OPERATING MANUAL

GloMax® Navigator System

Instructions for Use of Products **GM2000 and GM2010**





Revised 8/18
TM470

GloMax® Navigator System

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® Navigator System[a] is an easy-to-use microplate luminometer integrated with Promega chemistries for superior assay performance. This instrument provides researchers superior luminescence sensitivity and dynamic range for both strong and weak bioluminescence experimental samples as well as seamless integration with Promega industry-leading bioluminescence assays, including bioluminescent gene reporter, cell-based and biochemical assays. The luminometer features optional dual injectors to measure both glow- and flash-based luminescent reactions in 96-well plates.

The instrument is operated by an integrated Tablet PC, which provides quick and easy navigation through the control options. Exporting your results is simple with a variety of options, including export to your local data network, USB flash drive and cloud-based storage location. The GloMax® Navigator software provides many of the required technical elements of a part 11-compliant system (user authentication and authorization, data integrity and protection, electronic signatures and audit trails) when used with the appropriate laboratory workflow.



Figure 1. The GloMax® Navigator System.

1.B. Specifications

Instrument Specifications

Detection Modes	Luminescence
Read Type	Glow, Flash, Kinetic, Repeat
Sample Format	96-well plates
Tablet PC	Windows® 8.1 or 10 Tablet PC with USB connection to instrument, wireless connectivity to local network; export to network, cloud or USB flash drive
Dimensions	18.6in (47.2cm) width 20.0in (50.8cm) depth 9.4in (23.9cm) height without Tablet PC mounted 18in (45.7cm) height with Tablet PC mounted
Weight	Approximately 40lb (18.1kg)
Power Requirements	0.5A @ 100–240V AC, 50/60Hz (universal)
Warranty	1-year parts and labor warranty included
Regulatory Compliance	For Research Use Only. Not for use in Diagnostic Procedures.
CE Compliance	Pollution degree 2 Installation category II Indoor use only Mains supply voltage fluctuations are not to exceed ±10 percent of the nominal supply voltage This instrument complies with the requirements of the EU Directives for electromagnetic compatibility (EMC Directive) and electrical safety (the LVD). Compliance with the relevant Directives was demonstrated by third-party testing to the appropriate EN and IEC standards. The product bears the CE mark on its label as evidence of compliance, and an EU Declaration of Conformity for the product is available from Promega on request.

Luminescence Module Specifications

Detector	Top-reading, head-on photon-counting photomultiplier tube (PMT)
Wavelength Range	350–700nm
Detection Limit	1.5×10^{-21} moles of luciferase
Dynamic Range	>9 logs
Cross Talk	Less than 3×10^{-5} (white, 96-well plate, Corning Cat.# 3912)

1.B. Specifications (continued)

Injector System Specifications

Number of Injectors (optional)	Two injectors
Dispense Volume Range	5–200µl in 1µl increments
Injection Speed	20–500µl per second
Waste Collection Tray Volume	Approximately 50ml
Void Volume	500µl

Computer Requirements

Operating System	Windows® 8.1 or 10 Pro, 64 bit, with USB connection to instrument
RAM	2GB (4GB preferred)
Disk Space	64GB
Other Requirements	Microsoft.NET Framework 4.6.2, Microsoft Excel® 2013 Professional

Additional Computer Recommendations if Using Your Own PC:

- Disable automatic Windows® updates and virus scans
- Disable automatic power off, sleep or hibernation settings

  Disable "Fast Startup". Set the power button to Shut Down, not Sleep.

  Disable any other automatically or manually started software that would consume PC resources during operation.
- Ensure there are no domain policies that would overwrite any of the above settings.
- Ensure that Windows® will not turn off USB ports to save power.

Note: The Tablet PC provided with GloMax® Navigator is already configured for the settings listed above.

1.C. Product Components

PRODUCT	SIZE	CAT.#
GloMax® Navigator System	**1 each**	**GM2000**

For Research Use. Not for use in Diagnostic Procedures. Includes:

- 1 each GloMax® Navigator Instrument
- 1 each Tablet PC containing GloMax® Navigator Software
- 1 each Tablet PC AC Power Adapter
- 1 each Tablet Mount Attachment
- 1 each AC Power Adapter with detachable power cord
- 1 each USB Cable
- 1 each 2.5mm Wrench

PRODUCT	SIZE	CAT.#
GloMax® Navigator System with Dual Injectors	**1 each**	**GM2010**

For Research Use. Not for use in Diagnostic Procedures. Includes:

- 1 each GloMax® Navigator Instrument
- 1 each Tablet PC containing GloMax® Navigator Software
- 1 each Tablet PC AC Power Adapter
- 1 each Tablet Mount Attachment
- 1 each AC Power Adapter with detachable power cord
- 1 each USB Cable
- 1 each 2.5mm Wrench
- 1 each Dual Injectors (installed)
- 1 each Reagent Bottle Holder
- 1 each Waste Collection Tray

Available Separately

PRODUCT	SIZE	CAT.#
Dual Injectors and Pump Station Upgrade for GloMax® Navigator	**1 each**	**SA1304**
GloMax® Luminometer Light Plate	**1 each**	**E6531**

1.D. Precautions and Special Instructions

Safety Symbols and Special 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 sure 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.
	Clean up spills.	Nettoyer les déversements.

Special Instructions

- Wipe up spills immediately.
- The GloMax® Navigator Instrument contains sensitive optical components and precision-aligned mechanical assemblies. Handle with care.
- Use caution around solvents because they may damage the plastic case of the GloMax® Navigator Instrument.
- Do not submerge the GloMax® Navigator Instrument in water.
- Do not expose the GloMax® Navigator Instrument to temperatures outside the specified range, as damage may occur to the unit that will not be covered under warranty.
- Changes or modifications to this unit not expressly approved by Promega 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., microwave oven) because they 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 the instrument further than specified in this operating manual for routine maintenance and use.
- If the equipment is used in a manner other than that specified by Promega, the protection provided by the equipment may be impaired.
- Do not overfill multiwell plate wells because this may lead to spills and/or damage.
- If injectors are installed, check the tubing periodically and replace as needed to avoid leaks.
- Plug instrument and Tablet PC into the same wall socket or outlet strip to assure common grounding.
- Do not leave plate in the instrument after protocol is completed.

1.D. Precautions and Special Instructions (continued)

Precautions

Important Safety Instructions—Please save these instructions.

	Power OFF the GloMax® Navigator before accessing the interior, installing or cleaning injectors.	Mise hors tension de GloMax® Navigator avant d'accéder à l'intérieur, l'installation ou le nettoyage des injecteurs.
	Close the instrument door when the GloMax® Navigator is not in use.	Fermez la porte de l'appareil lorsque le GloMax® Navigator n'est pas en cours d'utilisation.
	The GloMax® Navigator is intended for indoor use only.	Le GloMax® Navigator est destiné à une utilisation en intérieur.
	Always disconnect the power before cleaning or performing routine maintenance.	Déconnectez toujours l'alimentation avant de nettoyer ou d'effectuer l'entretien de routine.
	Always disconnect the AC Adaptor from the power outlet when not in use.	Toujours débrancher l'adaptateur secteur de la prise de courant lorsqu'il n'est pas utilisé.

1.E. Environmental Requirements

Store and use the GloMax® Navigator under the following conditions:

Shipping and Storage Conditions	4–50°C, under noncondensing conditions, up to 75% humidity
Operating Conditions	5–30°C, up to 75% humidity
Operating Altitude Conditions	less than 2,000 meters above sea level

1.F. Inspection and Unpacking

Upon receiving the GloMax® Navigator System, inspect it carefully and make certain all accessories are included. Refer to the checklist shipped with the instrument for order-specific items. Save all packaging materials, if possible, in case the instrument needs to be returned for service. If any item is damaged, contact Promega Technical Services (e-mail: **techserv@promega.com**). Standard components are shown in Figure 2, Panel A.

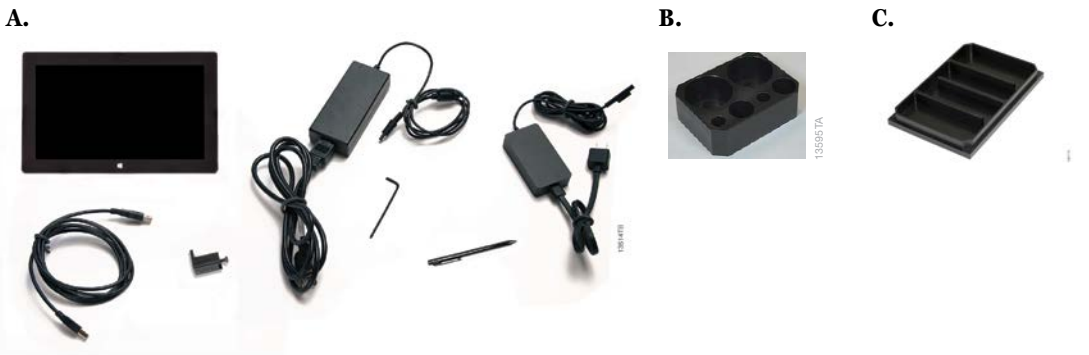


Figure 2. GloMax® Navigator System Accessory Components. Panel A. Components shown include: Tablet PC, Tablet PC Stylus, Tablet Fitting for mounting the Tablet PC, Tablet PC AC Power Adapter, Instrument Power Cord, Instrument AC Power Adapter, USB Cable and 2.5mm Wrench. **Panel B.** Reagent Bottle Holder (for GM2010 model only). **Panel C.** Waste Collection Tray (for GM2010 model only).

1. Remove the instrument and accessory box from the shipping container.



Figure 3. Contents of the GloMax® Navigator System accessory box.

1.F. Inspection and Unpacking (continued)

2. Place the GloMax® Navigator Instrument on a flat, level surface.
3. Ensure that the instrument is placed in a location that will allow you to meet the power requirement specifications (100–240V AC, 50/60Hz; Section 1.B).
4. Manually open the door of the instrument, and remove the interior foam packaging that prevents the optical head from moving during shipment.

2. Setting Up the GloMax® Navigator System

2.A. Setting Up the GloMax® Navigator Instrument and Tablet PC

1. Unpack the Tablet PC from its shipping box.
2. Place the Tablet PC in the Tablet Holder on the top of the GloMax® Navigator Instrument in the orientation shown in Figure 4.

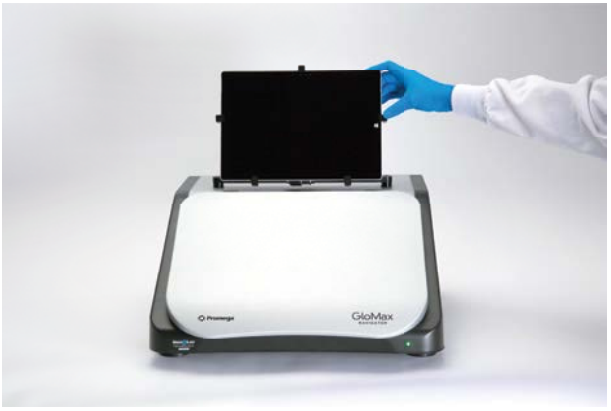


Figure 4. Instrument front and Tablet PC holder setup.

3. Secure the Tablet PC in the Tablet Holder by using the 2.5mm Wrench to screw the Tablet Mount Attachment Piece into place.
4. Ensure that the instrument On/Off switch is in the OFF position (Figure 5).
5. Using the provided USB cable, connect the Tablet PC to the USB port on the back of the instrument (Figure 5).
6. Connect the Tablet PC to its power supply, and then connect the Tablet PC Power Cable to a power outlet.
7. Connect the Instrument AC Power Adapter to the back of the instrument and to a power outlet.

   Note: We recommend connecting the instrument to an uninterrupted power supply (~500VA).

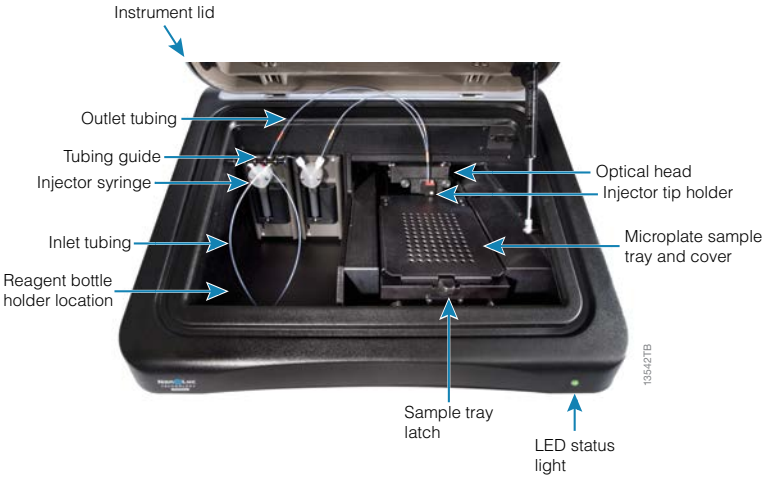


Figure 5. Interior view of the GloMax® Navigator Instrument



Figure 6. The back of the GloMax® Navigator Instrument. A. On/Off switch. **B.** Power connection. **C.** USB port to connect to Tablet PC. **D.** Two USB ports.

2.B. Switching On the GloMax® Navigator Instrument

1. Switch the instrument ON.
2. An LED light on the front right corner of the GloMax® Navigator indicates when the instrument is ON.
3. Power up the Tablet PC by pressing and holding the power button on the perimeter of the Tablet PC.

   Note: When powering ON, turn the instrument ON first and then the Tablet. A connectivity message may appear in the software if the Tablet is powered ON before the instrument. If that occurs power OFF the Tablet and then power ON the Tablet.

2.B. Switching On the GloMax® Navigator Instrument (continued)

4. The Tablet PC will begin its start-up protocol. After the operating software starts, either tap on the GloMax® Navigator Software Icon or double tap the GloMax® Navigator Software Icon on the Desktop screen to launch the GloMax® Navigator software.
5. The GloMax® Navigator System is now ready to use.

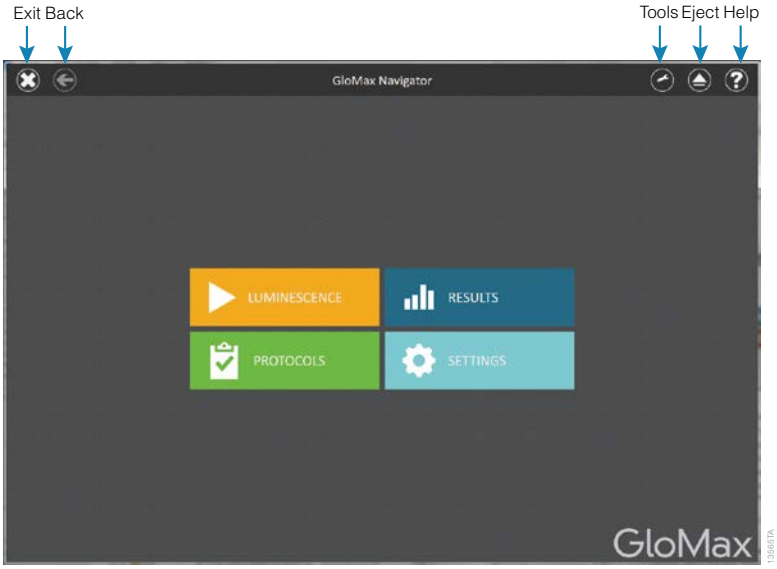


Figure 7. GloMax® Navigator software 'Home' screen.

2.C. Shutting Down the GloMax® Navigator Instrument

1. Switch the instrument OFF using the On/Off switch on the back of the instrument.
2. Shut down the GloMax® Navigator Software by tapping on the **x** in the upper left corner (Figure 7).
3. Shut down the Tablet PC using the Windows® shutdown procedure appropriate for your tablet PC:

   Windows 8: Swipe in from the right edge of the screen, select Settings, then select Power: Shut Down.

   Windows 10: From the Desktop screen, swipe upward to expose the Taskbar. Touch the **Start** button to open the Start menu, then touch the **Power** icon on the left side of the Start menu. From the Power drop-down list, touch the **Shut Down** item.

Note: When not in use for a prolonged period of time, the Tablet PC should be powered OFF.

2.D. Operating the GloMax® Navigator System

1. Open the door of the instrument and gently press the Microplate Sample Tray latch to release the tray cover (Figure 5). If a lid is present, remove from plate. Insert an opaque 96-well plate such that well A1 of the plate corresponds to the label "A1" on the plate tray (Figure 8).

2. Close the sample tray cover and the instrument door.



Figure 8. Inserting plate into sample tray.

3. Select the **Luminescence** Quick Read protocol on the 'Home' screen, or access a protocol of interest by pressing the **Protocols** button.
4. Select the **Start** button at the bottom right corner of the screen.
5. Enter the name of the result file by touching inside the text box and entering a name (Figure 9).

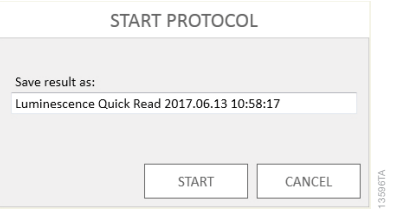


Figure 9. Save Results Window.

6. Select **Start** to begin the protocol.
7. The protocol will begin acquiring data and will display the results in the plate format in real time on the screen.
8. When the read is finished, **Export** and **Analysis** buttons will be active on the bottom left corner of the screen. Press **Export** to export results to the folder location specified by the administrator (Section 3.H, Administrator Settings). Results can be viewed and exported at a later time by touching the **Results** button on the 'Home' screen. Press the **Analysis** button to analyze results generated from the protocol (see Section 3.F, Analysis of Results).

3. GloMax® Navigator User Interface Screens

3.A. Tablet PC 'Home' Screen

The 'Home' screen on the Tablet PC is the main launching pad for interaction with the functionalities built into the GloMax® Navigator Graphical User Interface Software. The 'Home' screen (Figure 10) contains 4 buttons:

Luminescence. This Quick Read button allows you to immediately perform a luminescence read, selecting the plate map and Integration time.

Protocols. Pressing the **Protocols** button will provide you a list of all available protocols. These include preloaded protocols as well as user-defined protocols. The user can create user-defined protocols from this screen as well. Smart Protocols provide analysis directly after the measurement is completed.

Results. Use the **Results** button to access results, data analysis templates and data analyses. List items can be filtered by start and end date, or a keyword search can be used to find results based on Name, User or any other associated information.

Settings. Pressing the **Settings** button provides the user with instrument information and setup options. For example, one can name the instrument, specify where files are exported on the PC or Network drive, export log files, and access additional Tools.

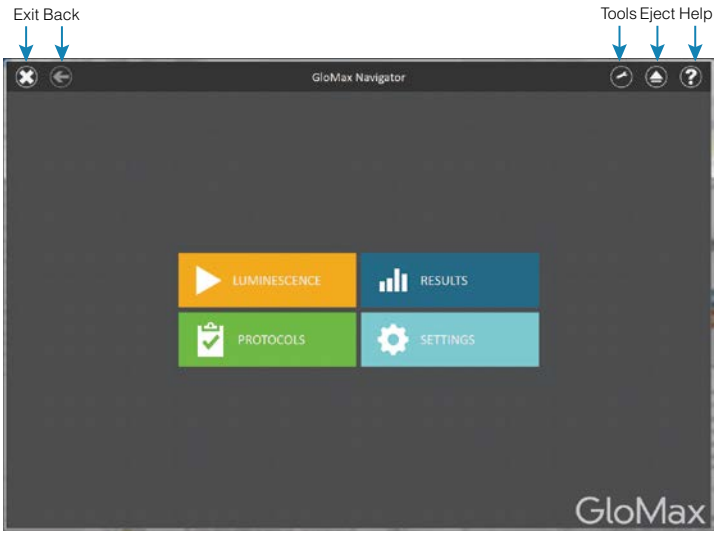


Figure 10. GloMax® Navigator 'Home' screen.

The Instrument name appears in the title bar of the user interface. The following navigation buttons are displayed across the top of the user interface window:

Exit. Tapping this button allows you to exit the GloMax® Navigator User Interface software and returns to the Windows® Operating System.

Back. Tapping this button returns you to the previous window.

Tools. Tapping this button expands a list of available tools such as accessing the **Injectors** to Prime, Reverse Purge and/or Flush and viewing the instrument information (**About**).

Eject. Tapping this button will move the Plate Tray to the Home position to add or remove a plate from the instrument.

Help. Tapping the **Help** button (question mark icon) activates the context-sensitive help for the current page of the GloMax® Navigator User Interface.

3.B. Quick Read Screen

Quick Reads are intended to allow users to perform a basic single-step measurement very easily. Simply define the plate map and the integration time for luminescence. Open the door, insert your plate, and press the **Start** button in the lower right corner to begin the plate read.



Figure 11. GloMax® Navigator 'Luminescence Quick Read' screen. On the plate map, blue wells are selected.

3.C. Protocol Screen

Touch **Protocols** from the 'Home' screen to access the list of protocols currently present in the software or create a new protocol. Use the buttons at the top left side of the screen to filter the list of protocols and display only **User**-created protocols, **Preset** protocols, **Smart** protocols or **All** protocols. The **Search** button is used to filter protocols based on a keyword search of the Name, Date/Time, User or Info fields. Additional searchable identifying information can be added to a protocol by selecting the checkbox to the right of the protocol, pressing the **Info...** button, and entering information using the keyboard that appears on the screen. Favorite protocols can be marked by tapping the **Star** adjacent to the protocol name. After marking a protocol as a "favorite" those protocols will automatically be listed at the top of the 'Protocol' screen to make locating them easier. There is no limit to the number of protocols that may be selected as favorites.

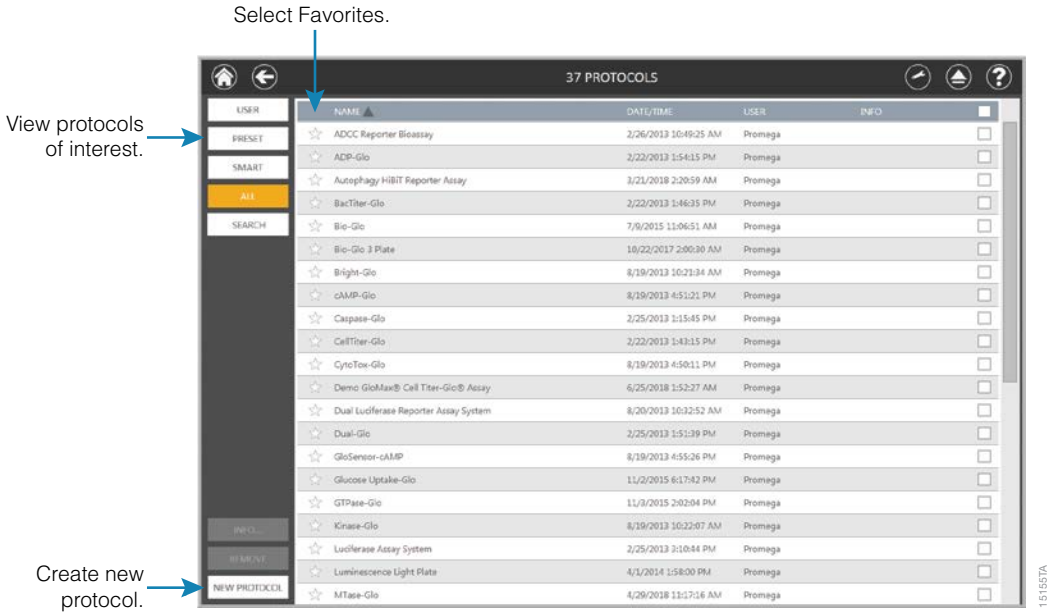


Figure 12. GloMax® Navigator 'Protocol' screen.

Only user-defined protocols may be deleted. To delete protocols, select one or more checkboxes to the right of the protocol and then press the Remove button. The user will be asked to confirm the request to delete protocols

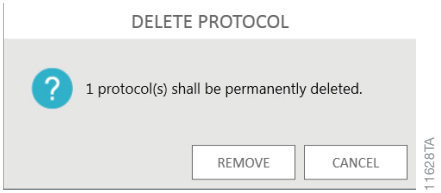


Figure 13. Delete Protocol message from the GloMax® Navigator software.

Smart Protocols

Smart Protocols are designed to provide the user with a guided setup of specific assays. Smart Protocols titled "Demo" should not be run for any other purpose than a demonstration of an assay kit. Following the data collection, the results are automatically analyzed for the user.

1. Tap the **Smart** button, and select the protocol of interest.
2. Follow the on-screen instructions. Insert the plate into the instrument.
3. Tap **OK** when ready to begin the protocol. The protocol will begin when **OK** is selected, so ensure the plate has been loaded into the instrument.
4. When the read is complete, the **Export** button will appear in the lower left corner of the screen. Upon selecting **Export**, the raw data will be exported to the location specified by the user. The **Analysis** button also appears to the right of the **Export** button. Selecting **Analysis** will analyze the results as described in Section 3.F, Analysis of Results.

Viewing Existing Protocols

1. To view details of an existing protocol, from the 'Protocols' screen, select the protocol of interest.
2. The protocol details will appear. If any changes are made to the protocol, the user has the ability to **Save** or **Save As** and provide a new name.
3. To run the protocol, press the **Start** button in the lower right corner of the screen.

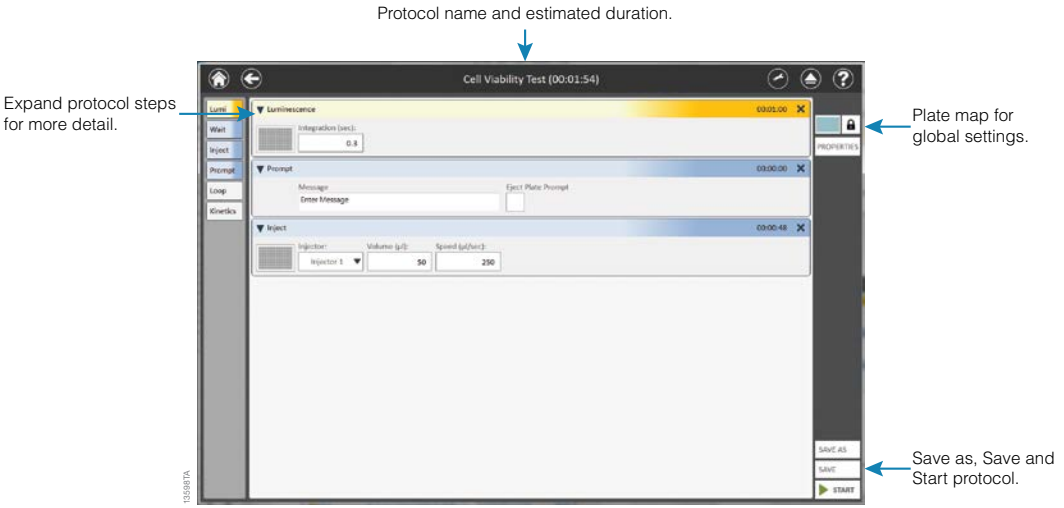


Figure 14. GloMax® Navigator 'Protocol' screen.

3.C. Protocol Screen (continued)

Creating a New Protocol

Basic Protocol Steps

1. To create a new protocol, from the 'Protocols' screen, tap the **New Protocol** button at the bottom of the screen (Figure 12).
2. You will be prompted to name the protocol. You also may provide a description, if desired.

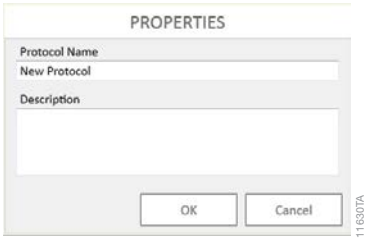


Figure 15. New Protocol name prompt from the GloMax® Navigator software.

3. Build your protocol by dragging and dropping protocol functions from the left panel onto the **Protocol Window**. Individual protocol functions are described in the Protoctol Functions section below. Use the **Properties** button on the right to modify the name and description of the protocol.

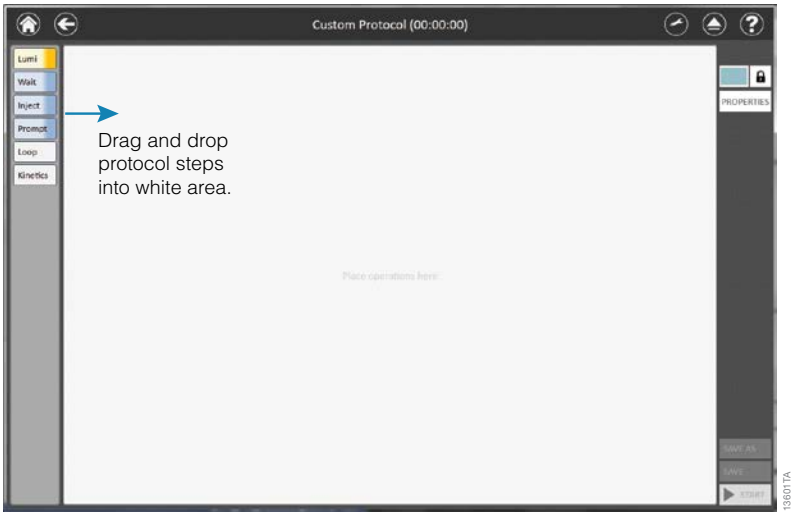


Figure 16. GloMax® Navigator 'New Protocol' screen showing drag and drop feature to create custom protocols.



Figure 17. GloMax® Navigator 'New Protocol' screen showing a step added to the protocol.

4. Select integration times and plate map (see below) as you build the protocol.
5. Rearrange steps by dragging and dropping as desired.
6. Delete steps by selecting the black **X** in the top right corner of the step.
7. Save the protocol by selecting either the **Save** or **Save As** button on the bottom right corner of the screen. If requested, enter any protocol name and description information and press the **OK** button. A user message will appear indicating that the protocol was saved successfully.
8. To run the protocol, press the **Start** button in the lower right corner of the screen.

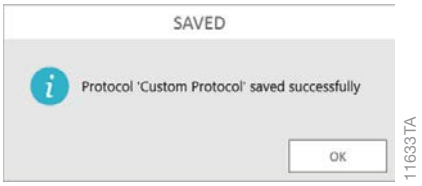


Figure 18. GloMax® Navigator New Protocol Successfully Saved user message.

Plate Maps

There are two ways to select a plate map for the measurement. The default is to apply the plate map to all steps within a protocol. In the upper right corner of the protocol, the user can lock or unlock the plate map. When locked (which is the default), the plate map is applied to each step of the protocol.

When the plate map is applied to each step of the protocol, only the plate map in the upper right corner may be modified. The plate maps within each step of the protocol are then shaded and cannot be modified.



Figure 19. When the plate map is locked, the map is applied to each step of the protocol.

3.C. Protocol Screen (continued)

When the plate map is unlocked, each step of the protocol can have a different plate map. The plate map in the upper right corner in this case is shaded and cannot be modified, whereas the plate maps within each step of the protocol are now active and the user can modify each step as desired.

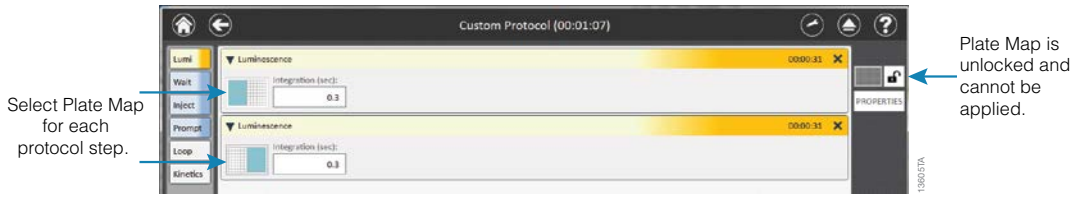


Figure 20. When the plate map is unlocked, a different plate map can be created for each step.

Whenever a protocol is locked, the plate map that is indicated in the upper right corner will apply to each protocol step. Notice in Figure 20, step 1 of the protocol has columns 1–6 selected, and step 2 has columns 7–12 selected. When locking the protocol, each step will revert to the global plate map.

Luminescence Integration Times

Integration times for luminescence reads may be selected from 0.1 to 10 seconds.

Protocol Steps

A variety of protocol steps can be used to customize your protocol of interest. These functions are added by dragging the button function in the left column of the 'New Protocol' screen into the protocol.

The functions can be expanded and contracted by selecting the black triangle at the top left corner of each function. They may be removed by selecting the black **X** at the top right corner of each function.



Figure 21. GloMax® Navigator New Protocol Functions.

Wait Function

Use the **Wait** function to pause or incubate before taking a measurement. After selecting the duration time window, a keypad will appear in which you can enter the time in hh:mm:ss format. Enter between 1 second and 72 hours in increments of 1 second.



Figure 22. Wait function screens.

Inject Function

Dual Injectors are an optional accessory for the GloMax® Navigator Instrument. On instruments equipped with dual injectors, you can choose which injector to use (Injector 1, Injector 2 or both), the desired injection volume (5µl–200µl) and the injection speed (20µl/sec to 500µl/sec). Select the wells that will be injected by touching the plate map and selecting the desired wells.

Warning: Make sure sufficient space is available in the well to accept the injected volume. Failure to do so may cause an overflow of reagent and/or sample into adjacent wells or into the interior of the instrument. See Cleaning and Maintenance (Section 5) if reagent is spilled inside the instrument.

The injectors may also be accessed from the **Tool** icon in the menu bar.

See Setting Up and Operating the Injector System (Section 4) for more details.

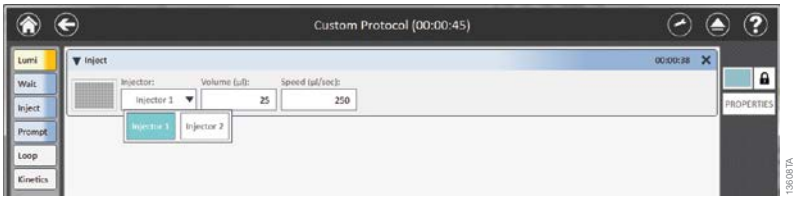


Figure 23. Inject Function.

3.C. Protocol Screen (continued)

Prompt

Use a message **Prompt** to provide the user with instructions. Tap **Enter Message** in the prompt, and a keyboard will appear for the user. Type a user message, then tap **OK** to enter it into the protocol.

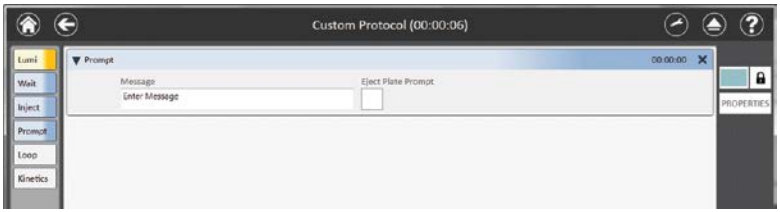


Figure 24. Prompt Function.

When the **Eject Plate Prompt** box is checked, the 'Prompt' screen shown in Figure 25 appears to the user during protocol, with the option to open the door.

If **Eject Plate** is selected, the instrument will home and the user can then open the door and remove the plate. After returning the plate into the Plate Tray and closing the door, the user may then select **Continue**. When **Continue** is selected, the protocol continues to the next step. These prompts and commands are useful if performing a multi-step protocol where the user must add reagent to the samples between measurements prior to continuing the protocol.

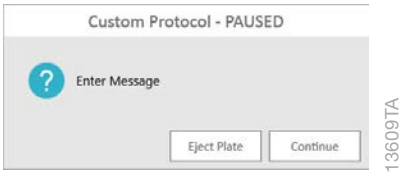


Figure 25. 'Prompt' screen with the Eject Plate option.

Loop

Loops are used to perform a set of steps on a **per-plate basis** over a fixed time interval, then repeating the set of steps a desired number of times.

Note: The interval (min) field defines the minimal interval of time for one loop iteration. If all of the operations within the loop are completed before the specified interval time has passed, the software will wait for the specified interval. If all of the operations take longer than the specified interval time, the software will continue to the next iteration without waiting.

Note: Loops can be used with luminescence detection and protocol functions. A maximum of 100 loops can be performed within a single loop step.

1. Add the **Loop** step to the protocol by dragging and dropping the **Loop** icon into the protocol.

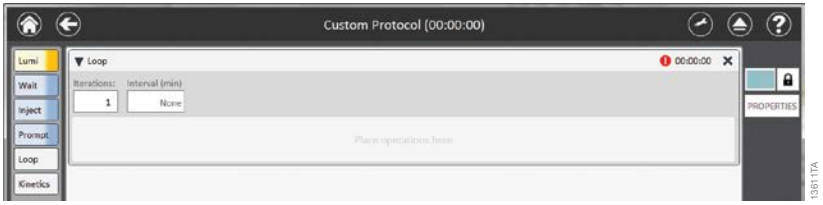


Figure 26. Loop function.

2. Select the desired number of iterations.
3. If the same plate map will be used for each step of the protocol, lock the plate map in the upper right corner to select the wells.

   If a different plate map is to be used for various steps, unlock the plate map in the upper right corner, then select the plate map icon within each step of the loop to select the desired wells.
4. Begin building the desired workflow by dragging and dropping the desired steps inside the Loop step. They should be contained in the Loop step.

Note: If adding an injector step inside a loop function, ensure that there is sufficient space in the well to accommodate multiple additions of reagent.

5. Rearrange the steps by touching and dragging the appropriate steps.

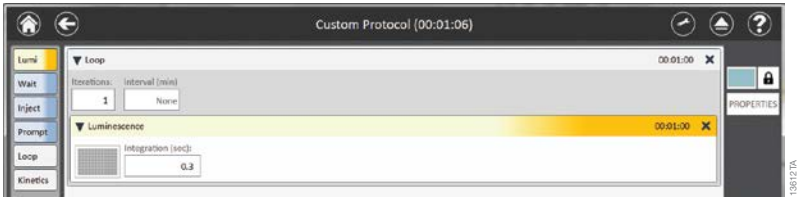


Figure 27. Loop function with with a Luminescence step within the Loop container.

Kinetics Function

The **Kinetics** function is used to perform a set of steps on a **per-well basis**, then repeating the set of steps a desired number of times (i.e., inject and read one well multiple times before proceeding to the next well).

Note: Kinetics can be used with all protocol functions except for user prompt functions. Loops may not be placed within a kinetic step, but kinetic steps may be placed within Loops. A maximum of 250 kinetic reads in 1-unit increments can be performed within a single kinetic step. For example, 10 readings with a 1-second interval means that 1 reading is taken every 1 second for 10 seconds.

3.C. Protocol Screen (continued)

Kinetics Function (continued)

1. Add the **Kinetics** step to the protocol by dragging and dropping the **Kinetics** icon onto the protocol.

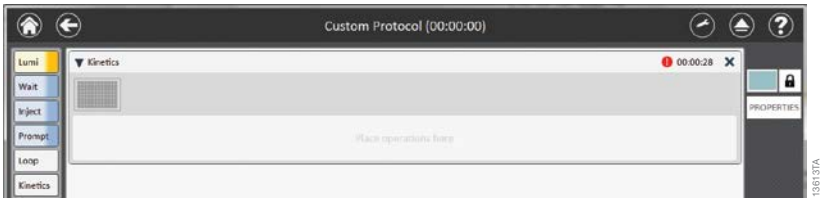


Figure 28. Kinetics function.

2. All well-associated operations within the kinetic block must have the same well selection. The plate maps of these operations are not individually editable.
3. Begin building the desired workflow by dragging and dropping the desired steps into the kinetic step. They should be contained within the kinetic step.

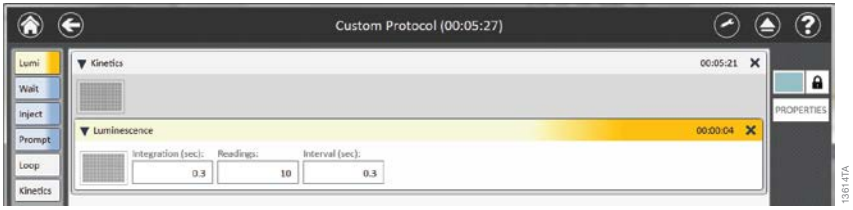


Figure 29. Kinetic Function with a Luminescence step within the Kinetic container.

4. Select the number of readings and interval (seconds) between each reading.

   Note: Typically the protocol steps are completed before the completion of the interval time, and therefore the instrument will pause until the completion of the interval time duration. However, if the protocol steps take longer to complete than the interval time, the protocol will complete all steps and then immediately continue without pausing for the interval time duration. Otherwise, once all steps are completed the protocol will pause until the interval time duration has been reached.
5. Rearrange the steps by touching and dragging the step.

3.D. Running a Protocol

When running a protocol, the results will display in real-time as the protocol proceeds. Results are automatically saved within the GloMax® Software. However, they can also be exported to a variety of locations, including the local Tablet PC, to a USB flash drive, a network drive or to a cloud location. Upon completion of the protocol, results can be analyzed using the Analysis functions in the GloMax® Software as described in Section 3.F, Analysis of Results.

1. After pressing the **Start** button on a Preset or User-Defined protocol, the user will be requested to provide a name for the protocol run on a 'Start Protocol' screen. By default the name for the run will be the name of the protocol with the current date and time appended to the end. Press the **Start** button on the 'Start Protocol' screen to begin the protocol.
2. As a protocol is running, the plate map will automatically appear on the screen, and the data will appear as they are collected. If multiple reads of the plate are performed, each result can be displayed by selecting the step that generated that result in the left navigation column.
3. Once the protocol is finished, results are shown in a heat map format to indicate wells with higher or lower signals in comparison to the entire plate (Figure 30). The software automatically scales the color selection, assigning the highest values red and the lowest values blue, along a gradient (Figure 31). To turn off the heat mapping of the data, touch the small plate map button at the top right side of the information bar above the data plate map. Touch the ellipsis to the left of the small plate map button to enter notes that will appear in the information bar.



Figure 30. Results plate map with heat map display.



Figure 31. Example of heat map colors applied to the results in the plate map.

Within the plate map, each individual sample may be viewed by tapping the well of interest (Figure 32).

3.D. Running a Protocol (continued)

Kinetic results display a graphical representation of the data during the course of the kinetics read (Figure 33). Data are automatically scaled based on the results within each well. Zoom in to view the axis for each well as desired. Users can use touch-screen gestures to zoom in or out, or to pan the well map.

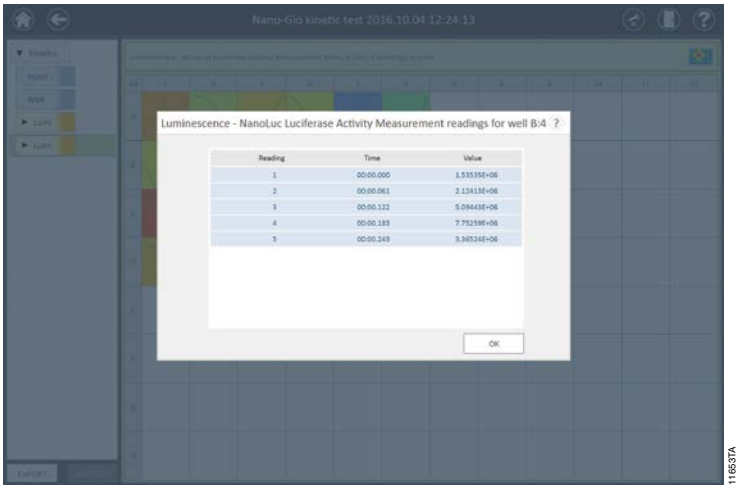


Figure 32. Example of individual well result for kinetic data.

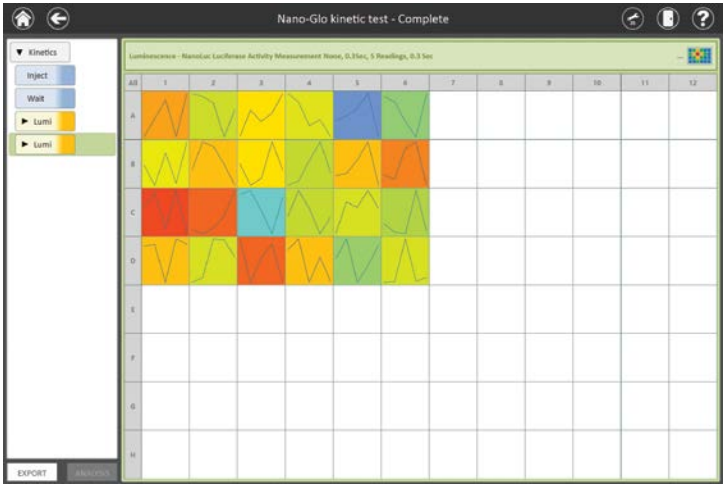


Figure 33. Results plate map for kinetic data.

4. In addition to viewing the data resulting from the protocol, the buttons to the lower left of the screen can be used to start an **Analysis** of these results or **Export** results.

   a. To analyze data, tap the **Analysis** button (bottom left corner of screen in Figure 33). Analysis functionality is described in Section 3.F, Analysis of Results. For certain result types (e.g., protocols containing kinetic reads), the **Analysis** button will be inactive because analysis is not supported for these protocol types.

   b. To export data, tap the **Export** button (bottom left corner of screen in Figure 33). The software will export the data to the manual export folder specified by the Administrator settings (see Section 3.H, Administrator Settings). By default data is exported in the following formats: a comma-separated value (.csv) file and a GloMax® portable data format (.raw) file. Depending on administrator settings, the data can also be exported as a Microsoft Excel® workbook (.xlsx) file and a Portable Document Format (.pdf) file. When interfacing with a LIMS, we recommend using the .csv file and importing according to your LIMS software guidelines.

      After export is complete the 'Export' screen is displayed (Figure 34). Tap the **Open** button to open the export location in a Windows® file browser, or tap the **Done** button to exit the 'Export' screen and return to the results plate map.

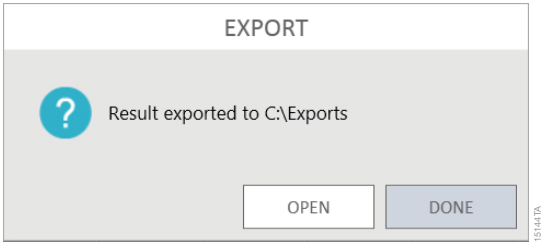


Figure 34. Export of results. This screen is displayed upon the successful export of results to the administrator-defined manual export location. Use the **Open** button to open the export location in a Windows® file browser or tap the **Done** button to return to the results plate map.

3.D. Running a Protocol (continued)

The exported Excel® file can be opened directly within Microsoft Excel® or Excel® viewer (Figure 35). Multiple tabs are located in the spreadsheet to view the data in plate map format or linear format by well. The following table shows the information in each tab of the Excel® export file.

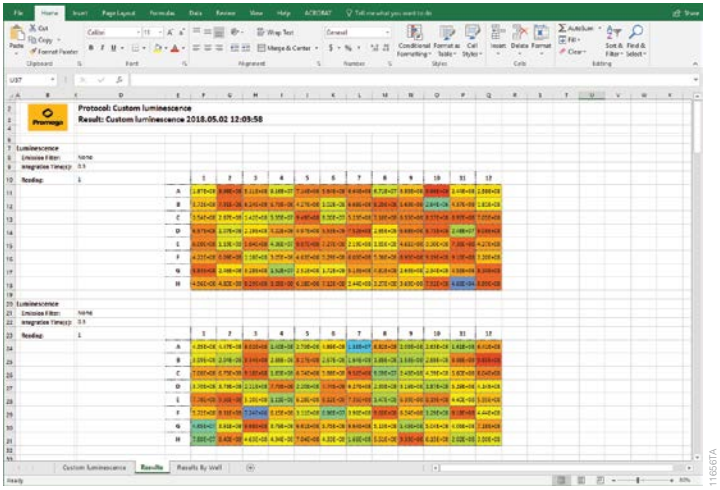


Figure 35. Results export to Microsoft Excel® workbook.

Table 1. Excel® Export Tab Information.

Tab Name	Description	
Protocol Name	Information regarding the protocol, user, date, instrument, serial number, firmware version, software version, plate type	
Results	Read parameters and plate map view of the data with heat map colors applied	
Results By Well	**Readings taken displayed by well. Columns include:**	
	n	Read number
	Time By Well (sec)	Elapsed time since the first read in the well
	Time By Plate(s)	Elapsed time since the first read in the plate
	Value	Raw data for the read
	Part	Not Applicable
Results Table (Kinetic and Loop Reads Only)	**Table format of data from all reads. Columns include:**	
	Read Type	Luminescence
	Read Number	The read number for the row of data
	Row time (sec)	Time in seconds for the first read of the row
	Row time (min)	Time in minutes for the first read of the row
	Well Number	Columns indicating the well for each read
	Part	Not Applicable
	Loop#	(Loop Only) Indicator of loop number
	Iteration#	(Nested Loops Only) Indicator of loop iteration
Results Charts (Kinetic Reads only)	Graphical display of the plate map with kinetic read curves	

5. Upon completion of the protocol, the results are saved to the list of results accessible through the 'Results, Templates and Analyses screen'. See Section 3.E, 'Results, Templates and Analyses' Screen for instructions on accessing saved results.

3.E. 'Results, Templates and Analyses' Screen

The 'Results, Templates and Analyses' screen is where the user can access any saved results, analysis templates and data analyses. From this screen, results, templates and analyses can be viewed, exported, imported or deleted.

1. To view a list of results from previous runs, analysis templates that have been created or data analyses that have been performed, from the 'Home' screen, tap the **Results** button.
2. The Left Navigation column of the 'Results, Templates and Analyses' screen presents the user with several options regarding the displayed information and functions that can be performed. At the top of the Left Navigation column are functions to filter the list of displayed results, templates or analyses.
    a. At the top of the Left Navigation column, the user can filter the displayed information by time period using the calendar search boxes. Use the **Start Date** and **End Date** buttons to specify a date range over which to view results, templates or analyses. These buttons will open a calendar on which the start date and end date can be selected. Press the **All** button to view all results, templates or analyses.
    b. Results, templates and analyses can also be filtered using a keyword search for text in the Name, User and Info columns. Touch the **Search** button to open the on-screen keyboard and enter a search term.
    c. Users can add identifying information to any list entry for results, templates or analyses. Check the boxes on the right side of the list entries to select those entries. Touch the **Info…** button to enter identifying information and associate it with the selected list entries.
3. In the center of the Left Navigation column, the user can press the **Results, Templates** or **Analyses** buttons to view the corresponding lists of entries. Creating Analysis Templates and performing Analyses are covered in Section 3.F, Analysis of Results.
4. At the bottom of the Left Navigation column, the user can **Export, Import** or **Remove** selected list items. These functions are described in depth below.
5. Touch any of the list entries to view the associated results, template or analysis.

‘Results, Templates and Analysis’ Screen Functions

The functions present on the ‘Results, Templates and Analysis’ screen allow users to **Export, Import** and **Remove** items (Figure 36), which are described below. For analysis templates, there is also a function to create a **New Template** that will be covered in Section 3.F, Analysis of Results.

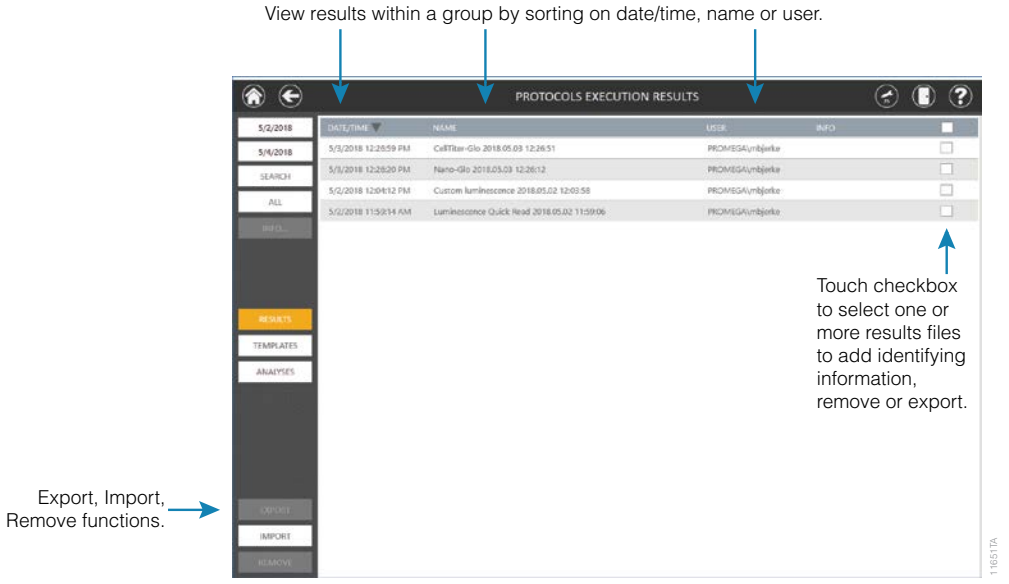


Figure 36. ‘Results, Templates and Analysis’ screen functions. This screen is used to display **Results** that have been generated, analysis **Templates** and data **Analyses**. **Export, Import** and **Remove** buttons in the lower left corner of the screen can be used to perform their indicated functions.

1. Exporting Results, Templates and Analyses

Results, Templates and Analysis that have been created by a user can be exported from the GloMax® software in a variety of file formats as specified by the administrator (see Section 3.H, Administrator Settings). By default results files are exported in a comma-delimited (.csv) and a proprietary portable data format (.raw) that can be imported into the GloMax® software on another PC. Administrators can also specify that results files be exported in Microsoft Excel® (.xlsx) and/or Adobe PDF (.pdf) format. Templates and Analyses are exported from this screen using proprietary portable formats (.template and .analysis) that can be imported into the GloMax® software on another PC.

3.E. 'Results, Templates and Analyses' Screen (continued)

1. Exporting Results, Templates and Analyses (continued)

Export existing results, templates or analyses by performing the following steps:

a. From the 'Home' screen, touch the **Results** button.

b. On the left side of the 'Results, Templates and Analyses' screen, touch the **Results, Templates** or **Analyses** button to access the appropriate list of items for export.

c. Check the boxes on the right side of the item(s) that you wish to export. You can use the checkbox in the header of the table to select/deselect all displayed list items. When items have been selected, the **Export** button near the bottom left side of the screen becomes active (Figure 37).

d. Touch **Export** to export the selected item(s). All exported files will be saved in the Administrator-specified manual export path and have the date and time of the export appended to the name.

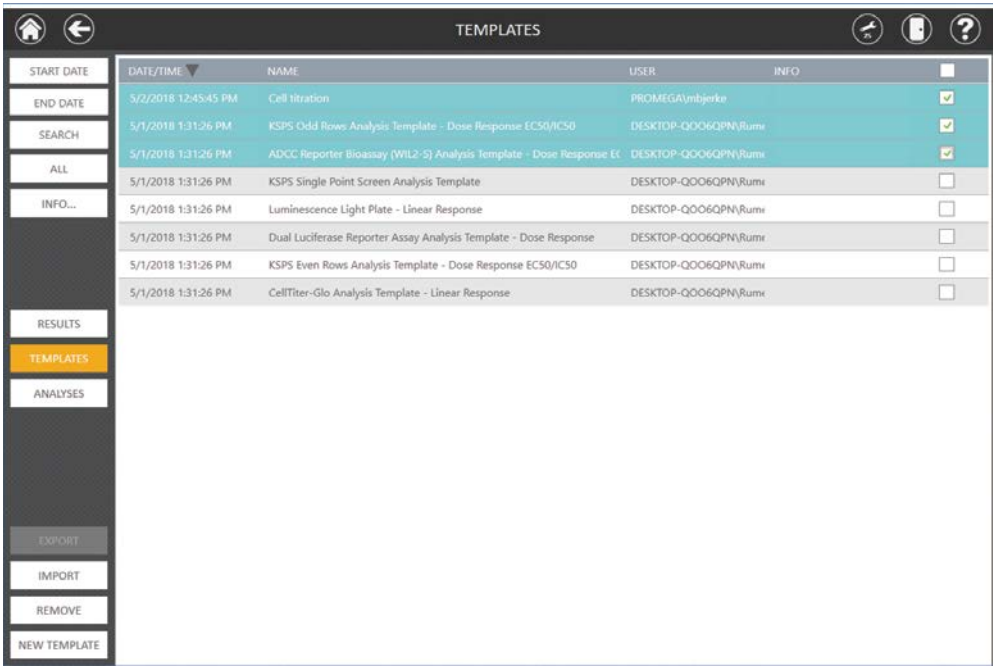


Figure 37. Functions of the 'Results, Templates and Analyses' screen. From the 'Results, Templates and Analyses' screen, you can **Export** or **Remove** one or more list items, **Import** a result, template or analysis (.raw, .template, .analysis) file or create a **New Template**.

2. *Importing Results, Templates and Analyses*

Results, templates and analyses that have been exported from the GloMax® software can be imported for use on another PC running the GloMax® software. Perform the following steps to import results, templates or analyses:

a. From the 'Home' screen, touch the **Results** button.

b. On the left side of the 'Results, Templates and Analyses' screen, touch the **Results, Templates** or **Analyses** button to import a file appropriate for the desired list.

c. Touch the **Import** button near the bottom left side of the screen to open the 'Import Results', Import Templates' or 'Import Analyses' screen, depending on the current list being viewed (Figure 38).

d. Navigate to the location of the file(s) you wish to import. The yellow boxes across the top of the screen indicate the currently selected path. Red boxes in the lower portion of the screen represent folders, and blue boxes in the lower portion of the screen represent files with the extension appropriate for the list currently being viewed. Results will have a (.raw) extension, templates will have a (.template) extension and analyses will have a (.analysis) extension. Touch the desired file(s) to import. Selected files will have a yellow border around the blue box.

e. Touch **OK** to import the selected file(s) into the list.

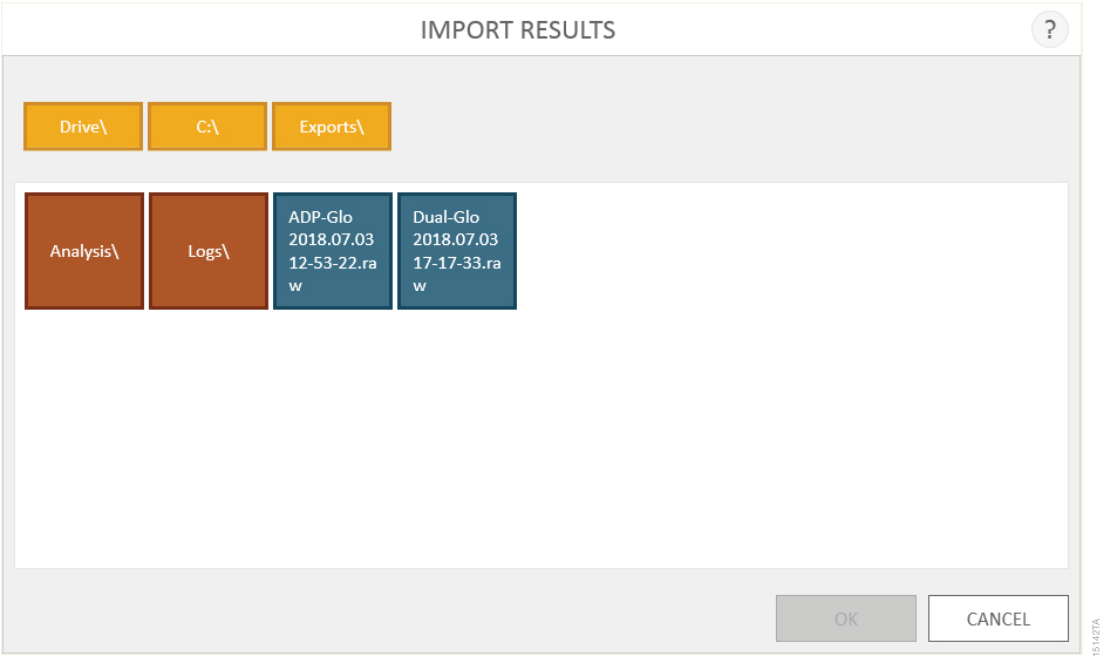


Figure 38. Importing Results, Templates or Analyses. Use the file browser screen to browse to the location of the desired import file.

3.E. 'Results, Templates and Analyses' Screen (continued)

3. Deleting Results, Templates and Analyses

Results, Templates and Analyses can be deleted from the GloMax® software by performing the following steps:

a. From the 'Home' screen, touch the **Results** button.

b. On the left side of the 'Results, Templates ans Analyses' screen, touch the **Results, Templates** or **Analyses** button to view the desired list.

c. Check the boxes on the right side of the list items that you wish to delete. Use the checkbox in the header of the table to select/deselect all displayed list items. When list items have been selected, the **Remove** button near the bottom left side of the screen becomes active.

d. Touch the **Remove** button on the bottom left side of the screen. You will be prompted to confirm that you wish to delete the selected list items. Select **Yes** to permanently remove the selected list items or **No** to cancel this action.

3.F. Analysis of Results

Analysis features provide a means of interpolating unknowns from a standard curve, analyzing data for linearity, estimating EC_{50}/IC_{50} and determining Z´-Factor. Analysis templates guide analysis and dictate what calculations will be applied to the data. Creating an analysis template includes defining the curve fit type, data types, well naming, concentrations/dilution factors and units that will be applied to the analysis of raw data from a plate read operation.

Note: The analysis functions inherent to the GloMax® software analyze data that have been generated on a GloMax® Instrument. It is the responsibility of the individual researcher to apply the analysis curve fit type that best fits the data and evaluate the results of any analyses for validity and accuracy.

The workflow for analyzing data includes:

- Opening a Result file.
- Applying an analysis template.
- Performing an analysis.
- Editing the result graph.
- Saving and exporting the analysis.

Opening a Result File

1. Results are accessed in two ways: on the screen immediately following the completion of a plate read or from the the 'Results' screen. To access the 'Results' screen, from the 'Home' screen tap the **Results** button.
2. The middle section of the Left Navigation column allows users to toggle the display on this screen between **Results, Templates** and **Analyses** (Figure 39).

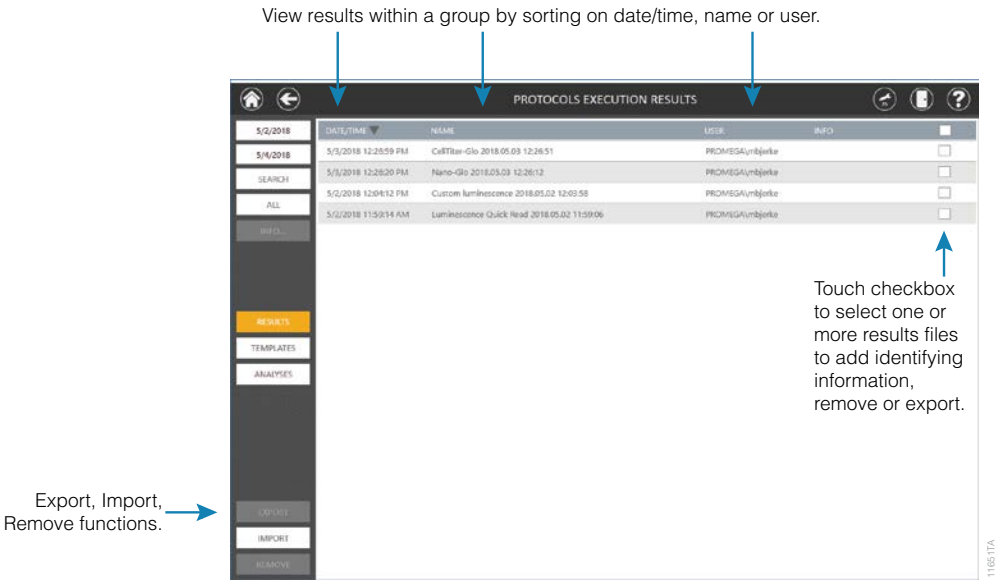


Figure 39. The 'Results, Templates and Analyses' screen.

3. Tap the **Result** file of interest.
4. Select the **Analysis** button in the lower left corner of the screen.

Applying a Pre-Existing Analysis Template

The analysis software contains example templates that can be used for data analysis as they are provided, or they can be modified to create a custom analysis template for your experimental needs.

1. Opening a result file will take the user to the 'Templates' screen.
2. Select the saved template from the list.

3.F. Analysis of Results (continued)

Applying a Pre-Existing Analysis Template (continued)

3. When opening a result file containing two reads, the software will prompt the user to either take a ratio of those two reads or proceed with analysis without taking a ratio. If prompted, select the formula mode before proceeding to application of an analysis template:

   Div (r1/r2) and Div (r2/r1): The user dictates which read is in the numerator and which read is in the denominator. The ratio options are only available for read files containing two plate reads. After computing ratio, select **Continue** to proceed with analysis of the ratiometric data. These options might be chosen if a ratio of two absorbance measurements is desired or if one wishes to compute a ratio of an experimental and control reporter prior to analysis.

   Export Ratio: If no further analysis of the ratio is desired, selecting **Export Ratio** will export the ratio directly to Excel®. This option might be chosen if a ratio of two absorbance measurements is desired and with no further analysis performed.

   Multiple Reads: Choose this option if the multiple reads shall be analyzed separately without taking a ratio. This option might be chosen if a multiplexed assay was performed consisting of two different plate reads, with each to be analyzed separately.

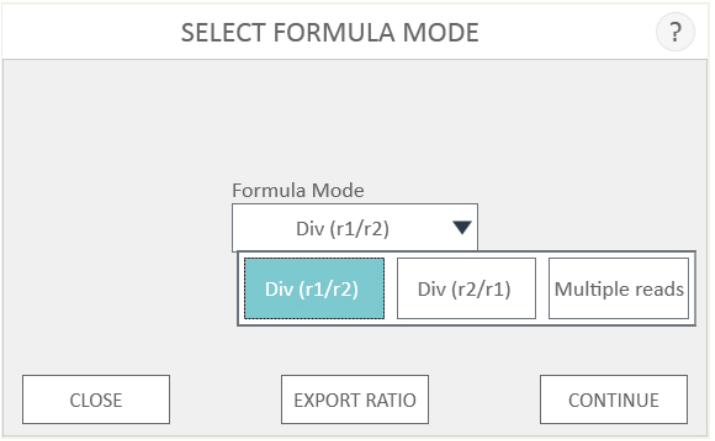


Figure 40. Compute a ratio of a two-read result file, or select Multiple reads to analyze each read separately.

Creating a New Analysis Template

New analysis templates can be created prior to Analysis, or they can be created over existing data and saved to the Templates list. Analysis templates can be applied to result files consisting of one read, or multiple reads.

1. Select **New** in the lower left corner of the 'Templates' screen.
2. When opening a result file containing two reads, the software will prompt the user to either take a ratio of those two reads or proceed with analysis without taking a ratio. Select the formula mode before proceeding to application of an analysis template. See descriptions of formula mode options in **Applying a Pre-Existing Analysis Template.**
3. The 'New Template' screen will open with analysis options on the left side and a plate map on the right side (Figure 41).

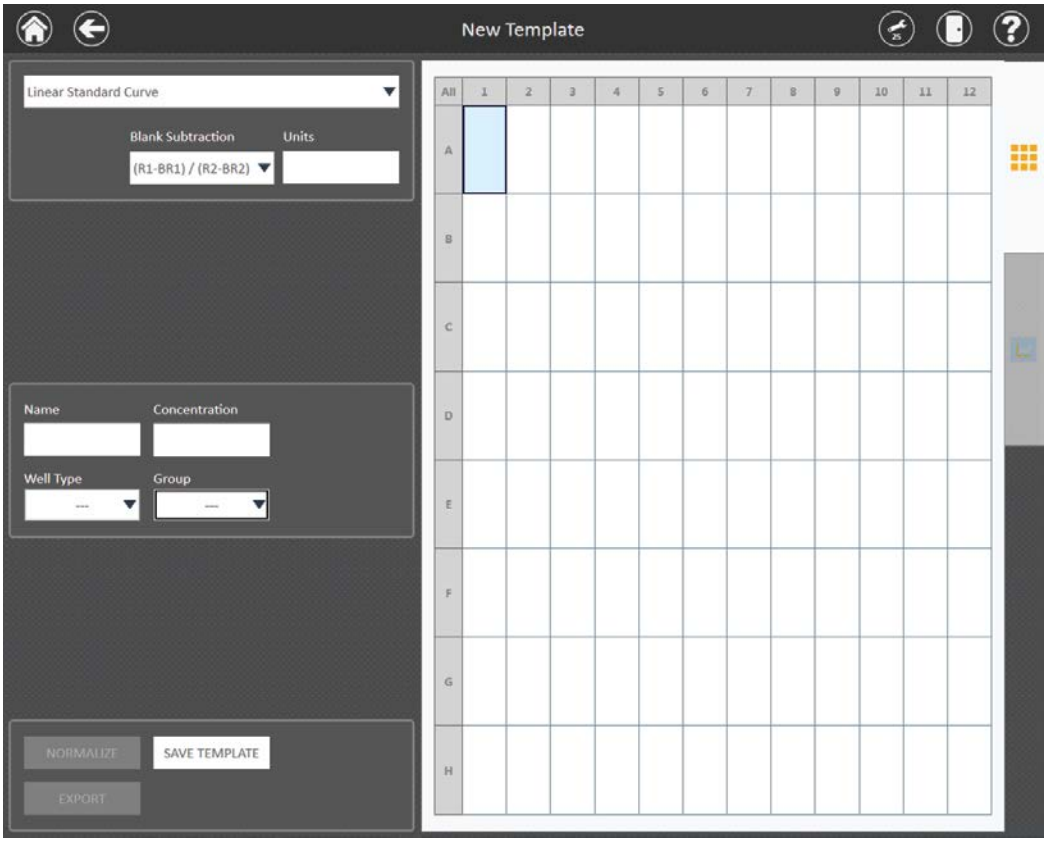


Figure 41. New Template creation. From this screen the user will define the curve fit type, units, well types, concentrations/dilution factors and names in the analysis template.

4. Touch the drop-down menu at the top left side of the screen to select the Curve Fit type for this template. There are 11 analysis curve fit types to choose from. The following tables highlight each analysis curve fit type, the function of each analysis and the formula used.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

Table 2. Analysis Curve Fit Types That Allow Assignment of Known, Unknown, Blank, Control 1 and Control 2 Well Types.

Analysis Curve Fit Type	Function of Analysis Type	Analysis Formula
Linear Standard Curve	Linear regression; interpolate Unknown concentration from curve	$y = f(x) = mx + b$
2nd Polynomial	Nonlinear regression, second order; interpolate Unknown concentration from curve	$f(x) = a + bx + cx^2$
3rd Polynomial	Nonlinear regression, third order; interpolate Unknown concentration from curve	$f(x) = a + bx + cx^2 + dx^3$
Power Regression	Nonlinear regression; interpolate Unknown concentration from curve	$f(x) = ax^b$
Four-Parameter Curve	Nonlinear regression; interpolate Unknown concentration from curve; EC_{50}/IC_{50} determination	$f(x) = B + \left(\frac{T-B}{1+10^{(logIC50-logx)S}}\right)$
Five-Parameter Curve	Nonlinear regression; interpolate Unknown concentration from curve; EC_{50}/IC_{50} determination	$f(x) = B + \left(\frac{T-B}{(1+10^{(logIC50-logx)S})^S}\right)$

Table 3. Analysis Curve Fit Types That Allow Assignment of Known, Blank, Control 1 and Control 2 Well Types.

Analysis Curve Fit Type	Function of Analysis Type	Analysis Formula
Dose Response EC_{50}/IC_{50}	Nonlinear regression; four-parameter curve fit; EC_{50}/IC_{50} determination	$f(x) = B + \left(\frac{T-B}{1+10^{(logIC50-logx)S}}\right)$
Linear Response	Linear regression	$y = f(x) = mx + b$
Point to Point	Connects points together with a straight line	No formula assigned
Cubic Spline	Connects points together with a smooth line	No formula assigned
Z´-Factor	Calculates Z´-Factor	$Z'\text{-}Factor = 1 - \left(\frac{3(\sigma_1 + \sigma_2)}{\lvert\mu_1 - \mu_2\rvert}\right)$

5. Touch the **Units** text box to open a keyboard and specify the unit of measurement for concentration on the entire plate. Only one unit of concentration can be specified for the plate. Select **Insert** in the lower right corner of the keyboard to access a list of Greek letters and characters, fractions or other commonly used scientific labels.

6. Touch and drag to select wells on the plate map that will contain samples of a given type. From the Well Type drop-down box select the corresponding well type (**Unknown, Known, Blank, Control**) that you wish to assign to those wells (Figure 42). For any Unknown wells, the user also may enter a sample volume.

   To select nonadjacent wells, touch a well and hold down until a rectangle appears, and continue with selection.

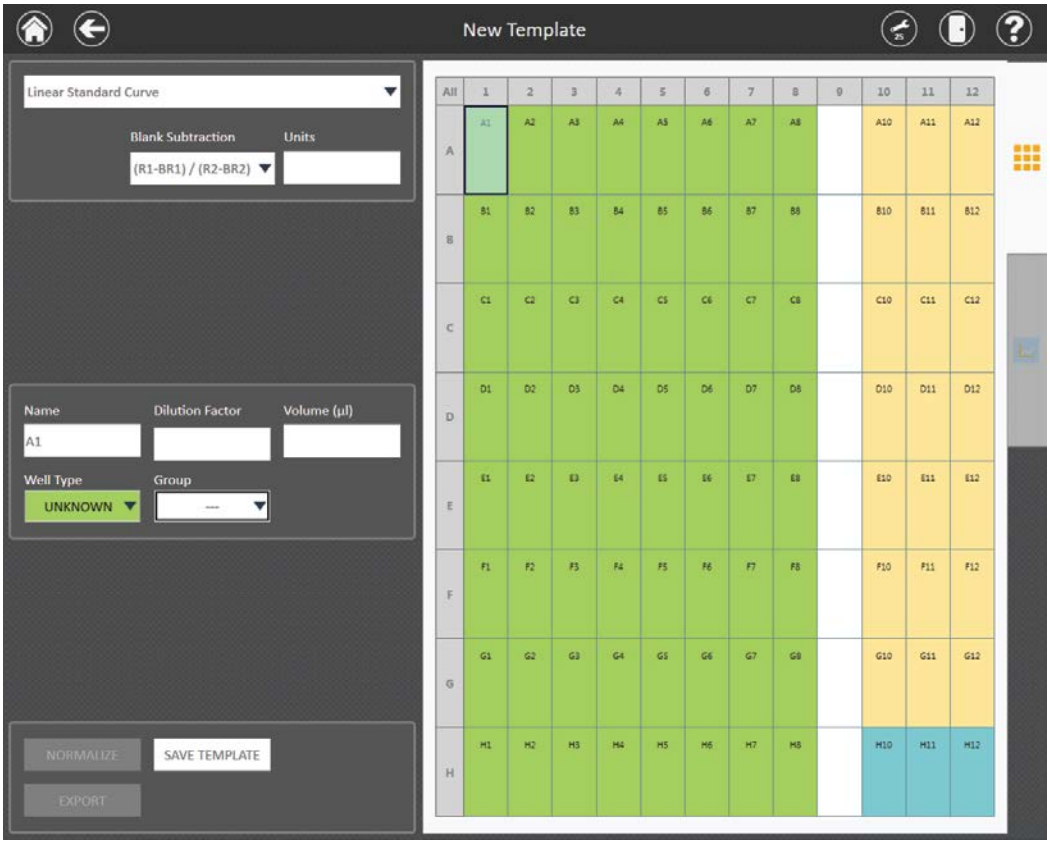


Figure 42. Template with well designations assigned. In this figure unknown, known and blank well designations have been assigned across a plate.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

Well Type Descriptions:

Unknown: A well where the concentration of the sample is unknown. It is possible to set a name, dilution factor and volume for this type of well.

Known: A well where the concentration of the sample is known. You can set a name and concentration for this type of well.

Blank: A well containing a blank for the experimental data set. The average values of all blank wells will be subtracted from all Known, Unknown and Control wells prior to analysis.

Control: Two controls may be selected, indicated as Control 1 and Control 2. Both Controls are required for Z´-Factor analysis. Only one control may be used for % Control and Fold-Change data normalization.

Blanks are subtracted from experimental wells as part of the analysis. Blanks that are assigned to a specific group will be subtracted from that group. Blanks not assigned to a group will be subtracted globally from any non-blank sample well.

Two blank options are included for dual-read result files:

(R1−BR1)/(R2−BR2) or (R2−BR2)/(R1−BR1): Pending how the ratio of the dual-read result is computed (Figure 40), the numerator or denominator will include the subtraction of the associated blank from Read 1 (R1) or Read 2 (R2) accordingly. This blank option is applicable to dual-read assay result files such as those generated with the Nano-Glo® Dual-Luciferase® Reporter Assay System.

(R1/R2) – (R1B/R2B): A ratio of the blank from read 1 and read 2 can be subtracted from the ratio of the reads from the experimental wells.

7. After assigning the well types on the plate, select the wells, which all should be named the same (e.g., all wells that contain the same sample or treatment set). Once the wells are selected, touch the Name text box and enter the name that should be applied to all of the selected wells (Figure 43).

   Note: To be considered a complete data set, all Known wells within a given treatment set or standard curve set must have the same name. For example, if naming the Known wells for a standard curve, use an identical name (“Standard”, “Stand”, “Known”). For Unknown wells, all wells of the same sample (regardless of dilution factor) should have the same name even if they are not replicates of one another. The identical names ensure the software applies the same analysis function to the wells.

   As the template is created, replicates are identified using a combination of Well Type, Name, Concentration/Dilution Factor and Volume. The number in the upper right corner signifies the replicate number for that well.

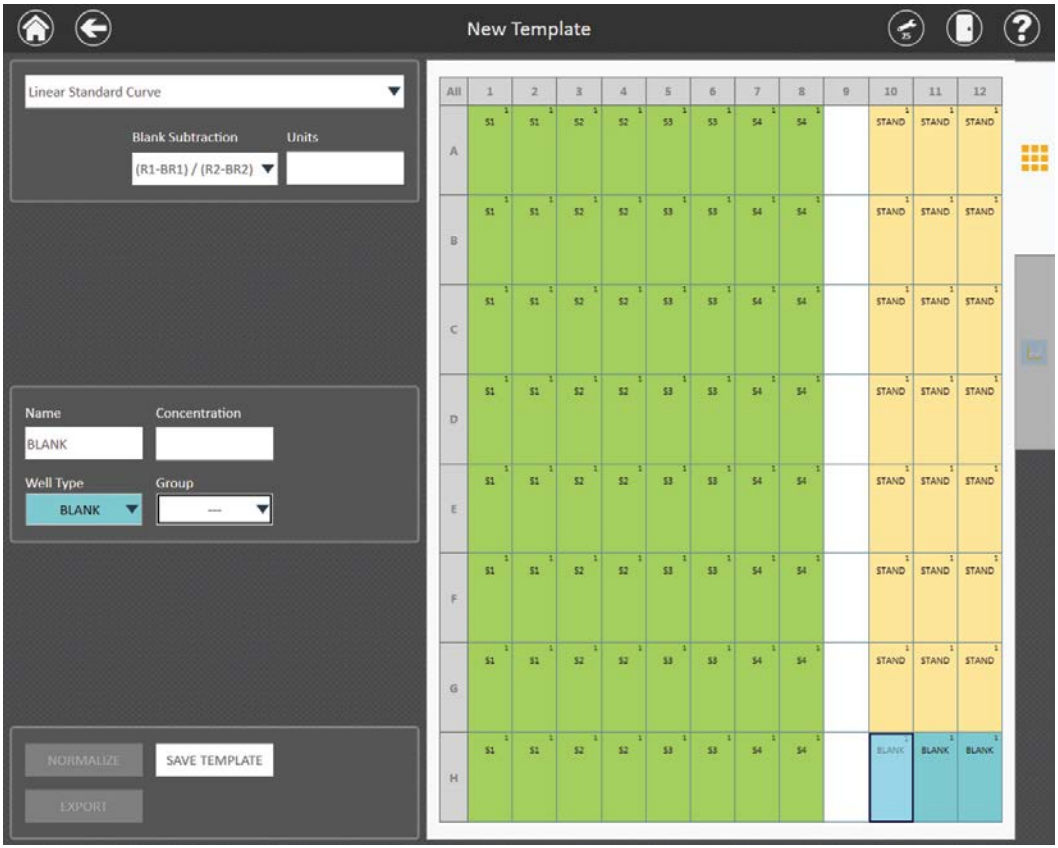


Figure 43. Well naming. Well names assigned to individual wells. S1–S4 names have been assigned to Unknown wells containing replicates of individual samples. STAND name has been applied to the replicates in the standard curve, and BLANK has been assigned to the Blank wells.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

8. Select all wells that have the same dilution factor or volume. Once the wells are selected, touch the Concentration or Dilution text box and assign the concentration or dilution factor value to the selected wells (Figure 44). For Unknowns, input a Volume (in µl) that represents sample input volume in the well. For example, if 1µl of sample volume was placed into the well, 1µl volume should be entered in the Volume (µl) box.

   Note: The **Clear** button can be applied if a mistake is made during template creation. Clearing a well removes all well type, naming, concentration/dilution factor and volume information associated with the well.

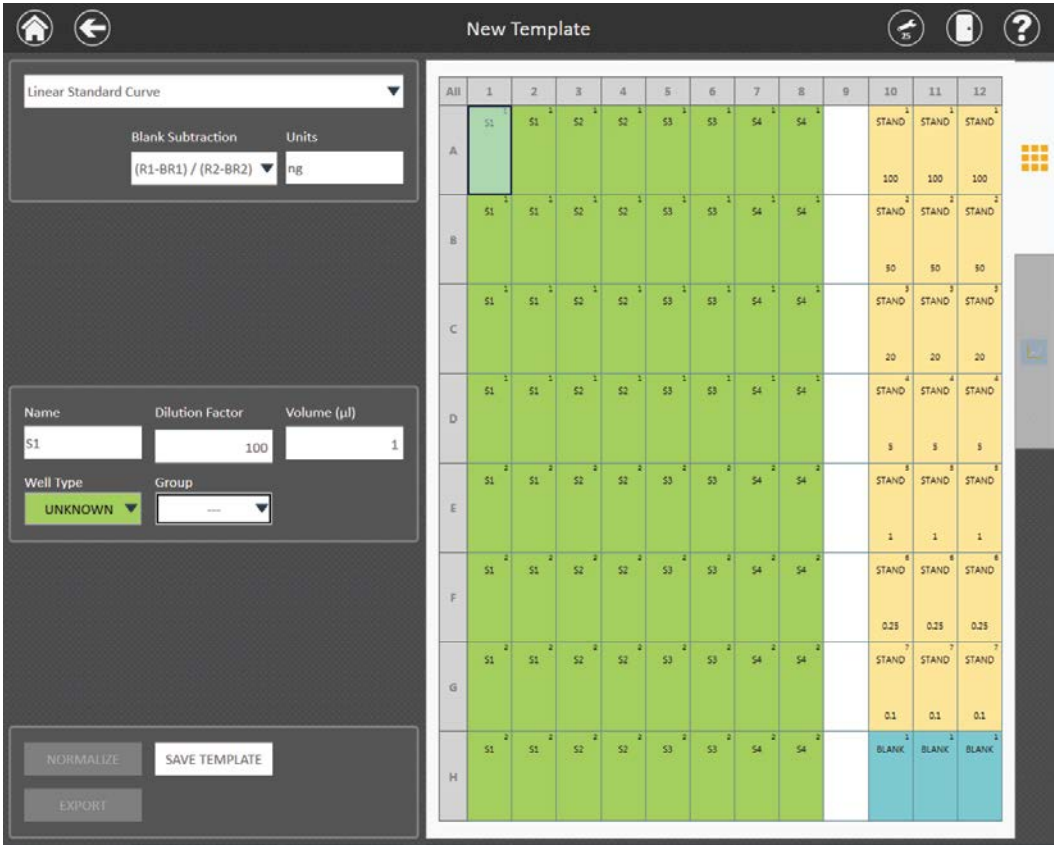


Figure 44. Concentrations and dilution factors. In this figure, concentrations have been applied to the standard curve replicates (shown at the bottom of each well). Dilution factors have been applied to the Unknowns (100 for wells A1–D8, 200 for wells E1–H8). A volume of 1µl has been assigned to the Unknown wells.

9. After all well types, names and concentrations/dilution factors and volumes have been applied to the plate map, select all wells that define an experimental set, or **Group**, that should all be analyzed together. All Known wells will appear on the graph. Unknown wells will be interpolated from the Known well standard curve.

   a. Touch the Group drop-down to expand the list of Group options. Up to eleven Groups (A–K) can be assigned to a plate. The dashed black line in the lower right corner of the Group drop-down menu will undo a Group assignment.

   b. Choose a Group from the Group drop-down and apply to the selected wells. Once a Group has been assigned, the frames of the selected wells will highlight with the corresponding Group color.

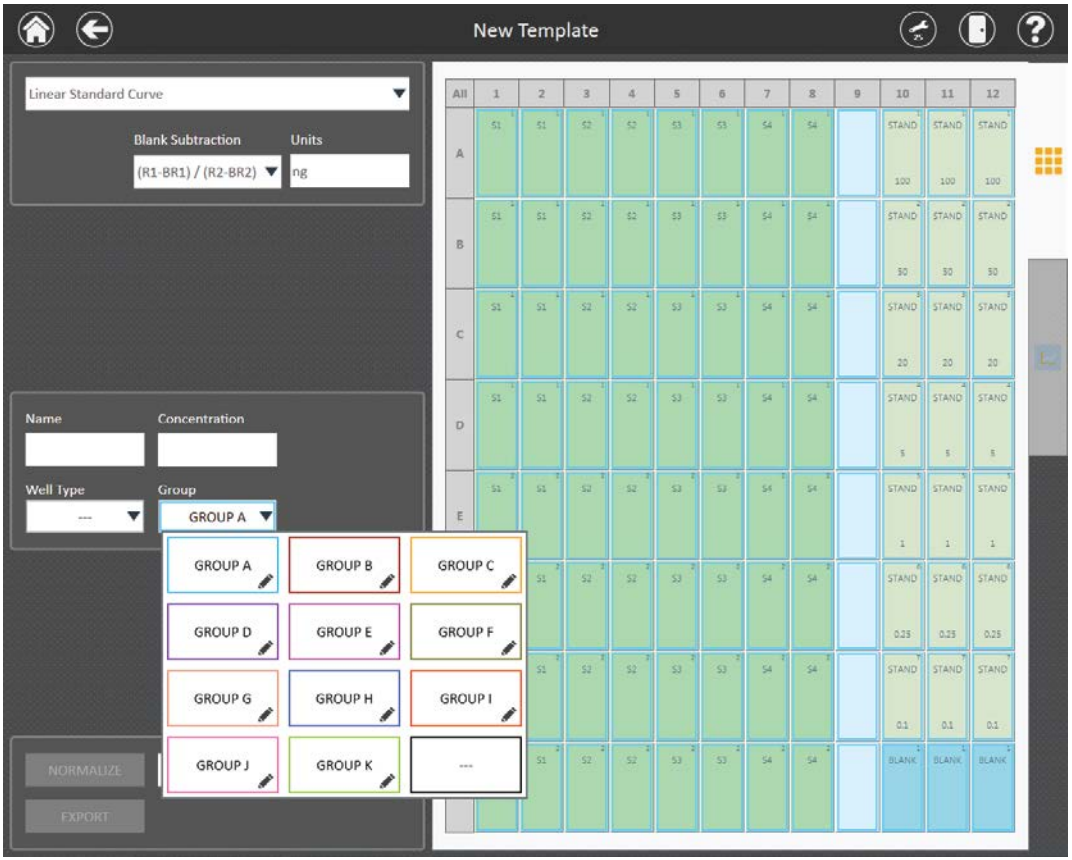


Figure 45. Use Group to define an experimental data set. The entire plate was selected (wells A1 through H12) and Group A applied. Up to 11 groups may be selected at a time.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

GloMax® Analysis software can analyze and graph multiple experimental data sets. When multiple groups exist on a single plate, well frames will be color coded to indicate individual groups (Figure 46).

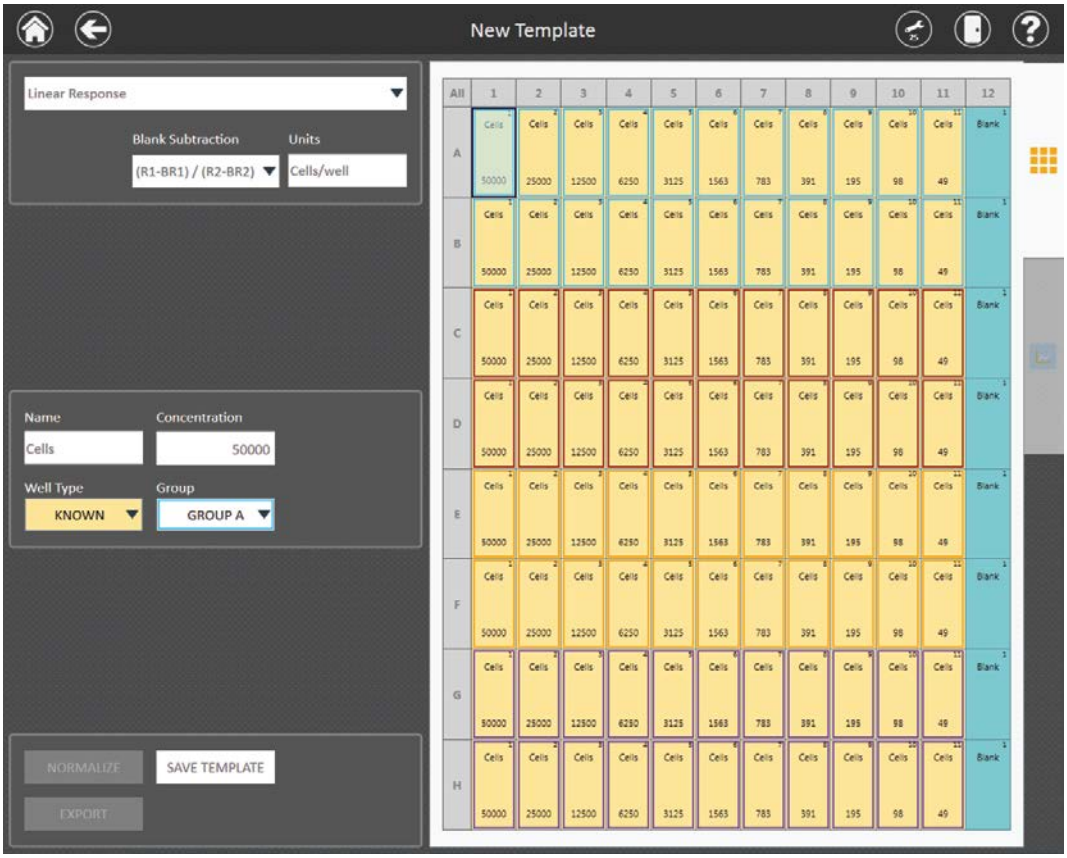


Figure 46. Multiple experimental data sets. When creating an analysis template with multiple experimental data sets, select all the wells that are part of each data set (containing Known, Unknown and Blank wells that should be analyzed together) and assign a group from the Group drop-down menu. A unique color will be applied to each group.

c. If desired, open a keyboard to edit the group name text by selecting the icon in the lower right corner of each Group letter in the Group drop-down menu (Figure 47). Edited Group name will be shown in the graph legend for the respective curve (Figure 48).

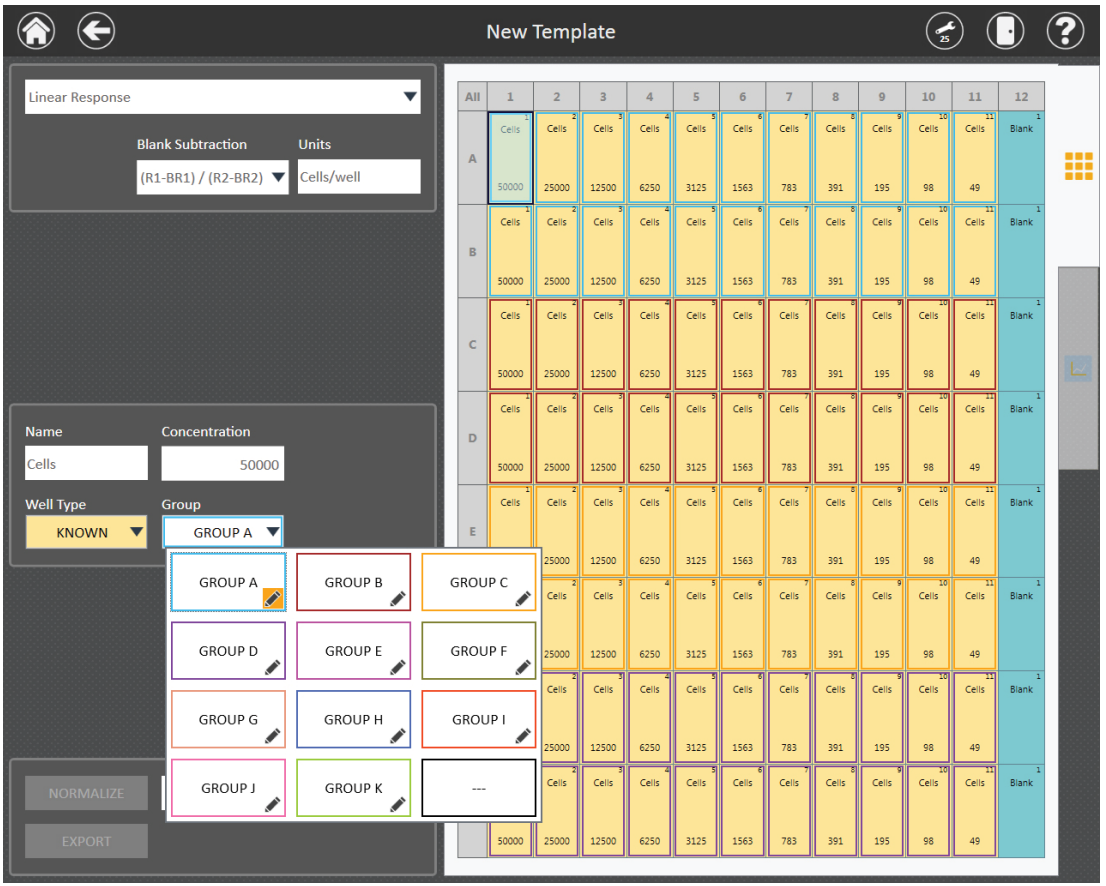


Figure 47. Select the icon in the lower right corner of each Group to edit the group label.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

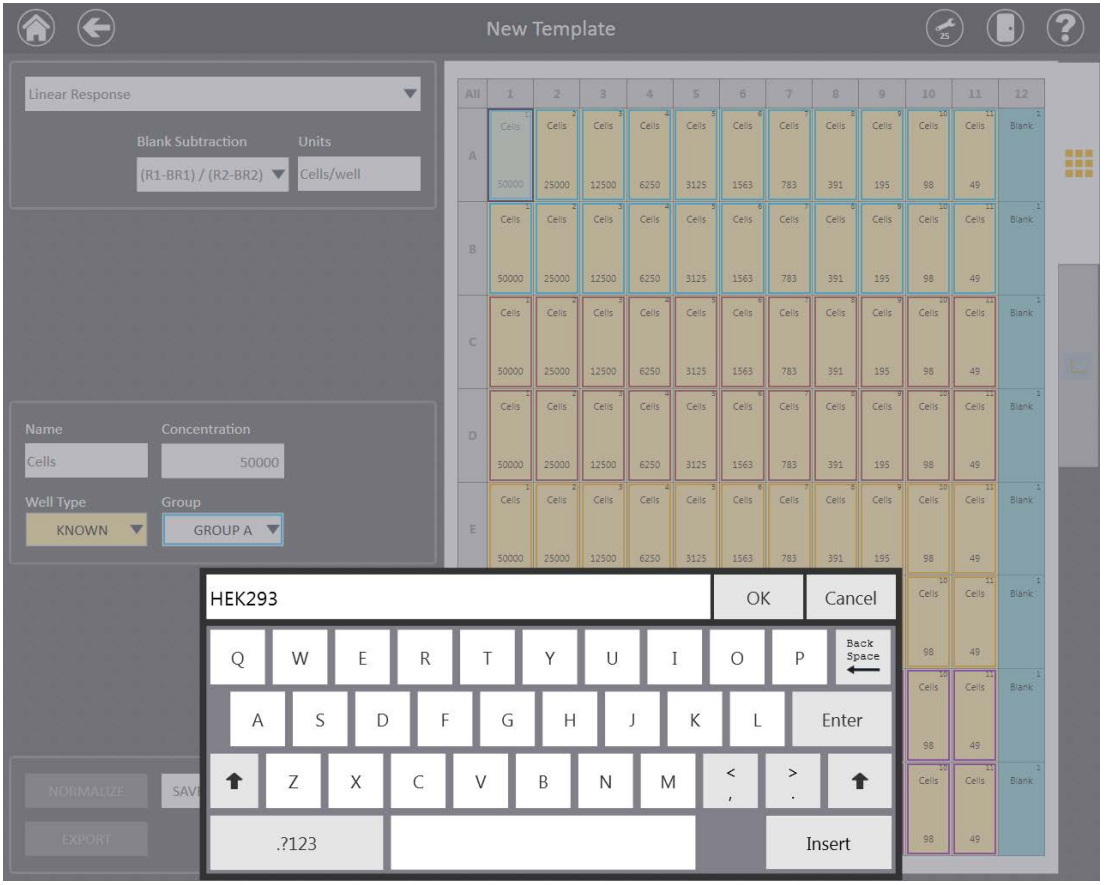


Figure 48. Type a new name for the Group label. Edited text will appear in the Group drop-down menu and in the graph legend.

10. Data normalization allows results to be expressed as either % Control or Fold-Change if desired. Normalization can be performed either before or after an analysis has been completed. Normalization requires the inclusion of a Control well type on the analysis template.

    Note: If Control wells are to be included on the graph then they must first be assigned as a Known well type within each experimental data set.

    a. Highlight the wells to assign as a control. From the Well Type drop-down menu, assign those wells as either Control 1 or Control 2 (Figure 49). **Note:** Data can be normalized to only one control at a time. The **Normalize** button becomes active once a control has been assigned to the plate.

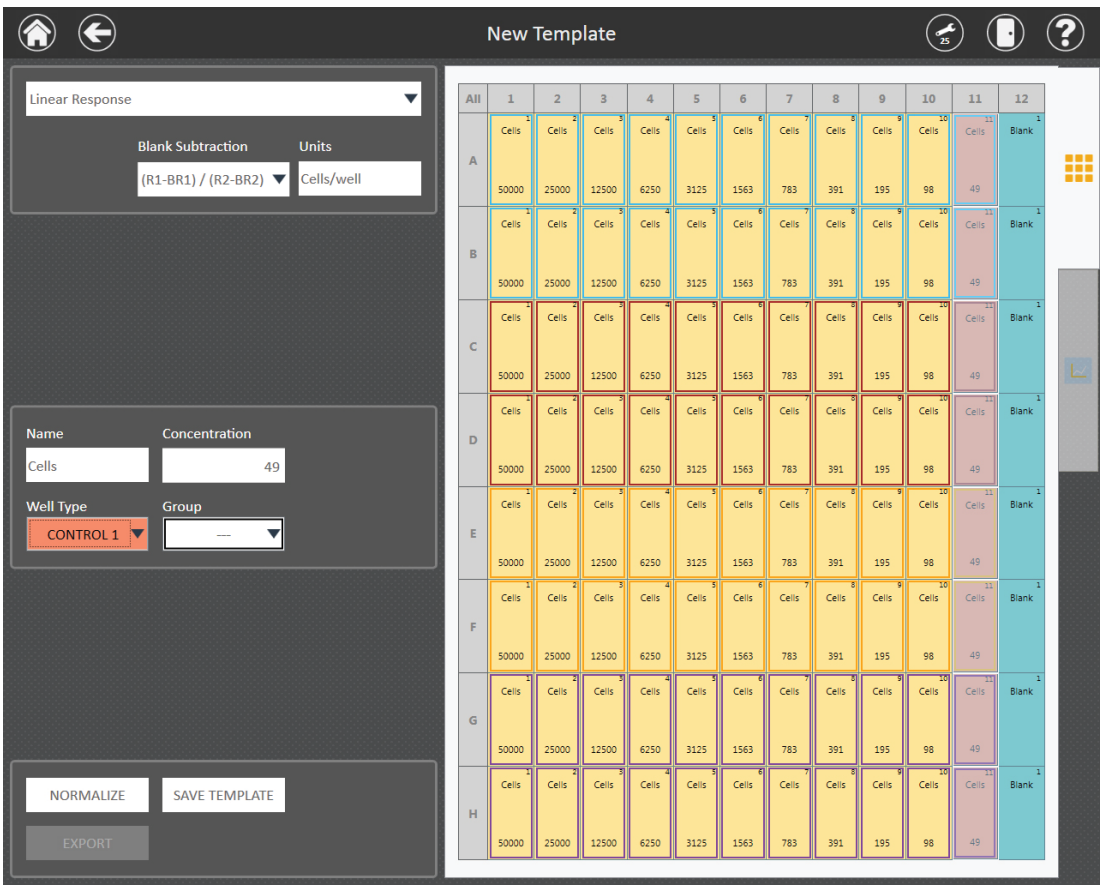


Figure 49. Control well assignment. A Control well type must be assigned in order to perform data normalization to % Control or Fold Change. The Normalize button becomes active once a Control has been assigned to the plate.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

b. Touch the **Normalize** button to access three options for normalization (Figure 50, Panel A). If only one control has been assigned to the plate, that control is automatically chosen for normalization. If more than one control is assigned to the plate, the user must specify which control to choose for normalization (Figure 50, Panel B).

i. **Data:** Undo any normalization performed on the plate.

ii. **% Control:** Experimental wells will be expressed as a % response relative to the control wells.

iii. **Fold Change:** Experimental wells will be expressed as fold response relative to the control wells.

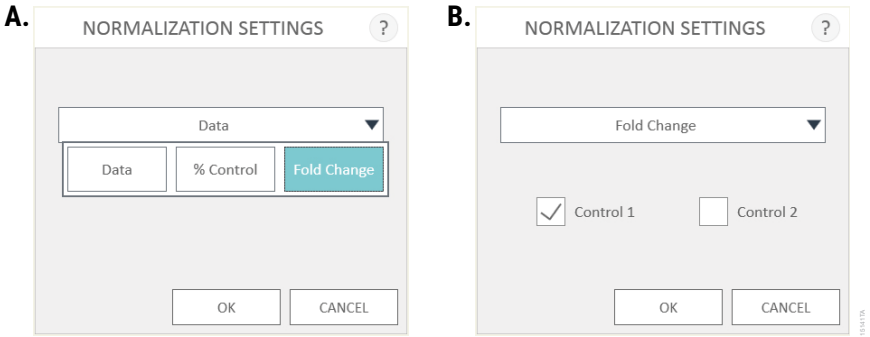


Figure 50. Data normalization. Panel A. There are two options for data normalization, **% Control** and **Fold Change**, and an option to undo normalization, **Data**. After selecting the normalization mode, normalization will automatically assign the control that is present on the plate. **Panel B.** If there are two controls on the plate, the user must specify which control to use for normalization.

c. Select **OK** to automatically normalize or undo normalization accordingly. If there are raw data present in the wells, normalization of the results occurs once **OK** is pressed.

11. Once the user has defined the analysis template, touch the **Save Template** button. When prompted, enter a name for the template, and then select **OK**. The name of the analysis template will now appear in the title bar and in the list of available analysis templates on the 'Templates' screen.

Performing an Analysis

1. Once a template has been assigned to the result file, touch the green **Run** button near the bottom of the left side of the screen to perform the analysis of samples (Figure 51). When the analysis is completed, an "Analysis has successfully completed" message will appear on the screen. Select **OK** to view the analyzed results.

   Selecting **Run** will initiate the analysis. The average value of the blanks will be subtracted from the Known and Unknown wells. Averages and Standard Deviations (if there are greater than three replicates of each

concentration) will be calculated for replicates and will be indicated in the data report. The analysis curve fit will be applied and a graph will be generated of the analyzed data.

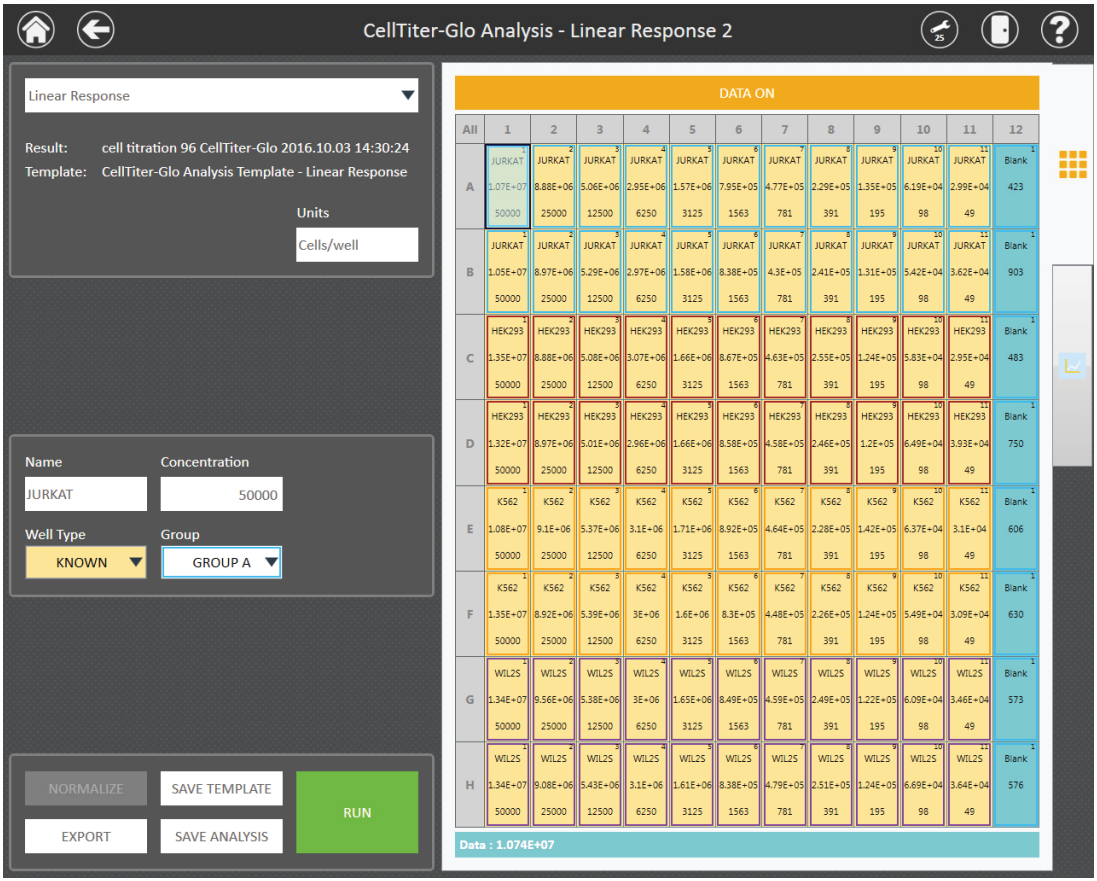


Figure 51. Once a template has been applied to the data, touch the Run button to analyze the results.

Note: Any changes made to the template (including the addition of Controls and performing data normalization) will require re-running the analysis in order to view the changes on the graph.

2. Performing the analysis will generate a best-fit curve of the data shown on the graphing tab of the 'Analysis' screen. The graphing tab will remain inactive until the **Run** button has been pressed.

   Depending on the type of curve fit applied to the data, the following information will be created as a result of pressing the **Run** button. The analysis formula is shown on the graph. Summarized statistical information for each curve is included in the graph legend. Additional statistical information is included in the data report.

3.F. Analysis of Results (continued)

Performing an Analysis (continued)

Table 4. Summary of Statistical Information that is Generated from Performing an Analysis.

Analysis Curve Fit Type	Analysis Formula Shown on Graph	Data Shown in Graph Legend	Additional Information Included in Data Report
Linear Standard Curve	$y = f(x) = mx + b$	R^2	Slope, Intercept
2nd Polynomial	$f(x) = a + bx + cx^2$	R^2	A, B, C
3rd Polynomial	$f(x) = a + bx + cx^2 + dx^3$	R^2	A, B, C, D
Power Regression	$f(x) = ax^b$	R^2	A, B
Four-Parameter Curve	$f(x) = B + \left(\frac{T-B}{1+10^{(logIC50-logx)S}}\right)$	R^2, IC_{50}	Slope, Bottom, Top
Five-Parameter Curve	$f(x) = B + \left(\frac{T-B}{(1+10^{(logIC50-logx)S})^S}\right)$	R^2, IC_{50}	Slope, Bottom, Top, Asymmetry Factor (S)
Dose Response EC_{50}/IC_{50}	$f(x) = B + \left(\frac{T-B}{1+10^{(logIC50-logx)S}}\right)$	R^2, IC_{50}	Slope, Bottom, Top
Linear Response	$y = f(x) = mx + b$	R^2	Slope, Intercept
Point to Point	No formula used	No additional information included	No additional information included
Cubic Spline	No formula used	No additional information included	No additional information included
Z´-Factor	$Z'\text{-}Factor = 1 - \left(\frac{3(\sigma_1 + \sigma_2)}{\lvert\mu_1 - \mu_2\rvert}\right)$	Z´-Factor Value	No additional information included

Data from the plate read will be populated in the center of the wells on the plate map. To view results of a single-read analysis, toggle the data displayed in the wells of the plate using the **Data On/Off** button at the top of the screen (Figure 57).

To view results from a multi-read analysis, touch the associated data tab for each read located at the top of the screen.

To view raw or analyzed data from dual-read result files, toggle the data view by pressing the **Ratio On/Off**, **Data 1 On/Off** and **Data 2 On/Off** buttons at the top of the screen.

3. After the analysis has been run, touch the **Graphing Tab** on the right side of the screen to view the graph of the results.

Editing the Result Graph

1. Adjust details on the graphing tab to modify the appearance of the graph. Use the checkboxes for **Log X-Axis** and **Log Y-Axis** to specify whether the desired axis should be displayed as a log scale. Touch **Graph title, X axis title** or **Y axis title** to change the name of the selected title. Use tablet gestures to zoom in or pan the graph (pinch to zoom out, reverse pinch to zoom in, swipe to pan). Touch the **Reset View** button to return the graph to the default display (Figure 52).

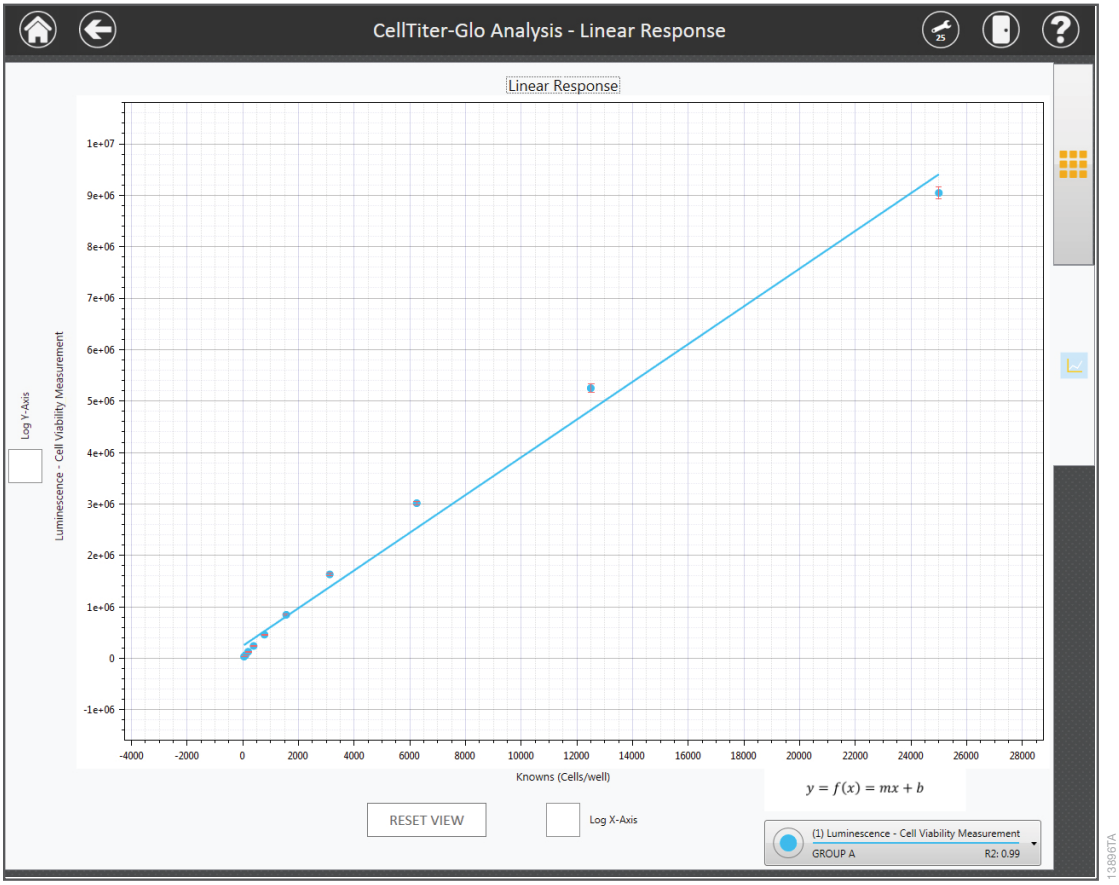


Figure 52. After selecting the Run button to analyze an experimental data set, the graphing tab on the right side of the screen becomes active. Touch the graphing tab to view analysis results. From this tab, Axes can be displayed as linear or log format, axis and graph titles can be modified, and the graph can be panned or zoomed. Touch **Reset View** to return the graph to the default view.

3.F. Analysis of Results (continued)

Editing the Result Graph (continued)

2. An expandable legend is located in the lower right corner of the graph. Touch anywhere within the legend box to expand the legend view (Figure 53, Panel A).

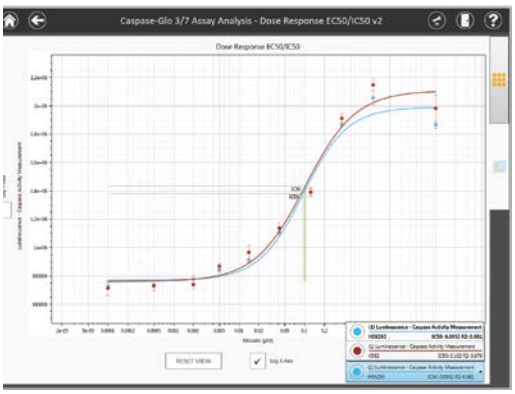
   Multiple curves may be present on the graph pending the number of groups assigned to the analysis template and/or the number of times that a plate has been read. Line color is associated with each experimental data set, or Group, assigned to the analysis template. Line symbols are associated with each time the plate is read for that group (Figure 53, Panel A).

   An analysis of a result file consisting of two Groups and one read of each Group would generate single curves of different color representing each Group.

   An analysis of a result file consisting of one Group that is read multiple times would generate a multi-curve graph where all lines are the same color as indicated by the group, with each line having a unique symbol associated with each read of that group.

3. Touching the symbol will remove a curve from the graph (Figure 53, Panel B). Add the curve back to the graph by touching the empty circle.

A.



B.

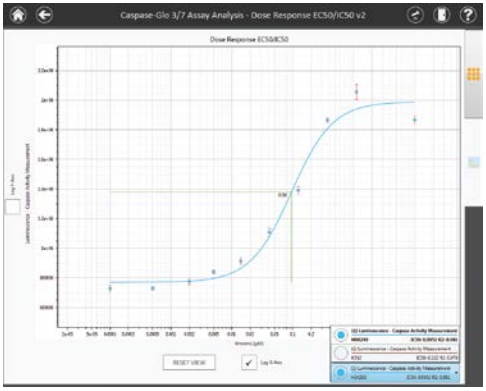


Figure 53. Colors represent groups; curves represent reads of each group. Panel A. Two groups are represented on the graph, with one read for each group. **Note:** Edited group names are shown on the graph. **Panel B.** Touching the symbol for any curve will remove that curve from the graph. Touch the empty circle to add the curve back to the graph.

4. Outliers can be excluded by touching the outlier point in the **Data Tab**, and then touching the **Exclude** button. After excluding outliers, touch the **Run** button to reanalyze the data with outliers removed.

Saving and Exporting the Analysis

Once you are satisfied with the results of the analysis, touch the **Save Analysis** button to save this analysis with a user-specified name within the list of Analyses on the 'Analyses' screen.

The analysis can be exported at the time that it is completed by touching the **Export** button in the bottom left corner of the screen. Analyses will be exported in the formats specified by the administrator (.xlsx, .pdf, or .analysis data reports) and are exported to the location specified by the Administrator (see Section 3.H, Administrator Settings). Alternatively, the saved analysis can be exported from the Analyses screen at a later time. See the Results, Templates and Analyses section (Section 3.E) for detailed descriptions of these file types and configuration of the export folder location.

3.G. 'Settings' Screen



Figure 54. The GloMax® Navigator 'Settings' screen.

3.G. Settings Screen (continued)

Instrument Info

Tapping the **Instrument Info** button reveals a list that includes the software and firmware versions, instrument name and maintenance and calibration values.



Figure 55. 'About GloMax® Navigator' screen located on the Settings menu. This figure shows example information only. Your instrument information may vary.

Self Test

Each time the instrument is powered "ON", it automatically performs a self test to check the motion of all axes. This button allows users to manually initiate a self test.

Tools

Tools may be accessed from the **Tools** icon in the menu bar (shown below) or using the **Tools** button on the 'Settings' screen.

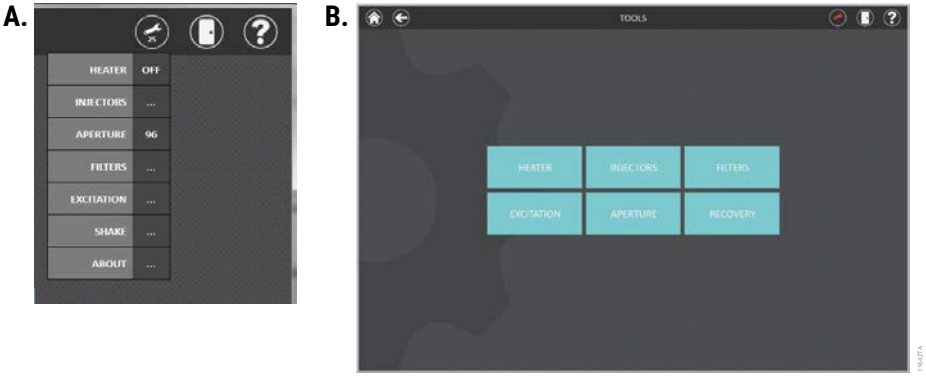


Figure 56. Accessing Tools. Panel A. Accessing the tools from the menu bar. **Panel B.** 'Tools' screen accessed by pressing the **Tools** button on the 'Settings' screen.

Injectors

Dual Injectors are an optional accessory for the GloMax® Navigator Instrument.

Injector System Specifications	
Number of Injectors	Two Injectors
Dispense Volume Range	5–200µl in 1µl increments
Injection Speed	20–500µl/second*
Waste Collection Tray Volume	Approximately 50ml
Void Volume	500µl

*For standard Luciferase Assay or Dual-Luciferase® Assays, we recommend an injector speed of 200µl per second.

Warning: Make sure sufficient volume is available in the well to accept the injected volume, especially when injectors are used within a loop function. Failure to do so may cause an overflow of reagent and/or sample into adjacent wells or into the interior of the instrument.

The Injectors may also be accessed from the **Tools** icon in the menu bar.

See Setting Up and Operating the Injector System (Section 4 for more details).

Recovery

Recovery provides the user the ability to manually initialize the instrument axes in case of a severe plate jam. This option is available only from the Settings --> Tools window. In the event of a plate jam, the instrument will automatically initialize instrument axes itself when either the **Door** button is selected, a Protocol is started, or if the instrument power is turned Off/On.

Initialize all axes by selecting the **Start...** button in this screen.

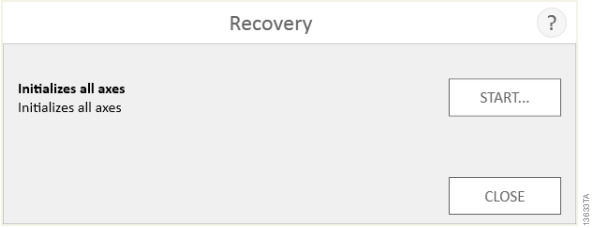


Figure 57. Recovery options.

Export Logs

The software records all actions performed by the instrument. If users experience error messages, export the log and send it to Promega Technical Services (**techserv@promega.com**) for troubleshooting. The log file is useful for troubleshooting events.

3.G. Settings Screen (continued)

Export Logs (continued)

Upon tapping the **Export Logs** button, a folder browser opens to allow the user to select the location at which logs will be exported (Figure 58). Navigate to the folder location where logs should be exported. The yellow boxes across the top of the screen indicate the currently selected path. Red boxes in the lower portion of the screen represent folders. Once you have selected the desired path, press the **Save** button to export log files.

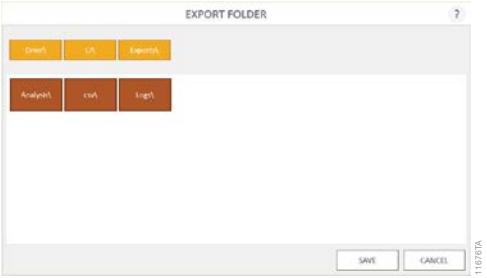


Figure 58. 'Export Folder' screen. Select a folder to which logs will be exported. Press **Save** to export log files.

Administrator

The **Administrator** button is only displayed when users with Administrator-level access to the GloMax® software view the 'Settings' screen. Functions available from the **Administrator** button are discussed in Section 3.H.

3.H. Administrator Settings

Administrator settings are only available to users with Administrator-level access to the GloMax® software. These settings allow the administrator to set software **Preferences**, set an **Instrument Name** for the GloMax® Instrument, **Import Protocols** and access software **Audit Records**. To access administrator settings:

1. From the 'Home' screen, tap the **Settings** button.
2. On the 'Settings' screen, tap the **Administrator** button to open the 'Administrator Page' screen (Figure 59). This button is only visible if the current user has Administrator-level access to the GloMax® software.



Figure 59. 'Administrator Page' screen.

Preferences

The 'Preferences' screen is where administrators can specify the file types and paths for the export of results and analyses. In addition, the administrator can apply scaling factors to luminescence results if desired. The settings present on each tab are described below.

Export Settings Tab: On the Export Settings tab the administrator can define file formats that should be exported for results files. By default, results will be exported as a comma-delimited text (.csv) and a portable data format (.raw) file. Check the box next to Export to PDF and/or Export to Excel to additionally have results files exported as .pdf and/or .xlsx files.

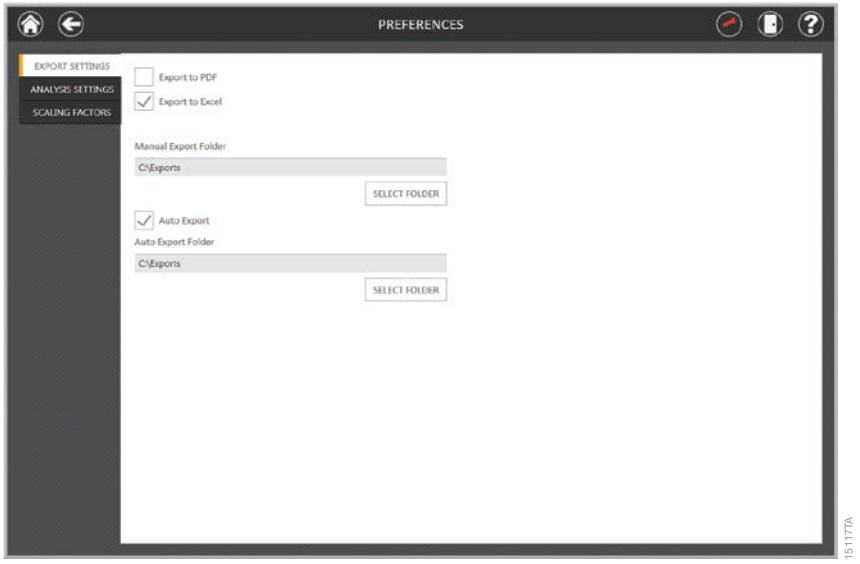


Figure 60. 'Preferences' screen; 'Export Settings' tab.

3.H. Administrator Settings (continued)

Preferences (continued)

The administrator can choose the folder path to which results will be manually exported. The administrator also choose whether results are automatically exported after every run and the path to which automatially exported results are saved. Use the **Select Folder** button underneath Manual Export Folder to open an 'Export Folder' browser screen and specify a value other than C:\Exports for manually exported results files (Figure 61). The yellow boxes across the top of the screen indicate the currently selected path. Red boxes in the lower portion of the screen represent folders. Once a folder path is selected, press the **Save** button to save the new path or **Cancel** to exit the screen without saving.

To have results automatically exported in the specified file formats after every protocol run, check the Auto Export box. If desired, specify an automatic export location by touching the **Select Folder** underneath Auto Export Folder to open an 'Export Folder' browser screen and specify a value other than C:\Exports for automatically exported results files (Figure 61). The yellow boxes across the top of the screen indicate the currently selected path. Red boxes in the lower portion of the screen represent folders. Once a folder path is selected, press the **Save** button to save the new path or **Cancel** to exit the screen without saving.

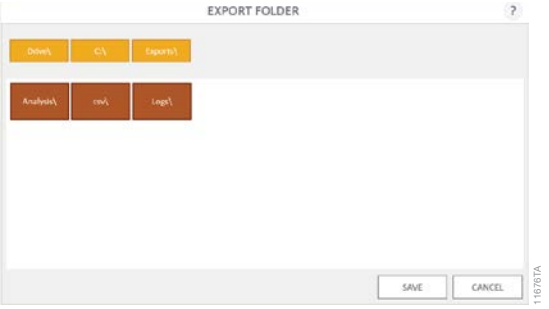


Figure 61. Specifying Export Folder Path. Use the **Select Folder** button to specify an export folder path for export files.

Analysis Settings

On the Analysis Settings tab, the administrator can specify the file formats in which analysis files should be exported and the export folder path for templates and analyses. Use the checkboxes at the top of the screen to specify the file formats in which analysis files should be exported. At least one file format must be selected for analyses to be exported. The administrator can choose one or more of the following: Export to GloMax to export a portable data format (.analysis) file that can be imported into GloMax® software running on another PC, Export to PDF to export analyses as an Adobe PDF (.pdf) file, and Export to Excel to export analyses as a Microsoft Excel® (.xlsx) file. Use the **Select Folder** button underneath Export Folder to open an 'Export Folder' browser screen and specify a value other than C:\Exports for exported template and analysis files (Figure 62). The yellow boxes across the top of the screen indicate the currently selected path. Red boxes in the lower portion of the screen represent folders. Once a folder path is selected, press the **Save** button to save the new path or **Cancel** to exit the screen without saving.

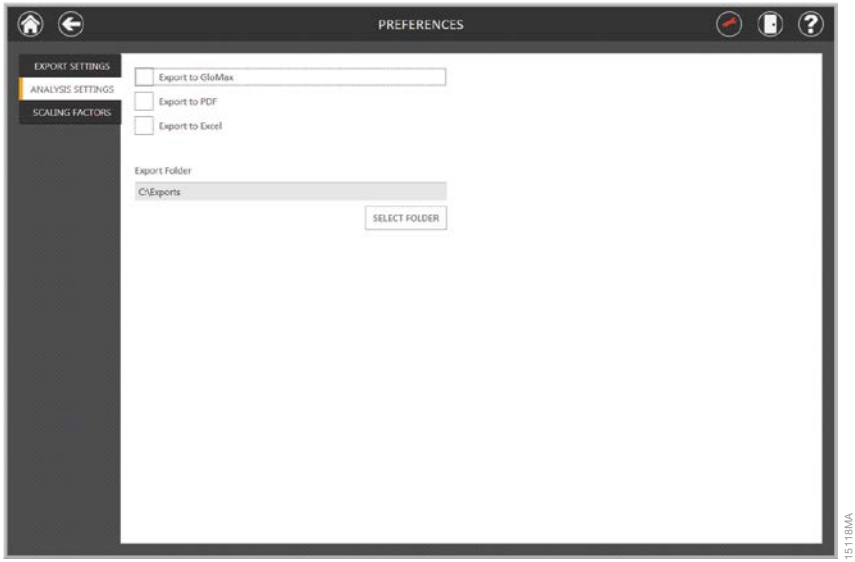


Figure 62. Analysis Settings tab. Specify the file formats for export of analyses and the export folder location for templates and analyses.

3.H. Administrator Settings (continued)

Scaling Factors

The Scaling Factors tab allows administrators to apply a scaling multiplier to luminescence data. Scaling factors are provided to offer a way for the data produced by the GloMax® Instrument to more closely match that of other plate readers. Scaling factors of 0.001 to 1000 can be applied to Luminescence data.

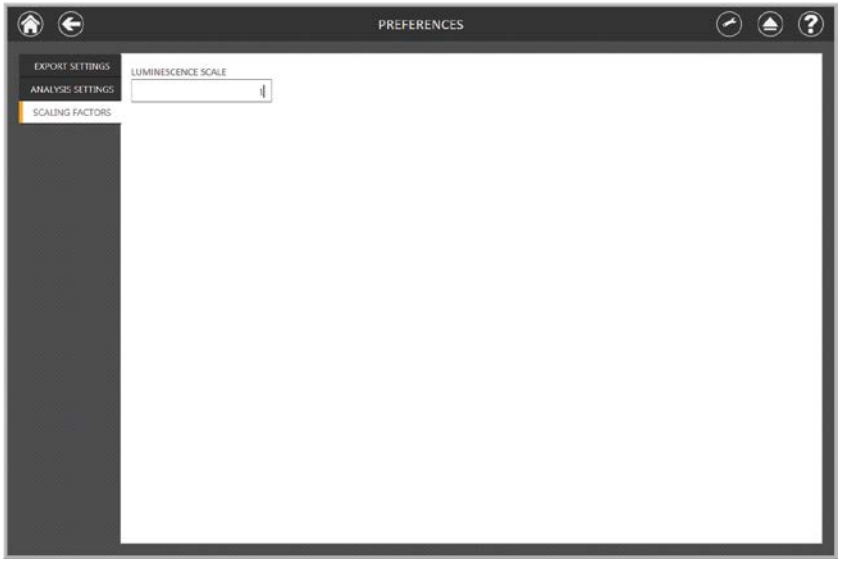


Figure 63. Scaling Factors tab. Administrators can specify a multiplier of 0.001 to 1000 that should be applied to luminescence data produced by the GloMax® Instrument.

Instrument Name

Enter the desired name of the instrument. This feature is typically used if a laboratory has more than one GloMax® Navigator Instrument. The instrument name will be included in the results files.

Note: Changing the instrument name will force a reboot of the Tablet PC.



Figure 64. Settings → Administrator screen → Instrument Name.

Import Protocols

Periodically Promega will release new protocols or updated versions of existing protocols to the Promega web site: **www.promega.com/resources/tools/detection-instruments-software/promega-branded-instruments/glomax-navigator/**

Download the protocol (.package) file from the web site and save to a USB flash drive, network location, local Tablet PC, etc.

From the GloMax® Navigator Software Import Protocols window (Settings→Administrator→Import Protocols), navigate to the folder location and select the file.

Select the **Drive** button at the top to view the available drive locations. Then select the specific drive to navigate to the folder of interest. Protocol (.package) files will be shown as blue boxes in the main part of the 'Select File' screen. Touch one or more protocol (.package) files to select them, and then press **OK** to import these files or press **Cancel** to return to the 'Administrator Page' screen without importing files.



Figure 65. Settings → Administrator screen → Import Protocols.

Audit Records

Administrators may view a chronological sequence of actions performed with the GloMax® Navigator System by selecting the **Audit Records** button within the 'Administrator Page' screen. Records can be filtered by time period using buttons on the left side of the screen: **Today**, **This Month**, the past **6 Months**, **This Year**, or **All**. Detailed audit records are automatically generated and stored with the GloMax® Navigator software that cannot be deleted or edited in order to provide technical elements of a part 11 compliant system when used with the appropriate laboratory workflow.

Records may be exported by selecting the **Export** button on the lower left corner of the screen.

3.H. Administrator Settings (continued)

Audit Records (continued)

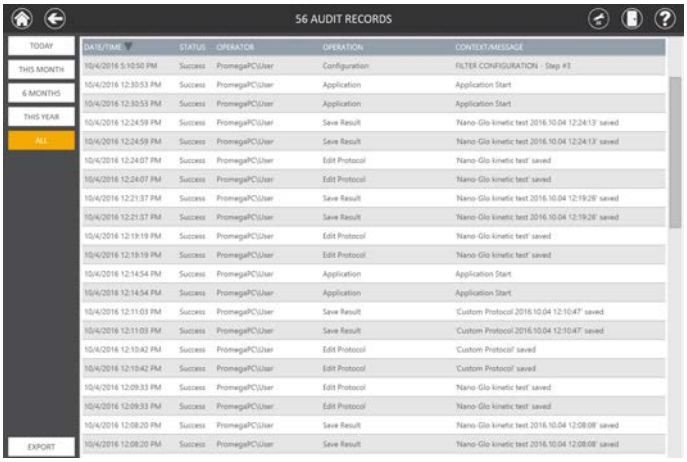


Figure 66. Audit Records screen.

Help

The context-dependent Help Screen can be accessed from any of the menu screens.

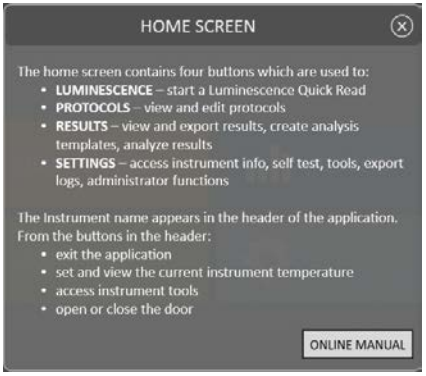


Figure 67. Help Screen.

4. Operating the Injector System (optional)

Injectors can be used with basic protocols, as well as with all Kinetic and Loop protocols.

Warning: Make sure sufficient volume is available in the well to accept the injected volume. This is especially important for Kinetic and Loop protocols where multiple injection steps may occur. Failure to do so may cause an overflow of reagent and/or sample into adjacent wells or into the interior of the instrument.

You can define the injection volume and speed, delay time and integration time for each of the two injectors using the Protocol builder from the 'Home' screen. This information is saved with each protocol.

The viscosity of solutions/reagents can affect the performance of the injectors.

If a protocol requires injectors, the injectors must first be primed with at least 500µl of the reagent to be injected. Priming wets the fluid path and removes air bubbles to ensure delivery of an accurate injection volume for the assay.

Priming is also required if an injection protocol has been interrupted for any reason (e.g., power failure).

You may need to optimize injection speed, depending on the solution/reagent you are working with. We recommend using the default settings of 200µl per second as a starting point. From the **Tools** icon in the menu bar, or accessed from the **Tools** button on the 'Settings' screen (Figure 56, Panel B), follow the guided instructions to **Prime**, **Reverse Purge** and **Flush** the injectors.

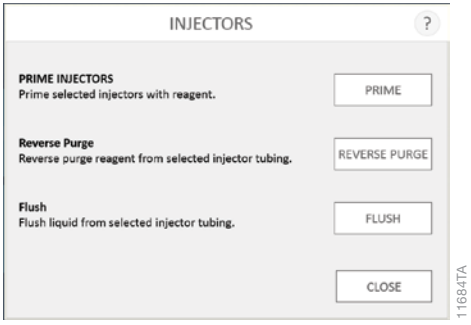


Figure 68. Injector functions (prime, reverse purge and flush).

After finishing an assay, unused reagent in the fluid path can be retrieved. Select the option to **Reverse Purge** by tapping the **Start…** button on the 'Injectors' screen. To prevent clogging of the fluid lines, flush after each use.

Note: The reagent bottle holder can accommodate four sizes of containers: a round flat-bottom bottle, a 50ml conical tube, a 15ml conical tube and a 15ml test tube.

4.A. Priming Injectors

1. Place the reagent container (tube or bottle) into the reagent holder.
2. Cover the bottle opening with Parafilm® to prevent reagent evaporation.
3. Insert the injector tube through the Parafilm® and into the reagent bottle.
4. Ensure the Waste Collection Tray is in position and empty.
5. Tap the **Prime** button shown in Figure 69.

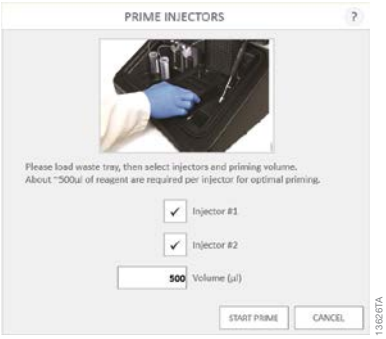


Figure 69. Injector prime function.

6. Indicate the injector to prime. Set the volume.
   Note: The minimum volume needed to prime is 500µl.
7. Tap the **Start Prime** button (Figure 69).
8. After priming is complete, empty the Waste Collection Tray.

Once the injectors are primed, they are ready for use according to the programmed protocol.

4.B. Reverse Purge (Retrieving Unused Reagents from Injectors, optional)

1. Tap the **Reverse Purge** button on the Injectors screen (Figure 68).

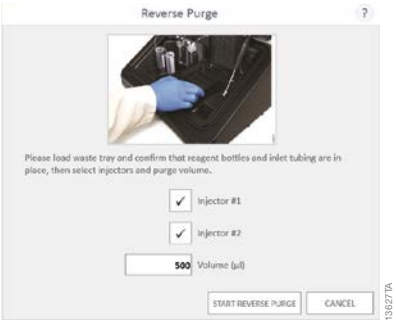


Figure 70. Reverse Purge function.

2. Ensure the Waste Collection Tray is in position and empty.
3. Tap the **Start Reverse Purge** button (Figure 70).
4. Any reagents left in the fluid lines will be returned to the reagent container.

4.C. Flushing the Injectors after Use

1. Remove the sample plate from the instrument.
2. Tap the **Flush** button on the 'Injectors' screen (Figure 68).



Figure 71. Injector Flush function.

3. Ensure the Waste Collection Tray is in position and empty.
4. Tap the **Start Flush** button (Figure 71).

   The recommended flush protocol uses a sequence of 1 cycle (1ml) of deionized water, 1 cycle (1ml) of 70% ethanol, 1ml of deionized water and then 1 cycle (1ml) of air to flush the fluid.

   Note: Empty Waste Collection Tray when priming and flushing are complete. See Section 5.F for injector cleaning instructions.

5. Cleaning and Maintenance

5.A. General Instrument Care

If a well is overfilled, immediately clean up any spills.

To gain access to the inside of the instrument, manually open the door.

5.B. General Cleaning

Turn off the GloMax® Navigator System and disconnect the AC Power Adapter whenever the interior of the instrument is open for cleaning and maintenance.

Residue accumulated from various reagents may inhibit proper movement of the Aperture cross talk mask. Immediately clean up any spills. We recommend thoroughly cleaning the interior of the instrument every 30 days as follows:

Do not allow excess solution to run off onto other electrical components, because 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® Navigator Instrument. **Do not** use solvents or abrasive cleaners.

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

5.C. Tablet PC Care

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

To clean the Tablet PC, turn off the power. The touchscreen has been coated to make it easier to clean. You don't need to rub hard to remove fingerprints or oily spots. To avoid scratches, use a soft, lint-free cloth to gently wipe the screen. You can dampen the cloth with water or an eyeglass cleaner, but don't apply liquids directly to the Tablet PC. Don't use window cleaner or other chemical cleaners on the Tablet PC.

5.D. Cleaning the Optical Head

1. Turn OFF the instrument. Disconnect the AC Power Adaptor. **Do not** attempt to clean the Optical Head while the instrument is ON.
2. Push the Microplate Sample Tray to the back of the instrument and push the Optical Head from the Home position toward the center of the instrument (Figure 72).

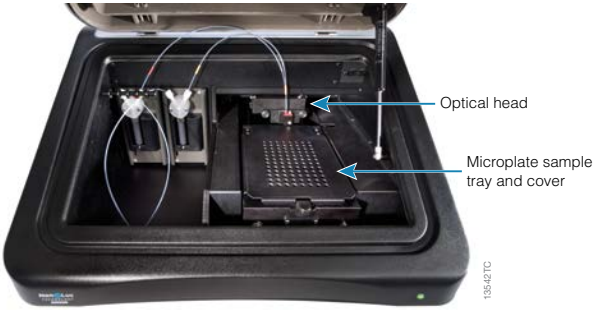


Figure 72. Interior of the GloMax® Navigator instrument.

3. Loosen the hand screws and remove the Injector Tip Holder from the Optical Head. Facing the front of the instrument, push upward and then leftward (as viewed from the bottom of the Tip Holder to release the Tip Holder from the Optical Head (Figure 73). Completely remove the Injector Tip Holder to take out the Aperture.



Figure 73. Remove the Injector Tip Holder.

5.D. Cleaning the Optical Head (continued)

4. Place your hand underneath the Optical Head. Grasp the Aperture and pull it toward you (Figure 74).
   Note: Do not touch the bottom surface of the Optical Head.



Figure 74. Remove the Aperture.

5. Soak the Injector Tip Holder and the Aperture in a 70% ethanol solution for 30 minutes to dissolve reagent residue. Rinse with deionized water.
6. Allow the Injector Tip Holder and Aperture to air dry completely before proceeding. Alternatively, blot dry with a lint-free, Kimwipes® tissue.
7. Return the Aperture to the Optical Head. Align the Aperture with the Optical Head and gently guide the Aperture onto the Optical Head (Figure 75).



Figure 75. Replace the Aperture.

8. Return the Injector Tip Holder to the Optical Head and tighten the hand screws. Position the holder just above the front pins on the Optical Head. Push the holder toward the right to lock the holder securely to the right pin of the Optical Head. Then push down and lock the holder on the left pin (Figure 76).



Figure 76. Replace the Injector Tip Holder.

9. Return the Optical Head to the Home position by pushing the Optical Head from the center of the instrument all the way to the right side of the instrument (Figure 72).
10. Pull the Microplate Sample Tray forward to the Home position.
11. Reconnect the AC Power Adaptor to the instrument. Turn ON the instrument.

5.E. Cleaning the Instrument Interior

Accumulated residue from various luminescent substrates may inhibit proper movement of the Optical Head. Failure to properly maintain a clean interior may cause a mechanical error and the irretrievable loss of data. We recommend thoroughly cleaning the interior every 30 days.

1. Turn OFF the instrument
2. Use a Kimwipes® tissue dampened with 70% ethanol to wipe the Microplate Sample Tray cover. Repeat.
3. Push the Microplate Sample Tray to the back of the instrument, exposing two steel guide rails upon which the sample tray glides (Figure 72). Use a Kimwipes® tissue dampened with 70% ethanol to clean the guide rails.
4. Push the Optical Head to the center of the instrument, exposing the black metal shelf on the right side of the instrument (Figure 73).
5. Clean the black shelf with a fresh Kimwipes® tissue dampened with 70% ethanol. Be sure to clean the home position for the optical head.
6. Close the instrument door and turn the instrument ON. The instrument will then return to the Home position and is ready to use.

5.F. Cleaning the Injectors

We recommend thoroughly cleaning the injectors every 30 days.

1. Use a prepared solution of 70% ethanol to flush the injector(s) three times. Prepare at least 10ml of ethanol for each injector to be flushed.
2. Place the container of 70% ethanol into the bottle holder. The inlet tube should be inserted so that it reaches the bottom of the container.
3. Ensure the Waste Collection Tray is in position and empty.
4. From the 'Tools' screen, select **Injector**. Tap the **Prime** button to initiate priming.
5. Allow the solution to sit in the fluid path for 30 minutes before flushing the injectors.
6. From the 'Tools' screen, select **Injector**. Tap the **Flush** button to show the 'Flush' screen.
7. Select 9 flush cycles and press **Start Flush** to wash the lines with 70% ethanol.
8. Empty and clean the Waste Collection Tray, and place it back into position.
9. Place a container of deionized water on the bottle holder with the inlet tube inserted to reach the bottom of the container. Prepare at least 10ml of deionized water for each injector to be flushed.
10. From the 'Tools' screen, select **Injector**. Tap the **Flush** button to initiate flushing.
11. Select 9 flush cycles, and press **Start Flush** to wash the lines with deionized water.
12. Empty and clean the Waste Collection Tray, and place it back into position.
13. Flush the injector 3 times with air. A small volume of water will remain in the injector after the air purge.

5.G. Cleaning the Waste Collection Tray

The maximum volume capacity of the Waste Collection Tray is approximately 50ml. Carefully remove the Waste Collection Tray from its position to avoid liquid spills.

After each prime and flush sequence, discard any fluid from the Waste Collection Tray, and rinse it with deionized water.

5.H. Removing or Replacing Inlet and Outlet Tubing

Replacement tubing assembly is available. See Section 7.E for ordering information.

1. Turn OFF the instrument. Disconnect the AC Power Adaptor.
2. Push the Microplate Sample Tray to the back of the instrument and push the Optical Head from the Home position toward the center of the instrument (Figure 72).

3. Loosen the hand screws and remove the Injector Tips and Injector Tip Holder from the Optical Head. Facing the front of the instrument, push upward and then leftward (as viewed from the bottom of the Tip Holder to release the Tip Holder from the Optical Head (Figure 73).
4. Remove the Injector Tubing from the Injector Tip Holder.
5. Disconnect the inlet or outlet tubing from the injector port by twisting the gray fitting counterclockwise.
6. Discard the used injector tubing.
7. Twist the fitting of the replacement tubing into the correct port of the injector pump.

   Note: The inlet and outlet tubing have different lengths. Tubing with one colored band is inlet tubing (Injector 1 is red; Injector 2 is yellow). Tubing with two colored bands is outlet tubing (Injector 1 is red; Injector 2 is yellow).
8. Insert the free end of the injector tubing into the Injector Tip Holder until the tip of the tubing has pushed through the red holder and stops.
9. Return the Injector Tip Holder to the Optical Head and tighten the hand screws. Position the holder just above the front pins on the Optical Head. Push the holder toward the right to lock the holder securely to the right pin of the Optical Head. Then push down and lock the holder on the left pin (Figure 76).
10. Insert the Injector Tips into the Injector Tip Holder. Snap the Injector Tips into place.
11. Return the Optical Head to the Home position by pushing the Optical Head from the center of the instrument all the way to the right side of the instrument (Figure 72).
12. Pull the Microplate Sample Tray forward to the Home position.
13. Reconnect the AC Power Adaptor to the instrument. Turn ON the instrument.

5.I. Additional Maintenance

Periodically wipe off the outside of the instrument with a damp cloth. Do not use solvents or abrasive cleaners to clean the instrument. Avoid spilling liquids into the Microplate Sample Tray.

If a spill has occurred:

1. Turn OFF the instrument. Disconnect the AC Power Adaptor.
2. Wipe up any moisture inside the Microplate Sample Tray.
3. Use Kimwipes® tissue dampened with 70% ethanol to clean the Microplate Sample Tray.
4. Allow the instrument to completely dry before using.
5. Connect the AC Power Adaptor and turn ON the instrument.

Note: If you suspect fluids have spilled onto the light detector, please contact Promega Technical Services for cleaning instructions.

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. Error Messages

Error Message	Description	Resolution
Start Problem	**Invalid Value:** Selection must be non-empty	Select at least one well on the plate map.
	Protocol Validation: No plate detected in instrument	Make sure the 96-well plate was inserted and is properly seated.
	Error: Cannot connect to the instrument. Device is not found; is it turned off or disconnected?	Tablet PC is not connected to the instrument, Tablet PC is OFF or Instrument is OFF. Check to see if the Tablet PC is connected to the instrument or turn ON the Tablet PC or turn ON the instrument. If the error persists, contact Promega Technical Services.
Open door detected during operation	The door of the instrument has been opened unexpectedly during operation of the instrument.	Manually opening the door of the instrument during an instrument operation will cause that operation to be aborted.
Reference position loss	See Reference position loss (Underrun)	See Reference position loss (Underrun)
Reference position loss (Underrun)	During an instrument operation the tray mechanism has not been able to move to the desired position. This may be caused by an obstruction in the instrument.	Attempt to remove the obstruction manually if possible. Press **Eject,** press **Self Test** on the 'Settings' screen or press **Recovery** in the Tools menu. Any of these methods should result in recovery of the obstructing item. Contact Promega Technical Services if it is not possible to resolve the issue.
Firmware read operation timeout	The instrument has failed to respond to a command.	Attempt to repeat the operation if possible. If this error recurs please contact Promega Technical Services to help troubleshoot the issue.
Firmware write operation timeout	The instrument has failed to write values to its firmware.	Attempt to repeat the operation if possible. If this error recurs please contact Promega Technical Services to help troubleshoot the issue.

Error Message	Description	Resolution
FPGA corrupt	FPGA image programming has failed, or FPGA module is defective.	Please contact Promega Technical Services for troubleshooting assistance.
ADC status invalid	Internal hardware failure has occurred.	Please contact Promega Technical Services for troubleshooting assistance.
Head loopback failure	Internal hardware failure has occurred.	Please contact Promega Technical Services for troubleshooting assistance.
No plate in instrument	No plate is present or a clear plate is in the Sample Tray.	Use an opaque white or black plate.
Multiple groups are not supported	Attempting to analyze multiple experimental data sets in an analysis run.	Exclude all but a single experimental data set and re-run the analysis.
Linear curve fit requires at least two curve points	Attempting to analyze a linear curve or linear standard curve with fewer than two known curve points	Specify more standard curve points in the analysis so at least two concentrations are present in the standard curve
Dose Response curve fit requires at least four curve points	Attempting to analyze a dose response curve with fewer than four concentration points	Specify at least four curve points in the analysis with independent concentrations.

6.B. Common Problems

Symptoms	Causes and Comments
Injectors sputter or drip	Reagent buildup in injector lines. Run the flushing protocol (Section 4.C).
	Injector speed may not be optimal for the viscosity or composition of the solutions used.
Injectors not injecting	No reagent in injector lines. Confirm that the inlet tubing is inserted into the bottom of the reagent container.
	Reprime the injectors. (Section 4.A).
	Injector tubing is clogged and may need to be replaced. (Section 5.F).
Plate not detected	The Microplate Sample Tray does not contain a plate or waste tray, as appropriate. Insert a plate tray or waste tray, as needed.

6.B. Common Problems (continued)

Symptoms	Causes and Comments
Plate stuck or jammed in instrument	Press **Eject,** press **Self Test** on the 'Settings' screen or press **Recovery** in the Tools menu (Section 3.G). Any of these methods can be used to attempt to recover the plate. If the issue is not resolved, contact Promega Technical Services (**techserv@promega.com**).
Tablet PC touch screen does not appear to be working	1. Verify the plug is securely connected to the Tablet PC. 2. Verify that the instrument is plugged into the USB port on the Tablet PC. 3. Restart the Tablet PC, and launch the GloMax® Navigator software. 4. If the issue is not resolved, contact Promega Technical Services (**techserv@promega.com**).
Power failure during run	In the event of a power failure, turn OFF the instrument and the Tablet PC. When power is resumed, turn the instrument and Tablet PC back ON. The results that were generated during the run (before the power failure) will be saved.
Instrument problem: "door opened" message: explanation	1. Instrument door was opened during a run, causing the reading to abort. Restart the run. 2. Something prevented the instrument door from fully closing. Check the instrument door for any obstructions. 3. The door sensor may be bent or broken. Contact Promega Technical Services.
Luminescent signal is reported as SAT	The luminescent output of the sample is saturating the detector. 1. Use less sample. 2. Use a black plate.
Low luminescent signal	Low activity in sample. Use white opaque plates.
High luminescent cross talk	Use high-quality white or black opaque plate.
Injector leaks	The inlet or outlet tubing is not properly connected to the injector pump. See Section 5.H for instructions on removing and replacing tubing.
Injectors do not sit properly in the Injector Tip Holder	Reagent residue has built up inside the Injector Tip Holder. See Section 5.D for instructions on cleaning the Optical Head.

Symptoms	Causes and Comments
Grinding noise during run	Reagent residue has built up on the Aperture. See Section 5.E for instructions on cleaning the interior of the instrument.
	The Microplate Sample Tray cover is open during the run. Close the tray cover and secure with the tray latch. The plate holder should be in the Home position.
The Microplate Sample Tray cover does not close	The 96-well plate is not sitting flat in the Microplate Sample Tray. Gently push the tray cover up to a 90 degree angle with the Microplate Sample Tray to completely open the tray. Place the 96-well plate inside the tray.
	Remove lid from 96-well plate, place inside the Microplate Sample Tray and close the tray cover.
Moisture appears on top of the Microplate Sample Tray cover after a run.	The injector tips are bent. See Sections 5.D and 5.I for instructions to change the tubing and clean the Optical Head.
	Injector tip holder is not seated correctly. Injector speed is not set correctly, causing reagent drips.
The 96-well plate has overflowed inside instrument.	• See Section 5.D for instructions to clean the Optical Head. • Check the wells selected for injection and measurement. • Check the total injection volume in the software protocol. • Check the volume of sample inside the well. The maximum volume per well is 300µl. • Thoroughly clean the interior of the instrument.
Reagent has spilled inside the instrument	Wipe up spills immediately using an absorbent paper towel or Kimwipes® tissue. If necessary, use a 70% ethanol solution to remove reagent residue.

6.C. Use of a USB Flash Drive

- Insert a USB flash drive into one of the two USB ports on the back of the instrument before running any protocol and do not remove until the protocol is finished.
- Do not insert or remove USB flash drive while instrument is running.
- Because USB flash drives may vary from vendor to vendor or from type to type, incompatibilities may occur. If the USB flash drive is not detected after a few seconds or if you encounter any issues with the USB flash drive, shut down and restart the Tablet PC and the instrument, and try a different brand of USB flash drive.
- If the Tablet PC becomes unresponsive after inserting a USB flash drive, shut down the Tablet PC and instrument, remove the USB flash drive, and restart the Tablet PC and the instrument.

7. Appendix

7.A. Configuring the Tablet PC

The GloMax® Navigator Tablet PC touch screen allows the user to adjust various operating system configurations and user settings as described below.

Your IT department or site Administrator should configure the Tablet PC according to the IT rules and IT procedures pertinent to your institution. The following is a set of guidelines for your IT personnel or site Administrator. Depending on your institution's IT policy, you may or may not be able to configure/change the settings for the Tablet PC. The Tablet is pre-installed with a Microsoft Excel® reader, but you may install the full version of Microsoft Office if you desire. We do not recommend loading other programs onto the Tablet because these may interfere with the instrument operation.

Note: Some institutions require anti-virus software installed on PCs within the institution. If installing an antivirus program please ensure it is set to manual, not automatic, update.

Antivirus software will slow the performance of the Tablet PC and will affect the performance of the GloMax® Instrument while it is measuring samples.

Additional recommendations if using your own PC:

- Disable automatic Windows® updates and virus scans
- Disable automatic power off, sleep, or hibernation settings
- Disable "Fast Startup". Set the power button to Shut Down not Sleep.
- Disable any other automatically or manually started software that would consume PC resources during operation.
- Ensure there are no domain policies that would overwrite any of the above settings.
- Ensure that Windows® will not turn off USB ports to save power.

Notes:

1. The Tablet PC that is provided with GloMax® System has already been configured for the settings listed above.
2. Ensure the User and Administrator groups are configured properly if adding the Tablet PC to your local domain (see 3. User Password and Setup). Failure to configure the User and Groups on the Tablet PC will prevent use of the GloMax® Navigator software.

The first time you use the GloMax® Instrument and Tablet PC, you should check the configuration of the following options. Settings can be changed later if required by following the instructions again.

1. Touch Screen

The GloMax® Tablet PC has a touch screen that can be used to navigate to the various screens. Touching and holding an icon on the Tablet for 3 seconds is equivalent to a Right Click on a normal PC.

2. Date and Time

The date and time set on the Tablet PC are used for the instrument run log to indicate when a protocol was run on the GloMax® Instrument, as well as during kinetic runs to mark the time during each read.

For Windows® 8:

a. Select the Windows® 8 **Settings** icon by swiping in from the right screen edge. Select Control Panel (or type "control panel" in the Search tool if you do not see Control Panel).

b. On the 'Control Panel' screen, tap the **Date and Time** menu item.

Note: If you are unable to see the **Date and Time** menu item, tap **Category View** in the upper right corner of the window and choose either **Large** or **Small** icons.

c. First set your time zone by tapping the **Change Time Zone** button.

d. On the 'Time Zone Settings' screen, select the appropriate time zone for your location and whether you wish the clock to automatically adjust for Daylight Savings Time.

e. Tap the **OK** button to save the time zone settings.

f. You will be returned to the 'Date and Time Settings' screen.

g. On the 'Date and Time Settings' screen, tap the **Change Date and Time** button.

h. Set the appropriate date and time for your current location using the calendar and clock setting icons.

i. Tap the **OK** button to save the date and time settings.

j. You will be returned to the 'Date and Time Settings' screen. Tap the **OK** button on this screen to return to the Control Panel.

k. Close the 'Control Panel' screen by tapping the red **X** button in the upper right corner of the screen.

For Windows® 10:

a. Close the GloMax® Software if it is open. If not at the 'Home' screen, touch the **Home** button in the upper left corner of the user interface. Touch the **X** in the upper left corner of the screen and then confirm that you want to exit.

b. From the 'Desktop' screen, touch the **Start** button on the left side of the Taskbar. Touch the **Settings** button to open the 'Windows Settings' screen (Figure 77).

7.A. Configuring the Tablet PC (continued)

2. Date and Time (continued)

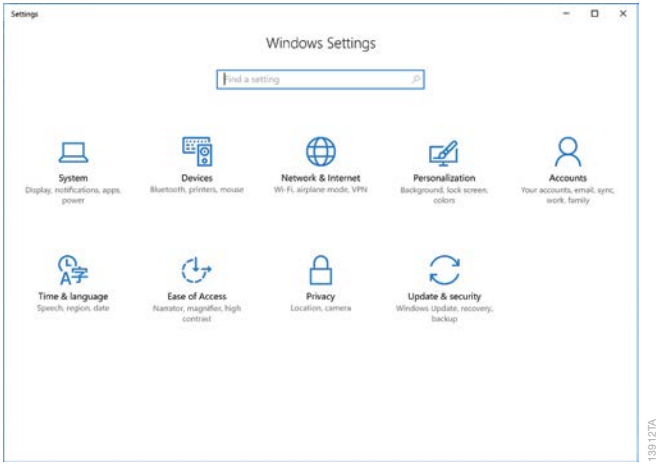


Figure 77. The 'Windows Settings' screen. The 'Windows Settings' screen provides access to multiple functions that can be used to configure options and settings for the Tablet PC.

c. Touch the **Time & language** button on the 'Windows Settings' screen to open the 'Time & language' screen (Figure 78).

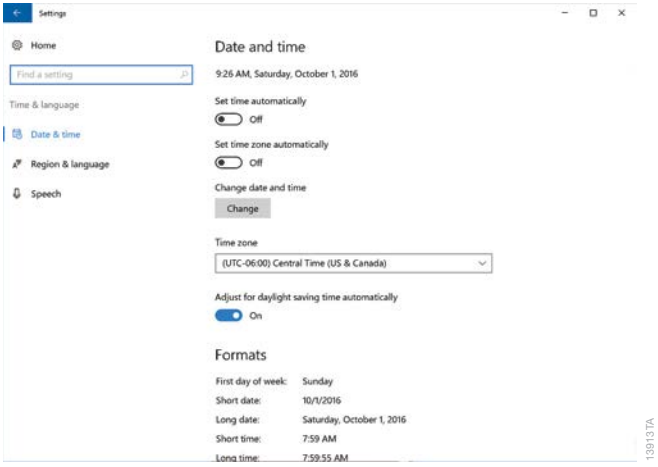


Figure 78. 'Time & language' screen. Settings for Date and time can be modified from this screen.

d. The 'Date and time' screen displays the current date, time, time zone, and daylight saving time settings on the Tablet PC. Check to see whether these match the current date, time, time zone and daylight saving time for your location.

Changing the Time Zone and Daylight Saving Time Settings

e. Use the drop-down menu under the **Time Zone** heading to select the time zone appropriate for your location.

f. Below the drop-down box for setting the time zone is the **Adjust for daylight saving time automatically** switch. Make sure this switch is in the on position if your location observes daylight savings time during the summer hours. Otherwise make sure the switch is in the off position.

Setting Date and Time

g. If the date and time shown on the 'Time & language' screen still does not accurately reflect the date and time in your location, touch the **Change** button below the Change date and time.

h. On the 'Change date and time' screen (Figure 79), use the drop-down boxes to select the appropriate date and time for your location.

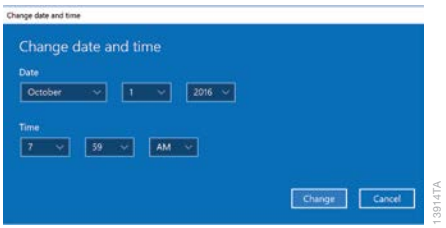


Figure 79. Adjusting date and time. Use the drop-down menus on the 'Change date and time' screen to adjust the displayed date and time on the Tablet PC.

i. Once you are satisfied with the date and time settings, touch the **Change** button to save the date and time settings. If you wish to discard your changes, touch the **Cancel** button.

j. You will be returned to the 'Date and time' window. Touch the **X** button in the upper right corner of the screen to return to the 'Desktop' screen.

7.A. Configuring the Tablet PC (continued)

3. User Password and Setup

GloMax® Software supports the following user roles.

PromegaAdministrator: Promega Administrators have the following capabilities:

- All PromegaUser capabilities
- Import protocols
- Select Export folders
- Set Instrument Name
- Export Audit Records

PromegaUser: Promega Users have the following capabilities:

- Select and run preloaded protocols
- Build user-defined protocols
- View, export results

Assigning User Accounts to Promega Groups

The GloMax® Software employs the Windows® login user access levels as a security tool for adding approved users and associated passwords. New user accounts should be created based on policies governing your institution. Only someone with an Administrator account can assign users to Promega groups. You must close the GloMax® Software to create user accounts.

1. Follow the instructions for your Tablet PC operating system.

For Windows® 8:

Swipe in from the right edge of the screen and select **Search**, then type in "lusrmgr.msc" and press **Enter**. The *Local Users and Groups* item should appear.

For Windows® 10:

a. Close the GloMax® Software if it is open. If not at the 'Home' screen, touch the **Home** button in the upper left corner of the user interface. Touch the **X** in the upper left corner of the screen and then confirm that you want to exit.

b. Touch the **Search** icon on the left side of the Taskbar.

c. Touch the 'Search' text box, then touch the **Keyboard** icon on the on the right side of the Taskbar to open the on-screen keyboard and enter the text lusrmgr.msc (Figure 80, Panel A). Touch the **X** on the on-screen keyboard to close the keyboard. Under the *Best match* header, an item called lusrmgr.msc should appear. Touch this item to open the 'Local Users and Groups (Local)' screen (Figure 80, Panel B).

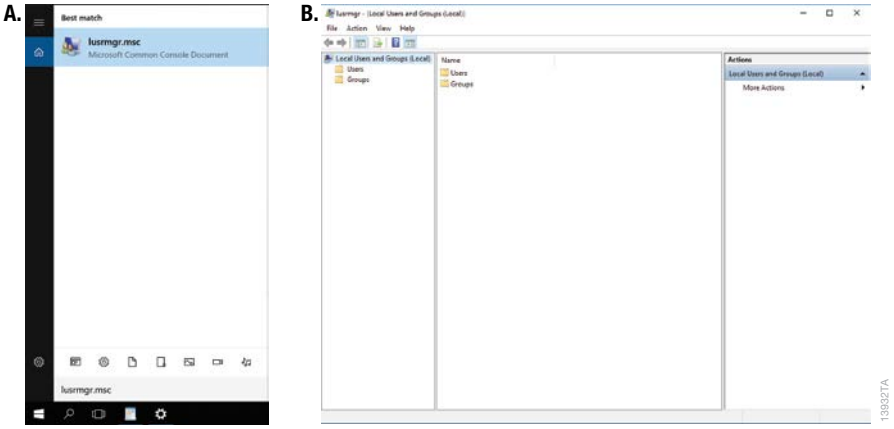


Figure 80. Accessing Users and Groups. Panel A. Touch the **Search** button in the taskbar and enter lusrmgr.msc into the search window to bring up the lusrmgr.msc item. **Panel B.** Touching the **lusrmgr.msc** item from the search list opens the 'Local Users and Groups (Local)' screen.

2. In the left pane of the 'Computer Management' screen, select **Local Users and Groups** and double-tap **Groups**.

   Note: If the Local Users and Groups menu item is not visible, select the System Tools item to expand that menu heading.

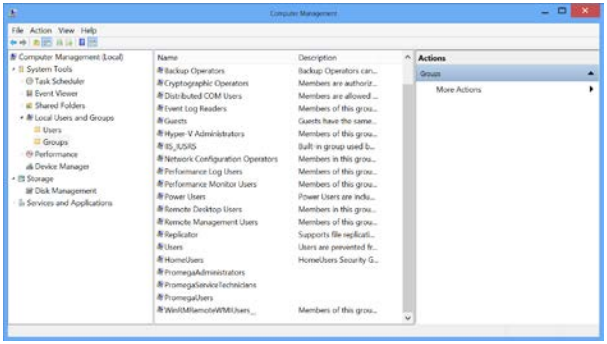


Figure 81. Selecting Groups from the Computer Management screen.

7.A. Configuring the Tablet PC (continued)

3. User Password and Setup (continued)

3. If you want to add Administrators, double-tap **PromegaAdministrators**. A 'PromegaAdministrator' window will open, which can be used to add existing users to the PromegaAdministrators group. Tap the **Add...** button to add users to the PromegaAdministrators group. In the "Enter the object names to select" area of the window enter the username of the user you wish to add to this group. Tap **OK** on this window and tap **OK** on the 'PromegaAdministrator Properties' screen to add users to the PromegaAdministrators group. Close the 'Computer Management' screen.

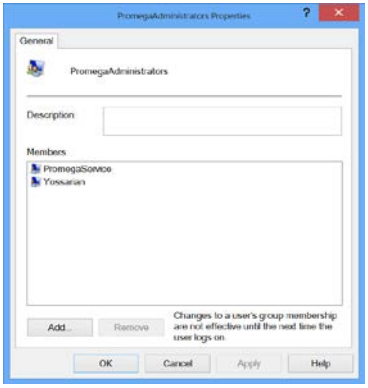


Figure 82. Adding users to the PromegaAdministrators group.

4. If you want to add users, tap **PromegaUsers**. A 'PromegaUsers' screen will open, which can be used to add existing users to the PromegaUsers group. Tap the **Add...** button to add users to the PromegaUsers group. In the "Enter the object names to select" area of the window enter the username of the user you wish to add to this group. Tap **OK** on this window, and tap **OK** on the 'PromegaUsers Properties' screen to add users to the PromegaUsers group. Close the 'Computer Management' screen.

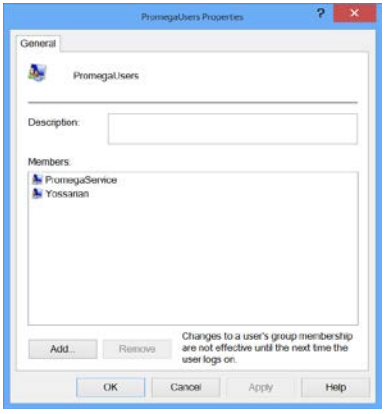


Figure 83. Adding users to the PromegaUsers group.

Removing User Accounts

The GloMax® Software employs the Windows® login user access levels as a security tool for adding approved users and associated passwords. Removing existing users can only be performed by someone with Administrator privileges.

1. Follow the instructions for your Tablet PC operating system.

For Windows® 8:

Swipe in from the right edge of the screen and select **Search**, then type in "lusrmgr.msc" and press **Enter**. The *Local Users and Groups* item should appear.

For Windows® 10:

a. Close the GloMax® Software if it is open. If not at the 'Home' screen, touch the **Home** button in the upper left corner of the user interface. Touch the **X** in the upper left corner of the screen and then confirm that you want to exit.

b. Touch the **Search** icon on the left side of the Taskbar.

c. Touch the 'Search' text box, then touch the **Keyboard** icon on the on the right side of the Taskbar to open the on-screen keyboard and enter the text lusrmgr.msc (Figure 84, Panel A). Touch the **X** on the on-screen keyboard to close the keyboard. Under the *Best match* header, an item called lusrmgr.msc should appear. Touch this item to open the 'Local Users and Groups (Local)' screen (Figure 84, Panel B).

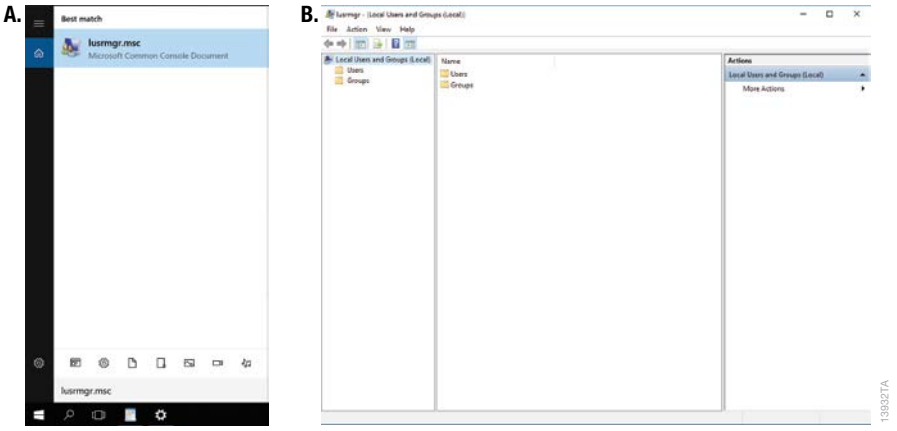


Figure 84. Accessing Users and Groups. Panel A. Touch the **Search** button in the taskbar and enter lusrmgr.msc into the search window to bring up the lusrmgr.msc item. **Panel B.** Touching the **lusrmgr.msc** item from the search list opens the 'Local Users and Groups (Local)' screen.

2. Tap **Local Users and Groups** and double-tap **Groups**.

3. If you want to remove Administrators, tap **PromegaAdministrators**. A 'PromegaAdministrator' screen will open, which can be used to remove existing users from the PromegaAdministrators group.

7.A. Configuring the Tablet PC (continued)

3. User Password and Setup (continued)

Removing User Accounts (continued)

4. Select the user you want to remove and tap the **Remove…** button. Tap **OK** to remove selected user from the PromegaAdministrators group. Close the 'Computer Management' screen.
5. If you want to remove users, tap **PromegaUsers**. A 'PromegaUsers' screen will open, which can be used to remove users from the PromegaUsers group. Select the user to be removed and tap the **Remove…** button Touch **OK** to remove the selected user from the PromegaUsers group.

Set Instrument Name (GloMax® Software)

Administrators can set the instrument name using the GloMax® Software by tapping the **Instrument Name** button from the 'Administrator Page' screen (Figure 85, **Home → Settings → Administrator**). Administrators can use the on-screen keyboard to manually enter the instrument name (Figure 86). The instrument name should be entered following the procedures and rules at your site.

Note: Changing the instrument name will force a reboot of the Tablet PC.



Figure 85. GloMax® Software 'Administrator Page' screen.



Figure 86. 'Instrument Name' screen. Administrators can manually enter the instrument name from the 'Instrument Name' screen.

7.B. Icons and Symbols

Home screen	
 11609TA	Exit Software
 11611TA	Quick access to the Tools Screen
 13629TA	Home all axes
 13630TA	Help Screen
From any screen other than the Home screen	
 11614TA	Home. Pressing this icon will take you to the Home Screen.
Protocol screen	
11615TA	Favorite. Mark to select a favorite protocol, which will then sort to the top of the page.
 11616TA	Yellow favorite indicates selection.
Protocol Editor screen	
 11617TA	Plate map is locked and applied to every step within the protocol
 11618TA	Plate map is unlocked, and each step of the protocol may have a different plate map selection.
 11619TA	Plate map
 11620TA	Attention, there is an error in the protocol. Touch this icon for information.
Results screen	
 11622TA	Press to turn the heat map display “on” or “off.
11621TA	Delete a result file from the Results Screen.

7.C. Warranty and Service

The GloMax® System comes with a one-year warranty from Promega. Additional warranty and service agreements are available. For more information, contact Promega Technical Services. Contact information is available at: www.promega.com. E-mail: **techserv@promega.com**

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

1. Contact Promega Technical Services.
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 GloMax® Service Agent. You will be issued a Promega return authorization number. YOU MUST OBTAIN a Promega return authorization number (RMA 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 (see Section 7.D). If the instrument has been exposed to any chemical, biological or radioactive hazards, contact Promega Technical Services for decontamination instructions before shipping.

7.D. Certificate of Decontamination

Disinfection and decontamination are required before shipping the instrument and instrument accessories for repair. Instruments returned for service must be accompanied by a signed and dated Certificate of Decontamination, which must be attached to the outside packaging of the instrument. Print this page, fill out, sign and return along with the instrument for repair.

1 Clean the interior of the instrument according to the instructions in Section 5.E.

2. Clean the injectors according to the instructions in Section 5.F.

3. Clean the Waste Collection Tray according to the instructions in Section 5.G.

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 used with body fluids or contaminated 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): _____

Promega

7.E. Related Products

GloMax® Navigator System Accessories

Product	Size	Cat.#
Dual Injectors and Pump Station Upgrade for GloMax® Navigator	1 each	SA1304
GloMax® Luminometer Light Plate	1 each	E6531
Replacement Tubing Assembly for GloMax® Navigator (Set of 2)	1 each	GM2030

GloMax® Navigator System Service Options

Product	Size	Cat.#
GloMax® Navigator Standard Service Agreement	1 each	SA1301
GloMax® Navigator Parts Only Service Agreement	1 each	SA1302
GloMax® Navigator Basic Service Agreement	1 each	SA1303
GloMax® Navigator Preventive Maintenance	1 each	SA1308
GloMax® Navigator Instrument Sales Rental, 1 month	1 each	E5302
GloMax® Navigator Installation Qualification (IQ)	1 each	SA1305
GloMax® Navigator Operational Qualification (OQ)	1 each	SA1306
GloMax® Navigator Installation and Operational Qualification (IQ/OQ)	1 each	SA1307

Cell Viability, Cytotoxicity and Cell Health Assays

Product	Size	Cat.#
CellTiter-Glo® Luminescent Cell Viability Assay*	10ml	G7570
BacTiter-Glo™ Microbial Cell Viability Assay*	10ml	G8230
Mitochondrial ToxGlo™ Assay*	10ml	G8000
CytoTox-Glo™ Cytotoxicity Assay*	10ml	G9290
Water-Glo™ Complete Aqueous	1 each	AM1001

*Additional Sizes Available.

Apoptosis Assays

Product	Size	Cat.#
Caspase-Glo® 3/7 Assay*	10ml	G8091

*Additional Sizes Available.

Reporter Assays

Product	Size	Cat.#
Dual-Glo® Luciferase Assay System*	10ml	E2920
Dual-Luciferase® Luciferase Reporter Assay System*	100 assays	E1910
Luciferase Assay System*	100 assays	E1500
NanoBiT™ PPI MCS Starter System	1 each	N2014
NanoBiT™ PPI Flexi® Starter System	1 each	N2015
Nano-Glo® Live Cell Assay System*	100 assays	N2011
Nano-Glo® Luciferase Assay System*	100ml	N1120
Nano-Glo® Dual-Luciferase® Reporter Assay System*	100ml	N1620
ONE-Glo™ Luciferase Assay System*	10ml	E6110
Bright-Glo™ Luciferase Assay System*	10ml	E2610
Steady-Glo® Luciferase Assay System*	10ml	E2510
Renilla Luciferase Assay System*	100 assays	E2810
Renilla-Glo® Luciferase Assay System*	10ml	E2710
ADCC Reporter Bioassay, Core Kit	1 each	G7010
ADCC Reporter Bioassay, Core Kit 5X	1 each	G7018
ONE-Glo™ + Tox Luciferase Reporter and Cell Viability Assay*	1 plate	E7110

*Additional Sizes Available

Cell Signaling Assays

Product	Size	Cat.#
P450-Glo™ CYP1A2 Screening System	1,000 assays	V9770
P450-Glo™ CYP2C9 Screening System	1,000 assays	V9790
P450-Glo™ CYP3A4 Screening System	1,000 assays	V9800
P450-Glo™ CYP2C19 Screening System	1,000 assays	V9880
P450-Glo™ CYP2D6 Screening System	1,000 assays	V9890
ADP-Glo™ Kinase Assay*	1,000 assays	V9101
Kinase-Glo® Luminescent Kinase Assay*	10ml	V6711
Kinase-Glo® Max Luminescent Kinase Assay*	10ml	V6071
Kinase-Glo® Plus Luminescent Kinase Assay*	10ml	V3771
cAMP-Glo™ Assay*	300 assays (384-well plate)	V1501
GloSensor™ cAMP Reagent*	25mg	E1290

*Additional Sizes Available.

7.F. Summary of Changes

The following changes were made to the 8/18 revision of this document:

1. Updated to coincide with a software update.

[a]Patent Pending.

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