multi Jr Base Instrument
- 1 GloMax[®]-Multi Jr Luminescence Module (factory-installed)
- 1 AC Adapter with Interchangeable Plugs
- 1 RS-232 Cable
- 1 Spreadsheet Interface Software (1 CD)
- 1 Setup Guide
- 1 CD containing Technical Manual

PRODUCT	QUANTITY	CAT.#
GloMax[®]-Multi Jr Base Instrument for Fluorescence and Absorbance Modules	1 each	E6070

For Research Use. Includes:

- 1 GloMax[®]-Multi Jr Base Instrument
- 4 10 × 10mm Plastic Methacrylate Cuvettes
- 1 AC Adapter with Interchangeable Plugs
- 1 RS-232 Cable
- 1 Spreadsheet Interface Software (1 CD)
- 1 Setup Guide
- 1 CD containing Technical Manual

Available Separately

PRODUCT	QUANTITY	CAT.#
GloMax[®]-Multi Jr PCR Tube Adapter	1 each	E6081
Fluorescence Optical Kit—BLUE (Ex: 460nm, Em: 515–570nm)	1 each	E6071
Fluorescence Optical Kit—UV (Ex: 365nm, Em: 410–450nm)	1 each	E6072
Fluorescence Optical Kit—Green (Ex: 525nm, Em: 580–640nm)	1 each	E6073
Fluorescence Optical Kit—Red (Ex: 625nm, Em: 660–725nm)	1 each	E6074

PRODUCT	QUANTITY	CAT.#
Fluorescence Optical Kit—GFPUV (Ex: 365nm, Em: 515–570nm)	1 each	E6075
Absorbance Module (user-installable; does not include Filter Paddle(s))	1 each	E6076
Absorbance Filter Paddle—560nm	1 each	E6077
Absorbance Filter Paddle—600nm	1 each	E6078
Absorbance Filter Paddle—750nm	1 each	E6079
Tripp Lite USB to Serial Adapter	1 each	TS2520

1.C. Specifications

Instrument Specifications

Detection Modes	Luminescence, Fluorescence and Absorbance
Read Type	Glow, Kinetic, Repeat
Sample Format	10 × 10mm cuvette (absorbance and fluorescence), 100–200µl minicell vial (optional; fluorescence), 1.5ml microcentrifuge tube (luminescence), 0.5ml PCR tube (optional; fluorescence)
User Interface	Built-in computer, touch screen navigation and operation
Data Output	Data displayed on screen or connected to computer (not included) via serial cable to download. Optional thermal printer available.
External Computer Requirements (optional)	Windows® XP operating system or later
Computer Interface	100% ASCII format through a 9-pin RS-232 serial cable at 9600 baud
Spreadsheet Software Interface	Compatible with 32- and 64-bit computers using Windows® 7 Professional Service Pack 1 with either Microsoft Office 2010 Home and Business Edition (32- and 64-bit versions) or Microsoft Office 2007 (32-bit version)
Power Requirements	AC Adapter: 100–240V AC, 50/60Hz, 0.3A Instrument: 12V DC, 0.7A Max
Auto Shutoff	Touch screen hibernates after 15 minutes of inactivity
Dimensions	32.82cm D × 26.52cm W × 21.39cm H (12.92" D × 10.44" W x 8.42" H)
Weight	2.9kg (6.5lb)
Compliance	EU Directives: 2004/108/EC Electromagnetic Compatibility 2006/95/EC Low Voltage Directive

Fluorescence Module Specifications

Light Source	Wavelength-matched LED
Detector	Photodiode
Wavelength Selection	Snap-in fluorescence optical kits



Fluorescence Module Specifications (continued)

Wavelengths	UV (Ex: 365nm, Em: 410–450nm) Blue (Ex: 460nm, Em: 515–570nm) Green (Ex: 525nm Em: 580–640nm) Red (Ex: 625nm: Em: 660–725nm) UV-GFP (Ex: 365nm, Em: 515–570nm)
Detection Limit	6ppt fluorescein
Linear Dynamic Range	6 logs, assay-dependent
Sample Adapter	10 × 10mm cuvette, 100–200µl minicell vial (optional), 0.5ml PCR tube (optional)
Readout	Direct concentration or raw fluorescence
Calibration	1- to 5-point calibration
Discrete Sample Average	Sample readings are averaged over 5 seconds to improve accuracy

Luminescence Module Specifications

Detector	Photomultiplier tube (PMT)
Spectral Range	350–650nm
Peak Wavelength	420nm
Detection Limit	1×10^{-16} moles ATP*
Linear Dynamic Range	5 logs
Sample Adapter	Holds 1.5ml microcentrifuge tubes

*Sensitivity determined using the ENLITEN® ATP Assay System (Cat.# FF2000).

Absorbance Module Specifications

Light Source	LED
Detector	Photodiode
Spectral Range	450–750nm
Wavelengths for Installed Filters	560, 600, 750nm*
Photometric Measuring Range	0–4.0 OD
Linear Dynamic Range	0–2.5 OD, assay-dependent
Sample Adapter	10 × 10mm cuvette
OD Accuracy	+/- 0.7%
OD Precision	+/- 0.5% at 1.0 OD
Sample Average	Sample readings are averaged over 6 seconds

*To inquire about availability of custom filters, contact Technical Services.

Please note that we cannot guarantee assay performance when using custom optical kits.

1.D. Inspection and Unpacking

Upon receiving the GloMax®-Multi Jr, please inspect it carefully and make certain all accessories are present. Refer to the checklist shipped with the instrument for order-specific items.

A GloMax®-Multi Jr shipment includes:

- GloMax®-Multi Jr Base Instrument (Cat.# E6070)
- AC Adapter with Interchangeable Plugs
- RS-232 Cable
- Spreadsheet Interface Software (SIS) CD-ROM
- Quick Start Guide
- 10 × 10mm Methacrylate Cuvettes (quantity of 4)
- Warranty Registration Card
- Fluorescence Optical Kit(s) (optional)
- Luminescence Module (Cat.# E6080 if installed)
- Absorbance Module (Cat.# E6076 if ordered)
- Absorbance Filter Paddle(s) (only if Cat.# E6076 is ordered)

Place the GloMax®-Multi Jr on a flat, level surface with good ventilation. Allow at least 16cm (6 inches) of clearance above the instrument to open and close the lid. Position the instrument so that the touch screen faces you. Do not position the unit in a location where the ON/OFF switch is not readily accessible or the AC Adapter cannot be unplugged easily.

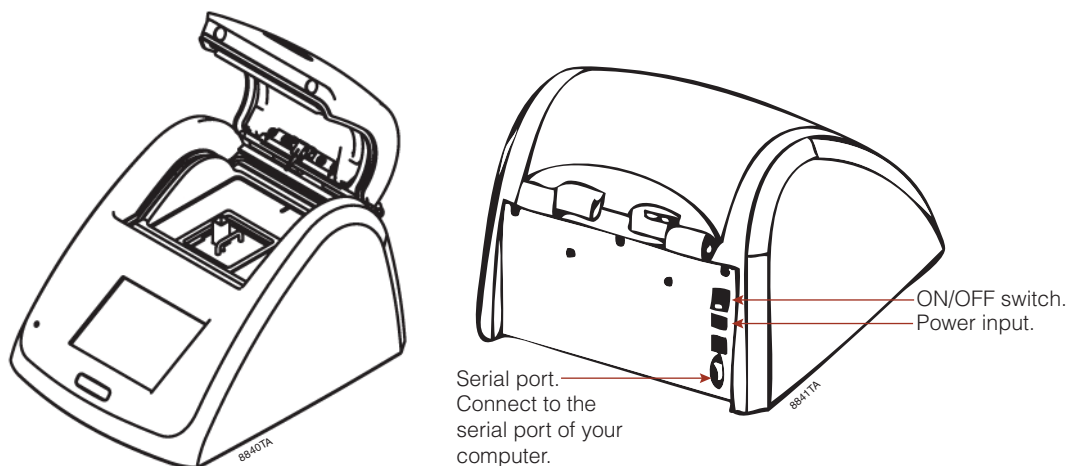


Figure 1. GloMax®-Multi Jr Instrument with touch screen facing operator (left) and touch screen facing away from operator (right).

1.D. Inspection and Unpacking (continued)

Instrument Power Up and Shut Down

1. Choose the appropriate AC plug for your wall outlet. If you need to remove a plug from the AC Adapter, depress the button immediately underneath the plug and slide the plug off the AC Adapter (Figure 2). Slide the desired AC plug onto the AC Adapter from the top until it clicks into place.



Be sure to use only the AC Adapter provided with your instrument by Promega. Powering the instrument with an unapproved AC Adapter may damage the unit.

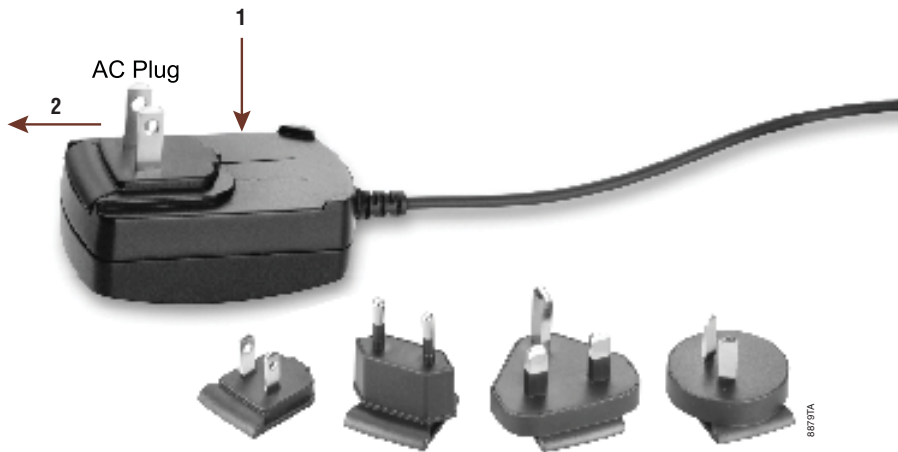


Figure 2. Placing the plug on the AC Adapter. Depress the button immediately underneath the plug (arrow 1), and slide the plug off the AC Adapter in the direction of arrow 2. Choose the appropriate plug and slide onto the AC Adapter from the top down until it clicks into place.

2. To power up the instrument, connect the AC Adapter to the Power Input of the instrument, and plug it into a wall outlet. Turn ON the ON/OFF switch located at the back of the GloMax[®]-Multi Jr.
3. To shut down the instrument, turn OFF the ON/OFF switch located at the back of the GloMax[®]-Multi Jr. Unplug the AC Adapter from the wall outlet, and disconnect the AC Adapter from the Power Input of the instrument.

Computer Operation (optional)

Software Installation

1. Install the Spreadsheet Interface Software (SIS) onto a computer to send data to an Excel[®] spreadsheet.

Note: Before exporting data from the luminometer to an Excel[®] spreadsheet, install the GloMax[®] SIS on a computer with an available serial port. The GloMax[®] SIS is compatible with 32- and 64-bit computers using Windows[®] 7 Professional Service Pack 1 with either Microsoft Office 2010 Home and Business Edition (32- and 64-bit versions) or Microsoft Office 2007 (32-bit version).

2. Insert the software CD-ROM into the CD-ROM drive of the computer to initiate the installation program.
3. After the installation is complete, an SIS icon will appear on the computer desktop and in the “Programs” menu.

Connecting to a Computer

1. Connect the 9-pin RS-232 serial cable between the GloMax[®]-Multi Jr and the computer.
2. Open the software on the computer.
3. Using the “Select COM Port” button, select the COM port connected to the RS-232 serial cable.

Notes:

1. The male 9-pin connector attaches to the GloMax[®]-Multi Jr, and the female connector attaches to the computer.
2. If the computer does not have a serial cable port, use a compatible USB to serial adapter (e.g., Cat.# TS2520). Be sure to install the appropriate drivers on the computer for the USB to serial adapter (drivers available at www.tripplite.com).

Connecting to a Thermal Printer (Cat.# E2821)

1. Connect the 9-pin RS-232 serial cable between the GloMax[®]-Multi Jr and the Thermal Printer.

Notes:

1. The male 9-pin connector attaches to the GloMax[®]-Multi Jr, and the female connector attaches to the printer.
2. If the computer does not have a serial cable port, use a compatible USB to serial adapter (e.g., Cat.# TS2520). Be sure to install the appropriate drivers on the computer for the USB to serial adapter (drivers available at www.tripplite.com).





Exporting Data to Excel[®]





1. When the GloMax[®]-Multi Jr is connected to a computer, open the SIS software on the computer.
2. An Excel[®] sheet will open automatically when the software is loaded.
3. Measurements from the GloMax[®]-Multi Jr are automatically transferred to the Excel[®] sheet.



Note: A computer connection is required for using the Luminescence Module in kinetics mode or the Fluorescence or Absorbance Modules in repeat measurement mode.

1.E. Precautions and Special Instructions

Safety Symbols and Markings		
	Danger. Hazardous voltage. Risk of electrical shock.	Danger. Tension dangereuse. Risque de choc électrique.
	Warning. Risk of personal injury to the operator or a safety hazard to the equipment or surrounding area.	Avertissement. Risque de préjudice corporel pour l'opérateur ou d'accident avec l'instrument ou l'entourage.
	It is important to understand and follow all laws regarding the safe and proper disposal of electrical instrumentation. Please contact your local Promega Representative for disposal of the instrument and power supply. Please follow your institutional requirements for disposal of the accessories.	Avertissement. Il est important de comprendre et de respecter toutes les lois relatives à la destruction sûre et correcte des appareils électriques. Veuillez contacter votre représentant Promega local concernant la destruction de l'appareil. Veuillez respecter les exigences de votre établissement concernant la destruction des accessoires.
	Equipment protected by double insulation or reinforced insulation.	Équipement protégé par une double isolation ou par une isolation renforcée.

Precautions		
IMPORTANT SAFETY INSTRUCTIONS—PLEASE SAVE THESE INSTRUCTIONS.		
	Power OFF the GloMax®-Multi Jr to change Optical Kits or to install a different module.	Eteignez le GloMax®-Multi Jr avant de changer le kit optique ou d'installer un module différent.
	The GloMax®-Multi Jr is intended for indoor use only.	Le GloMax®-Multi Jr est destiné exclusivement pour l'utilisation à l'intérieure.
	Always disconnect the power before cleaning or performing routine maintenance.	Il faut toujours éteindre l'instrument avant de le nettoyer ou d'effectuer de l'entretien de routine.
	Always disconnect the AC Adapter from the power outlet when not in use.	Toujours enlever l'adaptateur AC de la prise électrique lorsqu'il n'est pas utilisé.

Special Instructions

- Wipe up spills immediately.
- The GloMax[®]-Multi Jr contains sensitive optical components and precision-aligned mechanical assemblies. Avoid rough handling.
- Do not leave the lid open for extended periods of time to protect the PMT from exposure to ambient light.
- The GloMax[®]-Multi Jr readily accepts methacrylate or polystyrene cuvettes. Do not use glass or quartz cuvettes, which can become scraped or damaged. The Minicell Adapter accommodates glass minicell cuvettes. Cuvettes are not reusable. See Sections 3.B, 4.B and 5.B for details on suitable cuvettes and tubes.
- The Sample Compartment cannot accept cuvettes with an outer diameter over 12mm. The 10mm size refers to the internal diameter of the cuvette, so some plastic cuvettes also may be too large.
- Do not force oversized cuvettes into the Sample Compartment. This can damage the Sample Compartment. If the cuvette does not easily fit into the Sample Compartment, use a different cuvette.
- Use caution around solvents because they may corrode the plastic case of the GloMax[®]-Multi Jr.
- If a liquid is accidentally spilled inside the Sample Compartment, invert the GloMax[®]-Multi Jr to drain the excess liquid. Then wipe the inside area dry with a clean soft towel or tissue.
- If extra cleaning is needed, use a mild detergent to dampen the towel and wipe.
- Do not submerge the GloMax[®]-Multi Jr in water.
- Do not expose the GloMax[®]-Multi Jr to temperatures outside the specified range (Section 1.F), since damage may occur to the unit that will not be covered under warranty.
- Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- Do not use this device in proximity to sources of strong electromagnetic radiation (e.g., unshielded intentional RF sources), because these may interfere with the proper operation.
- Do not use this instrument for anything other than its intended use.
- Always disconnect the power before cleaning or performing routine maintenance.
- Do not disassemble unit.
- If the equipment is used in a manner other than that specified by Promega, the protection provided by the equipment may be impaired.

1.F. Environmental Requirements

Store and use the GloMax[®]-Multi Jr under the following conditions:

Shipping and Storage Conditions	5–40°C, under noncondensing conditions; up to 75% humidity
Operating Conditions	15–30°C, up to 75% humidity height above sea level: up to 2000m

2. Touch Screen Basics

The touch screen provides a user-friendly method to operate the GloMax[®]-Multi Jr. The touch screen is sensitive to the light pressure of a fingertip. It is not necessary to use a stylus. After 15 minutes without activity or user stimulation, the touch screen hibernates to conserve power. Lightly touch the screen once to reactivate. To select a function, touch the key corresponding to the function once.

Note: When setting up the instrument for the first time, the touch screen may require calibration. See “Touch Screen Calibration” later in this section for more information.

Home Screen

See Fluorometer Operation (Section 3), Luminometer Operation (Section 4) or Photometer Operation (Section 5) for specific details about the home screen for each module.

Tools

The Tools menu is accessible from the home screen regardless of which module is installed. Touch “Tools” to access “Settings” and “Diagnostics.”

Settings

See Fluorescence, Luminescence or Absorbance sections for detection-specific settings.

The following general options can be found under the “Settings” menu:

- Contrast
- Reset
- Lid Start

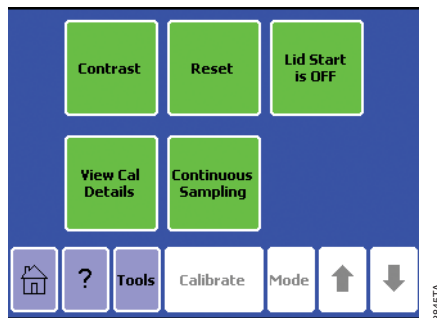


Figure 3. Settings Menu.

Contrast

Touch “Contrast” to increase or decrease the contrast of the touch screen and enhance visibility. The arrows increase or decrease contrast. Touch “Home” to save the adjustment, and return to the “Home” screen.

Reset

The “Reset” button restarts the GloMax®-Multi Jr. Normal operation does not require use of this feature. The Reset feature erases the data displayed on the “Home” screen.

Lid Start

When the “Lid Start” feature is ON, measurement begins as soon as the lid closes. The “Lid Start” feature allows for immediate measurement and eliminates the need to touch the “Measure” key. Touch “Lid Start” to turn the feature ON. While the “Lid Start” feature is ON, the touch screen does not hibernate. Return to the “Lid Start” key under the “Settings” menu to turn the feature OFF.

Diagnostics

The following options can be found under the “Diagnostics” menu:

- Touch Screen Calibration
- Device Configuration

Touch Screen Calibration

The “Diagnostics” menu contains a method for screen calibration. Although the touch screen is calibrated at the factory, it may need recalibration during initial instrument setup and occasionally over time.

1. Touch “Touch Screen Calibration”.
2. When the screen reads “Please touch the calibration point”, touch the gray box on the + with a dull object like a pen cap, a stylus or the pointed end of a microcentrifuge tube or PCR tube.
Do not use a pen or anything sharp because this might damage the screen.
Note: We recommend using a dull object for this calibration rather than your fingertip in order for the screen calibration to be more precise.
3. A second gray box will appear when the first + has been touched. Touch the + in this gray box.
4. Options for saving the calibration will appear. Touch “Apply New Calibration” if the new calibration is correct. Select “Reset To Factory Calibration” or “Abort Calibration” if you made a mistake during the calibration process.

Note: Alternatively, the touch screen can be reset to factory calibration settings by powering off the instrument and then touching and holding your finger on the screen during power on. Keep your finger on the screen until the “Home” screen appears. The touch screen should now be reset to factory settings.

Device Configuration

The “Device Configuration” key displays details about the GloMax®-Multi Jr configurations including the current graphical user interface (GUI) and firmware versions. This information may be needed if you experience a problem with your instrument or if new firmware upgrades are released.



3. Fluorometer Operation

3.A. Fluorescence Optical Kit

If the GloMax[®]-Multi Jr is purchased with the Fluorescence option, there are five fluorescence kits available for purchase.

Kit	Excitation Wavelength	Emission Wavelengths	Common Fluorophores
UV (Cat.# E6072)	365nm	410–450nm	Hoechst Dye, 4-methyl-umbelliferone (4-MU)
Blue (Cat.# E6071)	460nm	515–570nm	EGFP, rAcGFP, Fluorescein
Green (Cat.# E6073)	525nm	580–640nm	Rhodamine, Cy [®] 3, RFP
Red (Cat.# E6074)	625nm	660–725nm	Cy [®] 5
GFPUV (Cat.# E6075)	365nm	515–570nm	GFPuv

Custom optical kits also may be purchased. Please contact your local Promega Branch Office or Distributor for more details. Contact information available at: www.promega.com

Optical Kit Installation

1. Power OFF the GloMax[®]-Multi Jr.
2. Grasp the handle of the Optical Kit, and align the kit with the sample compartment.
3. Press down firmly to lock the Optical Kit in place (see Figure 4).
4. Close the lid, and power ON the GloMax[®]-Multi Jr.
5. If you have installed a Fluorescence or Absorbance Module, the touch screen will display an entry screen with all of the module options (see Figure 5).
6. Select the module that you have installed.
7. Confirm the correct module has been selected.

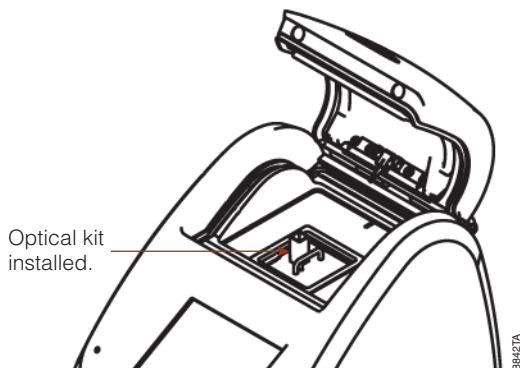


Figure 4. Optical Kit installed.

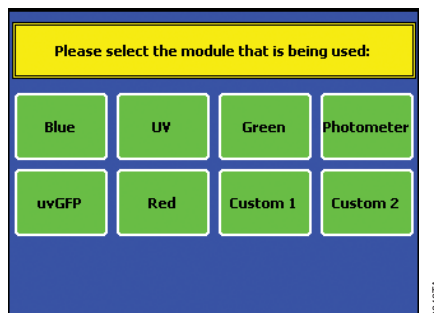


Figure 5. Entry Screen.

Optical Kit Removal

1. Power OFF the GloMax®-Multi Jr before removing the Optical Kit.
2. Grasp the handle, and gently pull up to release the kit from the sample compartment.



Warning: If the GloMax®-Multi Jr is also configured as a Luminometer, take care to keep the lid closed when not in use to protect the PMT from exposure to ambient light. In addition, do not leave the module slot empty; install another Fluorescence Optical Kit or the Absorbance or Luminescence Module immediately after removing the current Fluorescence Optical Kit.

3.B. Collecting Fluorescence Measurements

The GloMax®-Multi Jr accommodates 10 × 10mm methacrylate (for measurements using the UV Optical Kit) and polystyrene cuvettes (minimum 2ml volume). Do not use glass or quartz square cuvettes. The Minicell Adapter accommodates glass minicell cuvettes (minimum 100µl volume; see Section 3.D for more information about the minicell adapter). The glass minicell cuvettes can be used with all fluorescence optical kits. The PCR Tube Adapter accommodates 0.5ml PCR tubes (minimum 100µl volume; see Section 3.E for information on the PCR Tube Adapter).

3.B. Collecting Fluorescence Measurements (continued)

Home Screen

The “Home” screen appears after confirmation of the Optical Kit. The “Home” screen provides orientation for the multiple functions of the GloMax®-Multi Jr. From the “Home” screen, you can select “Calibrate,” “Tools,” “Mode” and “Help.” The “Home” screen also is the measurement screen. The GloMax®-Multi Jr reports data on the “Home” screen and displays the results for the 20 most recent measurements. Use the arrow keys to scroll through the most recent measurements. Data can be exported to any printer or computer that is properly connected to the GloMax®-Multi Jr.

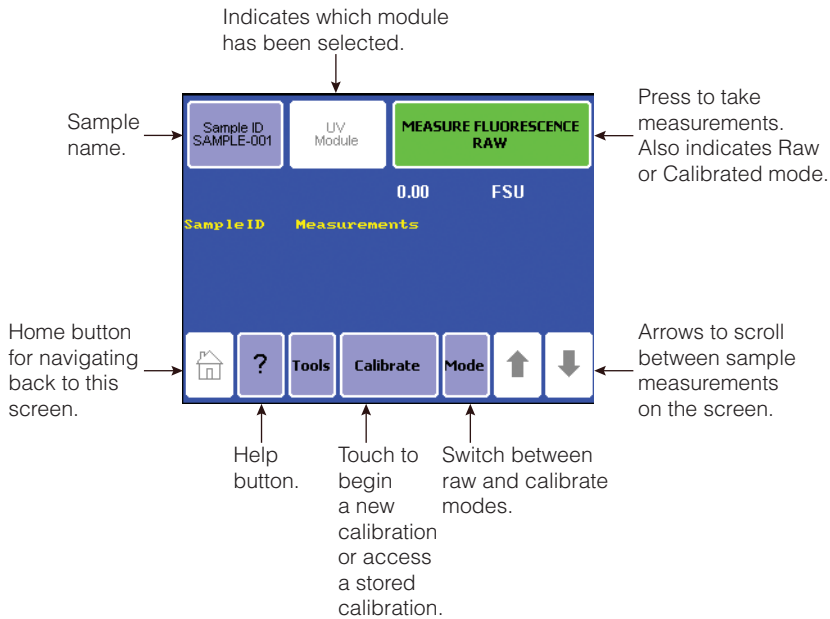


Figure 6. The Fluorescence Home Screen.

Raw Fluorescence Mode—No Calibration Required

Calibration is not necessary to measure fluorescence with the GloMax®-Multi Jr. Simply use Raw Fluorescence Mode to obtain the fluorescent value of a sample in Fluorescence Standard Units (FSU). Use a standard curve to determine the concentration of the analyte in the samples. The GloMax®-Multi Jr does not manipulate the data in any way while operating in the Raw Fluorescence Mode. It is not necessary to calibrate using a blank solution (i.e., water or assay buffer only) when using the GloMax®-Multi Jr for Raw Fluorescence Mode.

Direct Concentration Mode—Calibration Required

The Direct Concentration Mode requires calibration with one blank solution and 1–5 standard solutions.

1. Touch “Calibrate” to begin a calibration sequence.
2. Select “Run New Calibration” to create a new calibration or “Use Stored Calibration” to access a previously saved file.
3. Select the unit of measure.
4. Insert a blank solution containing water or assay buffer into the module, and press OK.
5. Enter the concentration for the first standard. When using multiple standards, enter the standards in order of increasing concentration (e.g., use the least concentrated or lowest standard for the first standard).
6. Insert the standard, and press “OK”.
7. Either select “Enter More Standards” or “Proceed with Current Calibration”.
8. Once the standards have been measured, press “Proceed with Current Calibration”, and an option to save the calibration or proceed with a temporary calibration will be presented.
Note: Users who do not wish to calibrate the instrument every time they run an assay may choose to save the calibration.
9. The instrument saves up to 18 calibrations.
10. The GloMax[®]-Multi Jr calculates a point-to-point linear regression for multiple-standard calibrations.

Measuring Samples

1. Open the lid of the GloMax[®]-Multi Jr, and insert the cuvette containing your sample. Close the lid.
2. Touch “Sample ID” to name your sample (optional). Using the keypad, enter the sample name into the name field. Touch “Save” to save the sample ID.
3. Touch “Measure Fluorescence” to begin measurement. The GloMax[®]-Multi Jr will measure the sample for 5 seconds and report the average reading per second for the sample.
4. The GloMax[®]-Multi Jr reports data on the “Home” screen and displays the results for the 20 most recent measurements.
Note: The GloMax[®]-Multi Jr does not store more than 20 measurements at one time. Measurements are not stored between power cycles. Record your measurements or transfer them to an Excel[®] spreadsheet via the SIS before powering down the instrument.
5. The newest measurement appears at the top of the list. Use the arrow keys to scroll through the measurements.
6. The data are exported automatically to any printer or computer that is properly connected to the GloMax[®]-Multi Jr (see Section 1.D for computer and printer connection instructions).

3.C. Fluorescence Settings

Touch “Tools” to access “Settings.”

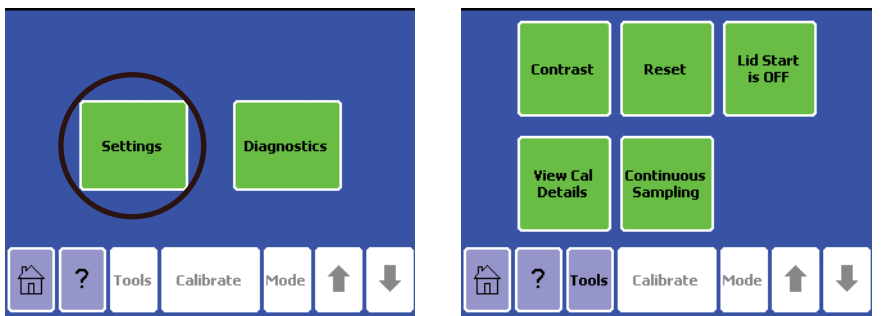


Figure 7. Accessing “Settings”.

View Cal Details

Touch “View Cal Details” to see information on the current calibration for Direct Concentration Mode. “View Cal Details” specifically provides information on the raw fluorescence for each standard and the blank solution as well as the unit of measure and the Optical Kit.

Continuous Sampling

The Continuous Sampling feature enables repeat measurements of a single sample at user-defined intervals.

Data must be collected via a computer or printer connection.

1. Touch “Continuous Sampling” to turn the feature ON.
2. Touch “Frequency” to select a measurement frequency using the arrow buttons.
 - a. The measurement frequency is shown as measurements/seconds, and the options are:
 - 1 measurement/ 3 seconds
 - 1 measurement/ 10 seconds
 - 1 measurement/ 30 seconds
 - 1 measurement/ 60 seconds
3. Touch “Total Number of Measurements” to select the total number of measurements using the arrow buttons. The maximum number of measurements is 9999.
4. Touch “OK” to return to the “Home” screen.
5. Touch “Measure Fluorescence” to start the measurement.
6. Connect the GloMax®-Multi Jr to a printer or a computer to collect the data obtained during Continuous Sampling.

Note: Touching the screen during measurement will cause an early abort of Continuous Sampling measurements. A message stating not to touch the screen during measurement will be displayed; if the screen is touched, then a message stating that the measurement was aborted will be displayed.

3.D. Fluorescence Minicell Adapter Operation (Cat.# E6094)

The Minicell Adapter with two focusing lenses makes using small sample volumes possible while preserving the superior sensitivity of the GloMax®-Multi Jr.

Place the Minicell Adapter into the Optical Kit sample compartment with the tab directed towards the back of the GloMax®-Multi Jr (see Figure 8).

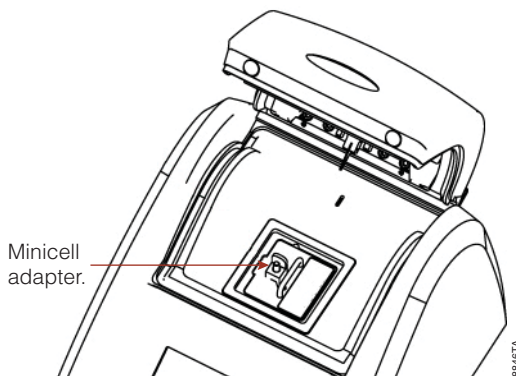


Figure 8. Proper orientation of the Minicell Adapter.

Transfer the sample to a minicell cuvette. The minimum volume necessary for reproducible results is 100µl, and the maximum volume is 200µl. Take care not to introduce air bubbles into the cuvette when transferring samples. Insert the minicell cuvette into the Minicell Adapter. Close the lid, and measure the sample.

Note: The glass minicell cuvettes should not be reused.

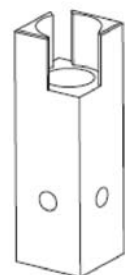
3.E. GloMax®-Multi Jr PCR Tube Adapter Operation (Cat.# E6081)

The GloMax®-Multi Jr PCR Tube Adapter allows measurement of samples in 0.5ml PCR tubes with small sample volumes while still preserving the superior sensitivity of the GloMax®-Multi Jr.

The PCR Tube Adapter is multidirectional and can be inserted into the Optical Kit sample compartment in any orientation.

Transfer the sample to a 0.5ml PCR tube. The minimum sample volume required for reproducible results is 100µl. Insert the PCR tube into the PCR Tube Adapter, close the lid and measure the sample. Take care not to introduce air bubbles into the sample.

Note: The 0.5ml PCR tubes should not be reused.



**GloMax®-Multi Jr
PCR Tube Adapter**

4. Luminometer Operation



Warning: Take care to keep the lid of the GloMax[®]-Multi Jr closed when it is not in use to protect the PMT from exposure to ambient light. Prior to the first use, remove the protective label that covers the PMT opening.

4.A. Luminescence Module

Luminescence Module Installation

1. Power OFF the GloMax[®]-Multi Jr.
2. Before the first installation of the Luminescence Module, remove the protective label over the light detector located in the sample compartment.
3. Align the Luminescence Module with the sample compartment.
4. Press down to lock the Luminescence Module in place (see Figure 9).
5. Close the lid, and power ON the GloMax[®]-Multi Jr. A countdown of 60 seconds allows the GloMax[®]-Multi Jr PMT to warm up before measuring luminescent samples.

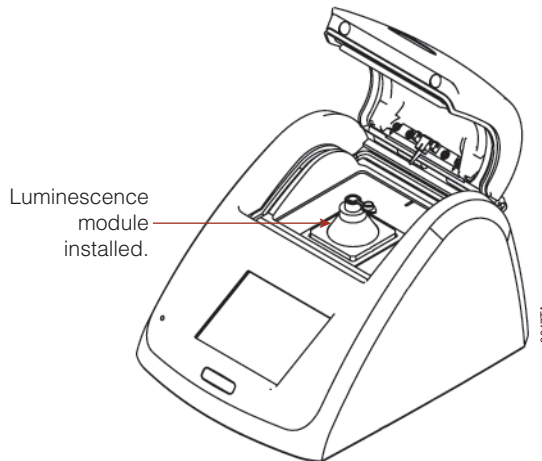


Figure 9. Luminescence Module Installed.

Luminescence Module Removal

1. Power OFF the GloMax[®]-Multi Jr before removing the Luminescence Module.
2. Grasp the Luminescence Module, and gently pull up to release the module from the sample compartment.



Warning: Keep the lid closed when not in use to protect the PMT from exposure to ambient light. In addition, do not leave the module slot empty; install a Fluorescence Optical Kit or the Absorbance Module immediately after removing the Luminescence Module.

4.B. Collecting Luminescence Measurements

The GloMax[®]-Multi Jr is a bottom-reading luminometer and does not require a minimum sample volume. The GloMax[®]-Multi Jr accommodates standard 1.5ml microcentrifuge tubes. Natural (clear) polypropylene microcentrifuge tubes are suitable.

Home Screen

The “Home” screen appears after the PMT warm-up period. The “Home” screen provides orientation for the multiple functions of the GloMax[®]-Multi Jr. From the “Home” screen, you can select “Protocols,” “Tools” and “Help.” The “Home” screen also is the measurement screen. The GloMax[®]-Multi Jr reports data on the “Home” screen and displays the results for the 20 most recent measurements. Use the arrow keys to scroll through the most recent measurements. Data can be exported to any printer or computer that is properly connected to the GloMax[®]-Multi Jr.

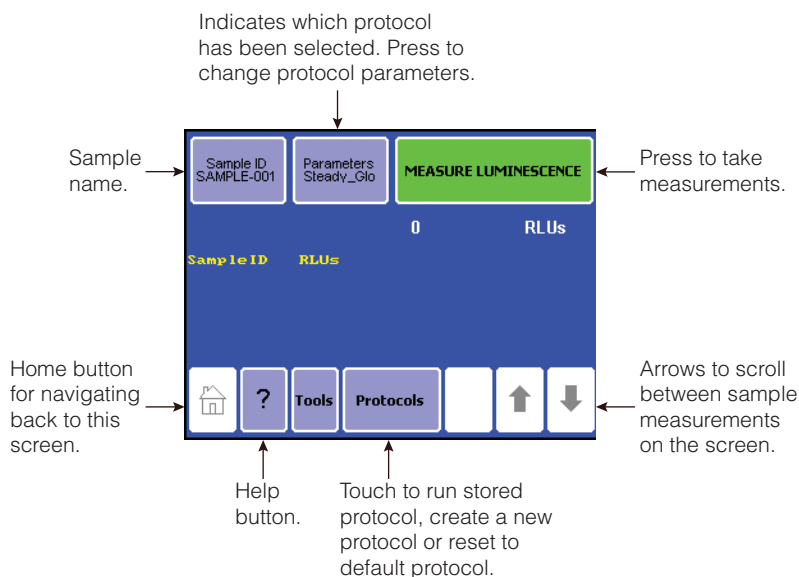


Figure 10. The Luminescence Home Screen.

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Home Screen (continued)

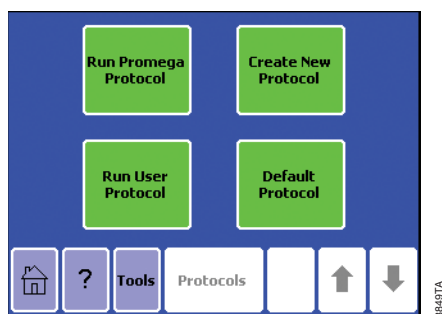


Figure 11. The Protocol Menu.

Luminescence Protocols

There are four types of protocols that can be run on the GloMax®-Multi Jr:

- Run Promega Protocol
- Create New Protocol
- Run User Protocol
- Default Protocol

Run Promega Protocol

The GloMax®-Multi Jr Luminometer accommodates the measurement requirements for Promega luminescent assays.

1. Touch “Run Promega Protocol” to select the protocol that corresponds to your assay system. For example, if you are using the Steady-Glo® Assay for a luciferase gene reporter study, touch “Steady-Glo.” The luminometer will open a Steady-Glo® Luciferase Assay System protocol with the recommended measurement settings automatically programmed.
2. Touch “OK” to accept the parameters and return to the “Home” screen. You are now ready to measure your samples.

Create New Protocol

1. Touch “Protocols,” then “Create New Protocol” to customize a protocol for a particular assay.
2. Use the arrow keys to adjust the integration time between 1 and 10 seconds.
3. Measuring shorter half-life luminescence may require enabling the kinetics feature.
4. Touch “Kinetics” to turn the feature ON. The integration parameter does not apply when using Kinetics.

Note: Kinetics data must be collected via a computer or printer.

- a. Touch “Frequency” and select a measurement frequency using the arrow buttons.
 - i. Measurement frequencies are listed as measurement/second(s).
 - ii. Frequency options are:
 - 1 measurement/ 1 second
 - 5 measurements/ 1 second
 - 10 measurements/ 1 second
 - 1 measurement/ 10 seconds
 - 1 measurement/ 60 seconds
- b. Touch “Total number of measurements” and select the total number of measurements using the arrow buttons. The maximum number of measurements is 9999.

5. Touch “OK” to return to the “Home” screen.
6. Alternatively, touch “Save As” to name the protocol and store the parameters for future use.

Run User Protocol

1. To retrieve a stored protocol, touch “Protocols,” then “Run User Protocol.”
2. Highlight the protocol name and touch “Show Parameters” to review the parameters for the stored protocol.
3. To measure a sample, touch “OK” to return to the “Home” screen. The Protocol name will be displayed in the upper middle button of the home screen.
4. The GloMax[®]-Multi Jr may store as many as 18 protocols at any given time.
 - a. To delete a protocol, touch “Protocols,” then “Run User Protocol”.
 - b. Highlight the protocol name, then touch “Delete Protocol”.

Default Protocol

The default protocol loads when the instrument is turned on and provides a single measurement using a 1-second integration time. Use the default protocol when your assay does not have a specific integration requirement.

Measuring Samples

1. Open the lid of the GloMax[®]-Multi Jr, and insert the 1.5ml microcentrifuge tube containing your sample. Close the lid.
2. Touch “Sample ID” to name the sample (optional). Using the keypad, enter the sample name into the name field. Touch “Save” to save the sample ID.
3. Touch “Measure Luminescence” to begin measurement. The GloMax[®]-Multi Jr measures the sample and reports the reading in Relative Light Units (RLU).
4. The GloMax[®]-Multi Jr reports data on the “Home” screen and displays the results for the 20 most recent measurements.

Note: For kinetic measurements, the GloMax[®]-Multi Jr only reports data to a computer or printer. The GloMax[®]-Multi Jr does not store more than 20 measurements at one time. Measurements are not stored between power cycles. Record your measurements or transfer them to an Excel[®] spreadsheet via the SIS before powering down the instrument.

5. The newest measurement appears at the top of the list. Use the arrow keys to scroll through the measurements.
6. The data are exported automatically to any computer or printer that is properly connected to the GloMax[®]-Multi Jr (see Section 1.D for computer and printer connection instructions).

5. Photometer Operation

5.A. Absorbance Module

If the GloMax[®]-Multi Jr is purchased with the absorbance option, there are 3 absorbance filters that can be purchased with the Absorbance Module: 560nm, 600nm and 750nm. Custom absorbance filters also may be purchased. Please contact your local Promega Branch Office or Distributor for more details. Contact information available at: www.promega.com

Absorbance Module Installation

1. Power OFF the GloMax[®]-Multi Jr.
2. Align the Absorbance Module with the sample compartment.
3. Press down to lock the Absorbance Module in place (see Figure 12).
4. Close the lid, and power ON the GloMax[®]-Multi Jr.
5. Select “Photometer” from the list of options on the touch screen.
6. Install the filter paddle that corresponds to the wavelength of absorbance for the assay (see Figure 12).

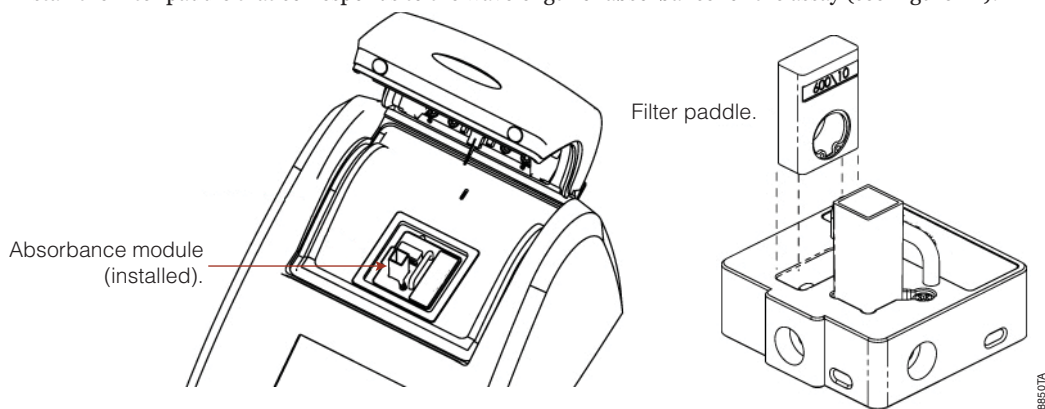


Figure 12. Filter Paddle Installation.

Absorbance Module Removal

1. Power OFF the GloMax®-Multi Jr before removing the Absorbance Module.
2. Grasp the handle, and gently pull up to release the Absorbance Module from the sample compartment.



Warning: If the GloMax®-Multi Jr is also configured as a Luminometer, take care to keep the lid closed when not in use to protect the PMT from exposure to ambient light. In addition, do not leave the module slot empty; install a Fluorescence Optical Kit or the Luminescence Module immediately after removing the Absorbance Module.

5.B. Collecting Absorbance Measurements

The Absorbance Module accommodates 10 × 10mm methacrylate and polystyrene cuvettes (minimum 2.0ml volume).

Home Screen

The “Home” screen appears after installing the Absorbance Module and choosing the photometer option. From the “Home” screen, you can select “Blank,” “Tools,” “Mode” and “Help.” The “Home” screen also is the measurement screen. The GloMax®-Multi Jr reports data on the “Home” screen and displays the results for the 20 most recent measurements. Use the arrow keys to scroll through the most recent measurements. Data can be exported to any printer or computer that is properly connected to the GloMax®-Multi Jr.

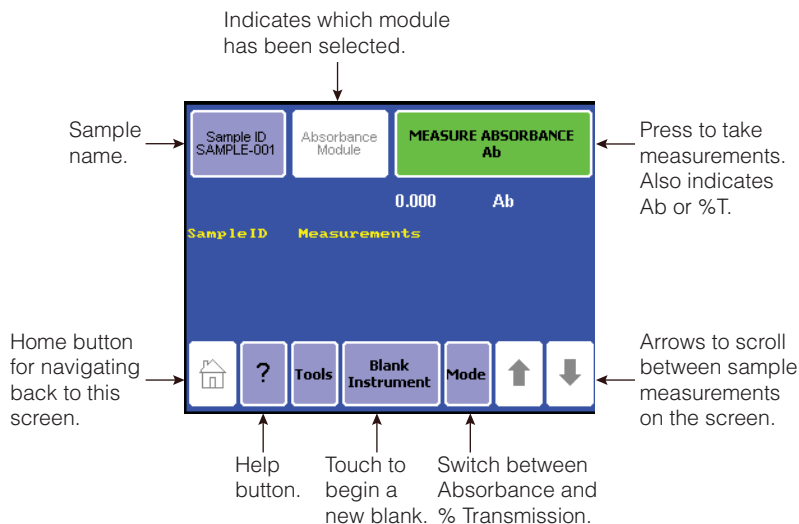


Figure 13. The Absorbance Home Screen.

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5.B. Collecting Absorbance Measurements (continued)

Measuring Blank Solution

Before measuring the absorbance of your samples, **the baseline of the GloMax[®]-Multi Jr must be reset to zero.** To do this, measure a blank solution after powering ON the GloMax[®]-Multi Jr and changing filters. For best results, measure the blank solution immediately before reading a series of samples using your sample buffer. Blank values are not stored between power cycles.

1. Touch “Blank Instrument” to measure the blank solution.
2. Insert a 10 × 10mm cuvette containing your sample buffer (blank solution).
3. Touch “OK”.
4. Touch the “Cancel” key to abort the measurement.

Measuring Samples

1. Open the lid of the GloMax[®]-Multi Jr, and insert the cuvette containing your sample. Close the lid.
2. Touch “Sample ID” to name your sample (optional). Using the keypad, enter the sample name into the name field. Touch “Save” to save the sample ID.
3. Touch “Measure Absorbance” to begin measurement. The GloMax[®]-Multi Jr will measure the sample for 6 seconds and report the average reading for the sample.

Note: The GloMax[®]-Multi Jr does not store more than 20 measurements at one time. Measurements are not stored between power cycles. Record your measurements or transfer them to an Excel[®] spreadsheet via the SIS before powering down the instrument.

5.C. Absorbance Settings

Touch “Tools” to access “Settings.”

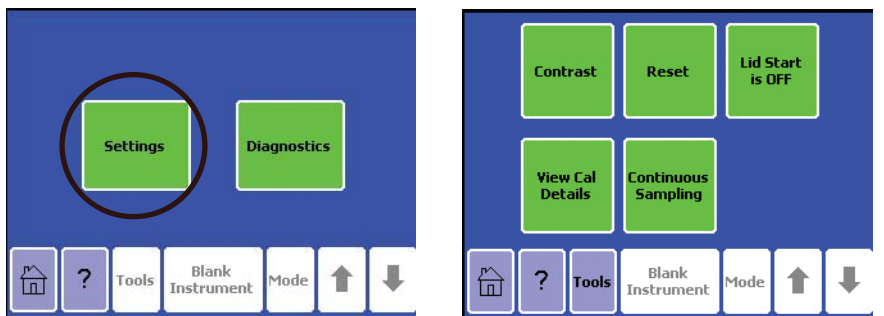


Figure 14. Accessing “Settings”.

View Cal Details

Touch “View Cal Details” to determine whether the baseline of the GloMax[®]-Multi Jr has been reset to zero and to view the values for the current blank solution.

Continuous Sampling

The Continuous Sampling feature enables repeat measurements of a single sample at user-defined intervals.

Data must be collected via a computer or printer connection. Connect the GloMax[®]-Multi Jr to a computer or a printer to collect the data obtained during Continuous Sampling.

1. Touch “Continuous Sampling” to turn the feature ON.
2. Touch “Frequency” to select a measurement frequency using the arrow buttons.
 - a. The measurement frequency is shown as measurements/seconds, and the options are:
 - 1 measurement/ 3 seconds
 - 1 measurement/ 10 seconds
 - 1 measurement/ 30 seconds
 - 1 measurement/ 60 seconds
3. Touch “Total Number of Measurements” to select the total number of measurements using the arrow buttons. The maximum number of measurements is 9999.
4. Touch “OK” to return to the “Home” screen.
5. Touch “Measure Absorbance” to start the measurement.

Note: Touching the screen during measurement will cause an early abort of Continuous Sampling measurements. A message stating not to touch the screen during measurement will be displayed; if the screen is touched, then a message stating that the measurement was aborted will be displayed.



6. Troubleshooting

For questions not addressed here, please contact your local Promega Branch Office or Distributor. Contact information available at: www.promega.com. E-mail: techserv@promega.com

6.A. Fluorescence Troubleshooting

Symptom	Possible Causes and Comments
Bad calibration error message	This error message may occur if the fluorescence of the blank solution is higher than that of the standard. Compare the reading of the standard and blank solutions in Raw Fluorescence Mode. The fluorescence of the single-point standard should be >3 times higher than that of the blank solution. The fluorescence of the multi-point standard should be >1.2 times higher than that of the blank solution or previous standard.
Erratic reading	When direct fluorescence readings do not produce expected values, review the standard value entered during the calibration. The number of the standard value should correspond to the actual concentration of the standard (Section 3.B). Erratic readings also can be caused by air bubbles, temperature changes in the sample, scratches or condensation on the sample tube/cuvette, a dirty Minicell Adapter or dust.
Low readings	<p>Check the excitation and emission wavelengths of the analyte against the specifications of the Fluorescence Optical Kit in use. Different analytes require different Optical Kits.</p> <p>Confirm that the Minicell and Minicell Adapter are inserted in the proper orientation (tab directed towards the back of the instrument).</p> <p>The concentration of the fluorophore is outside the linear range of the assay. Samples with high fluorophore concentration can show lower than expected readings. Confirm fluorophore concentration. Check linearity by diluting a sample 1:1 (for example; also be sure to use an appropriate blank for the dilutions). If the sample is within the linear range, the reading will decrease in direct proportion to the dilution. If the reading does not decrease in direct proportion to the dilution or if the reading increases, the sample is beyond the linear range of the fluorophore.</p>
High background	A wet cuvette or spill could contaminate the cuvette holder and increase the background. A dirty Minicell Adapter or dirty PCR Tube Adapter also could cause high background. Carefully clean the cuvette holder or adapters with 70% ethanol.

6.B. Luminescence Troubleshooting

Symptom

Possible Causes and Comments

Low readings

Check the temperature of the reagent and the limit of detection for the assay on the GloMax[®]-Multi Jr. If measuring flash-type luminescence, use the kinetics feature to observe the rate of light production.

Use the Lid Start feature if the chemistry of the luminescence assay is very fast ; see Section 2.

Check that the protective label has been removed from the PMT opening.

High background

Reagent residue may contaminate the GloMax[®]-Multi Jr. Power OFF the instrument, remove the Luminescence Module and gently clean the interior using a Kimwipes[®] tissue dampened with 70% ethanol.

Instrument lid may have been left open for too long, and PMT has become saturated. Close instrument lid, leave instrument on overnight to allow PMT to recover, and take a background measurement the following day. If background value is still high, contact Promega Technical Services.

Luminescence Module not detected

The module is not fully installed or installed in the wrong orientation. Turn off the instrument and firmly reinsert the Luminescence Module in the correct orientation.

The metal connectors on the module are dirty. Inspect the connectors for dirt. Clean using a Kimwipes[®] tissue dampened with 70% ethanol. If reinserting or cleaning the module does not correct the problem, contact Promega Technical Services.

The metal connectors in the instrument are damaged. Inspect the connectors. If they are broken, the instrument will require service. Contact Promega Technical Services.



6.C. Absorbance Troubleshooting

Symptom	Possible Causes and Comments
Nonlinear response	Many absorbance assays do not produce a linear response but instead produce a sigmoidal or pseudosigmoidal response.
Low readings	Check the filter installed in the Absorbance Module, and make sure it is the correct filter for the assay. View the Calibration Details from the “Tools” menu.
Bad calibration error message	Install the proper filter and use an appropriate buffer in a clean cuvette to reset the baseline. Use the blank solution to reset the baseline to zero. Check the Calibration Details from the “Tools” menu.

6.D. Spreadsheet Interface Software Troubleshooting

Symptom	Possible Causes and Comments
Excel® does not open	Excel® is not installed on the computer. Make sure Excel® is installed and opened. The software cannot find Excel®. Open Excel® from the Program Menu on the computer, then double-click on the Spreadsheet Interface Software icon.
Both green lights are ON, but data do not appear in Excel®	Wrong COM port selected. Click “STOP”, then click on the “COM” button to change the COM port. Luminometer not connected to computer. Check the RS-232 connection between the GloMax®-Multi Jr and the computer.
New data do not report to Excel®	There is an editing process occurring within an Excel® cell. Wait until all the data are collected before editing the Excel® spreadsheet.
The software does not install	The computer allows only administrators to install new software. Log in as Administrator for the computer, then install the software, or contact your IT support desk.
The software does not open	The software was not installed properly. Log in as Administrator. Remove the software and re-install.

6.E. Touch Screen Troubleshooting

Symptom	Possible Causes and Comments
Touch screen is blank or nonresponsive	Sample saturates detector. Power OFF the GloMax [®] -Multi Jr. Wait 5 seconds. Power ON the instrument.
Fingerprints appear on the touch screen	Power OFF the GloMax [®] -Multi Jr, then use a Kimwipes [®] tissue dampened with 70% ethanol to clean the touch screen.
Touch screen alignment is off. You must touch outside of the button area to obtain a response.	The touch screen requires calibration. Power OFF the GloMax [®] -Multi Jr. Touch the GloMax [®] -Multi Jr screen with one finger. Keeping the finger on the screen, turn on the power. Continue touching the GloMax [®] -Multi Jr touch screen until the “Home” screen appears. See Section 2 for more information on touch screen calibration.

7. Appendix

7.A. Returning the GloMax[®]-Multi Jr

The GloMax[®]-Multi Jr and any accessories come with a one-year warranty from Promega covering defects in materials and workmanship under normal use. For more information, contact Promega Technical Services. Contact information is available on the web at: www.promega.com or by e-mail at: techserv@promega.com

- The instrument and accessories must be installed, powered and operated in compliance with the directions in this Technical Manual and the directions accompanying the accessories.
- Damage incurred during shipping is not covered by warranty.
- Damage resulting from measuring incompatible samples is not covered by warranty.
- Damage resulting from reagent spills is not covered by warranty.
- Damage resulting from contact with corrosive materials or atmosphere is not covered by warranty.
- Damage from salts, proteins and other moderately corrosive materials that are not promptly removed from the instrument are not covered by warranty.
- Damage caused by user modification of the instrument is not covered by warranty.

If a problem arises with your instrument, please contact Promega or your local Promega representative for support. If further action is required, repair options will be presented and a return authorization number assigned if necessary. Promega is not responsible for instrumentation returned without an authorization number. When you ship the instrument for service please remember to:

1. Obtain a return authorization from Promega.
2. Decontaminate the instrument (see Section 7.D for decontamination instructions).



7.A. Returning the GloMax[®]-Multi Jr (continued)

3. Affix a signed and dated Certificate of Decontamination to the outside of the package in which the instrument is returned (Section 7.D).
4. Use the original packaging materials to ensure that no damage will occur to the equipment during shipping.

7.B. Cleaning the GloMax[®]-Multi Jr

General Instrument Care

Immediately clean up any spills.

The instrument lid should be kept closed when not in use to avoid damage.

General Cleaning

Shut down the GloMax[®]-Multi Jr (Section 1.D) whenever the interior of the instrument is open for cleaning and maintenance.

Immediately clean up any spills. We recommend thoroughly cleaning the interior of the instrument every 30 days using a Kimwipes[®] tissue dampened with 70% ethanol. Do not allow excess solution to run off onto other electrical components, as this may cause damage to the instrument and its electronics. Do not use solvents or abrasive cleaners.

Use a cloth dampened with deionized water to periodically wipe clean the exterior of the GloMax[®]-Multi Jr. Do not use solvents or abrasive cleaners.



Warning: If a fluid spill on the detector is suspected, immediately contact Promega Technical Services.

Touch Screen Care

Do not use any sharp object such as a pen, pencil, stylus or marker to make contact with the touch screen. These may damage or leave a permanent mark on the touch-sensitive LCD screen. Do not spill liquid on the screen.

To clean the GloMax[®]-Multi Jr touch screen, turn off the instrument. Use a Kimwipes[®] tissue dampened with 70% ethanol to gently and cautiously clean the touch screen.

7.C. Instrument Disposal



Contact your local Promega Representative for disposal of the instrument. Please follow your institutional guidelines to handle the disposal of accessories.

7.D. Certificate of Decontamination

Disinfection and decontamination are required prior to shipping the instrument and instrument accessories for repair. Instruments returned must be accompanied by a signed and dated Certificate of Decontamination attached to the outside packaging of the instrument.

To disinfect and decontaminate:

1. Shut down the GloMax[®]-Multi Jr (Section 1.D) before cleaning. Use a cloth dampened with deionized water to wipe clean the exterior of the instrument. Do not use solvents or abrasive cleaners.
2. Thoroughly clean the interior of the instrument using a Kimwipes[®] tissue dampened with 70% ethanol. Do not allow excess solution to run off onto the electrical components, because this may cause damage to the instrument and its electronics. Do not use solvents or abrasive cleaners.
3. Use a Kimwipes[®] tissue dampened with 70% ethanol to gently clean the touch screen.

Failure to confirm disinfection and decontamination will result in decontamination charges before the instrument will be serviced.

Select either (A) or (B):

- A. I confirm that the returned items have not been contaminated by body fluids or by toxic, carcinogenic, radioactive, or other hazardous materials.
- B. I confirm that the returned items have been decontaminated and can be handled without exposing personnel to health hazards.

Circle the type of material used in the instrument: Chemical Biological Radioactive**

Briefly describe the decontamination procedure performed:

Date: _____

Place: _____

Signature:

Name (block capital letters):

** The signature of a Radiation Safety Officer is also required if the instrument was used with radioactive materials.

This instrument is certified by the undersigned to be free of radioactive contamination.

Date: _____

Place: _____

Signature:

Name (block capital letters):



7.E. Warranty Information

Warranty Terms

The **Standard One-Year Warranty**, included with the system price, covers all parts, labor and shipping to and from our depot repair location as well as a temporary replacement instrument upon request. The temporary replacement instrument will be shipped via standard ground shipment and will arrive in 5–7 working days. If you no longer have your GloMax[®] Instrument shipping carton, we will provide you with a box for shipment of the instrument back to our service technicians. We will repair and return it to you performing to original factory specifications.

If the instrument warranty or previous agreement has expired, we will offer a 45-day grace period during which the standard agreement pricing applies. After the 45-day grace period, the service agreement price is 15 percent more than list.

Warranty Service

To obtain service during the warranty period, please take the following steps:

1. Contact Promega Technical Services at: **techserv@promega.com**
2. Carry out minor adjustments or tests as suggested by your Technical Services contact.
3. If it is determined that the instrument should be returned for repair, Promega Technical Services will arrange for service by an authorized service agent. You will be issued a Promega return authorization number.
YOU MUST OBTAIN a Promega return authorization number before returning an instrument for service.
4. Before returning the instrument, you will be responsible for cleaning it and providing a Certificate of Decontamination. If the instrument has been exposed to any chemical, biological or radioactive hazards, contact Promega Technical Services for decontamination instructions.

Out-of-Warranty Service

Follow the same steps as for Warranty Service. Our Technical Services Department is happy to assist you by telephone or correspondence at no charge. Repair service will be billed at a flat rate. Your invoice will include freight charges.

7.F. Related Products

Accessories

Product	Quantity	Cat.#
Thermal, Serial Printer and Cable, Universal Power	1 each	E2821
Tripp Lite USB to Serial Adapter	1 each	TS2520
PCR Tube Adapter, GloMax [®] -Multi Jr	1 each	E6081
Minicell Adapter Kit (for measuring 100–200µl of sample)	1 each	E6094

Includes 400 glass minicell cuvettes.

Replacement Parts

Product	Quantity	Cat.#
Minicell Borosilicate Glass Cuvettes (replacement cuvettes for E6094)	400 each	E6091
10 × 10mm Square Polystyrene Cuvette (3.5ml capacity)	100 each	E6092
10 × 10mm Square Methacrylate Cuvette (3.5ml capacity)	100 each	E6093
Replacement Instrument AC Adapter with Interchangeable Plugs	1 each	E6095
Thermal Printer Paper	1 roll	E2851

Service Agreement and Upgrade

Product	Quantity	Cat.#
GloMax [®] -Multi Jr Service Agreement	1 each	SA3080

After the warranty period is over, you can continue to receive the same comprehensive service and support from Promega as you did when your system was under warranty. The Service Agreement covers all parts, labor and shipping to and from our depot repair location as well as a loaner instrument upon request. If your system needs repair, we will provide a box for shipment of the instrument back to our service facility. We will repair it and return it performing to original factory specification.

8. Summary of Changes

The following changes were made to the 9/14 revision of this document:

1. In Section 1.C, Absorbance Module Specifications, the Spectral Range was updated.
2. The document design was updated.



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All prices and specifications are subject to change without prior notice.

Product claims are subject to change. Please contact Promega Technical Services or access the Promega online catalog for the most up-to-date information on Promega products.