OPERATING MANUAL

GloMax® Explorer System

Instructions for Use of Products **GM3500 and GM3510**

GloMax® Explorer 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

1. Introduction

1.A. Description

The GloMax® Explorer System[a] is a high-performance multimode detection instrument developed with Promega reagent assays to provide a simple means of detecting advanced chemistries. This instrument provides researchers superior luminescence sensitivity and dynamic range for both strong and weak bioluminescence experimental samples as well as seamless integration with industry-leading bioluminescence assays from Promega. GloMax® Explorer is able to measure luminescence, fluorescence intensity and visible absorbance.

The instrument is operated by an integrated Tablet PC, which provides quick and easy navigation through the control options. Exporting your results is seamless with a variety of options, including export to your local data network. The GloMax® Explorer software also 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.

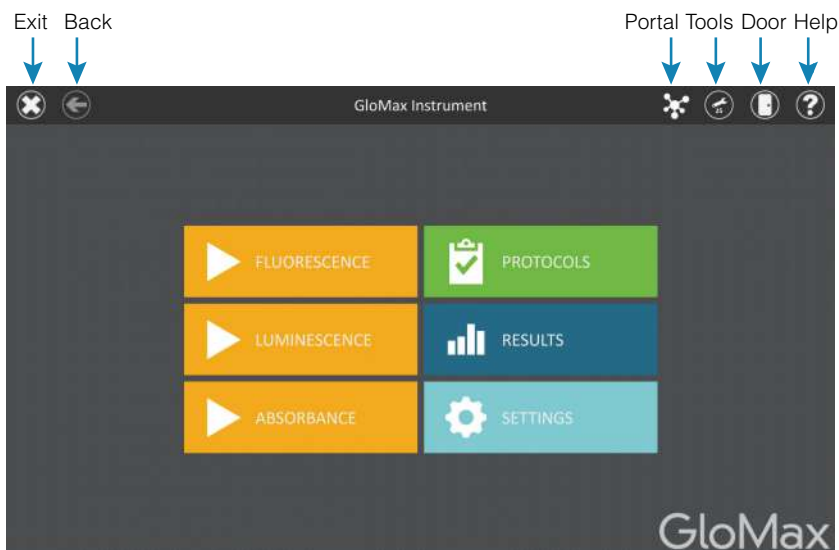**2**   Promega Corporation · 2800 Woods Hollow Road · Madison, WI 53711-5399 USA · Toll Free in USA 800-356-9526 · 608-274-4330 · Fax 608-277-2516

     TM433 · Revised 6/22   **www.promega.com**

Figure 6. GloMax® Explorer software 'Home' screen.

2.C. Shutting Down the GloMax® Explorer Instrument

1. Switch the instrument OFF using the On/Off switch on the back of the instrument.

   Note: When the instrument is not in use for a prolonged period, it is best to turn OFF the external power supply using its own On/Off switch.

2. Shut down the GloMax® Explorer Software by tapping on the **x** in the upper left corner (Figure 6).

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® Explorer System

1. Open the Door of the instrument by tapping the **Door** icon on the top right corner of the screen (Figure 6). When the plate tray extends, add the plate such that well A1 of the plate corresponds to the label "A1" on the plate tray (Figure 7).

2. Select one of the yellow Quick Read protocols on the 'Home' screen, or access a protocol of interest by pressing the **Protocols** button.

3. Close the door using the **Door** icon on the top right corner of the screen.

2.D. Operating the GloMax® Explorer System (continued)

4. Select the **Start** button at the bottom right corner of the screen.

Figure 7. Plate tray extended.

5. Enter the name of the result file by touching inside the text box and entering a name (Figure 8).
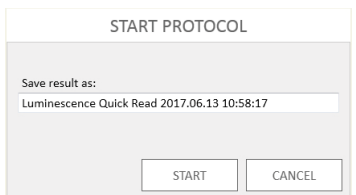
Figure 8. Save Results Window.

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® Explorer 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® Explorer Graphical User Interface Software. The 'Home' screen (Figure 9) contains 6 buttons:

Fluorescence. This Quick Read button allows you to immediately perform a fluorescence read, selecting the plate type (6-, 12-, 24-, 48-, 96- or 384-well plate, with or without plate lids for 96- and 384-well plates), Excitation filter wavelength and Emission filter wavelength.

Luminescence. This Quick Read button allows you to immediately perform a luminescence read, selecting the plate type (6-, 12-, 24-, 48-, 96- or 384-well plate, with or without plate lids for 96- and 384-well plates) and Integration time.

Absorbance. This Quick Read button allows you to immediately perform an absorbance read, selecting the plate type (6-, 12-, 24-, 48-, 96- or 384-well plate, with or without plate lids for 96- and 384-well plates) and absorbance filter wavelength.

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, the user can name the instrument, specify where files are exported on the PC or Network drive, specify filter wavelengths and locations within the custom filter paddle, export log files and access additional Tools.
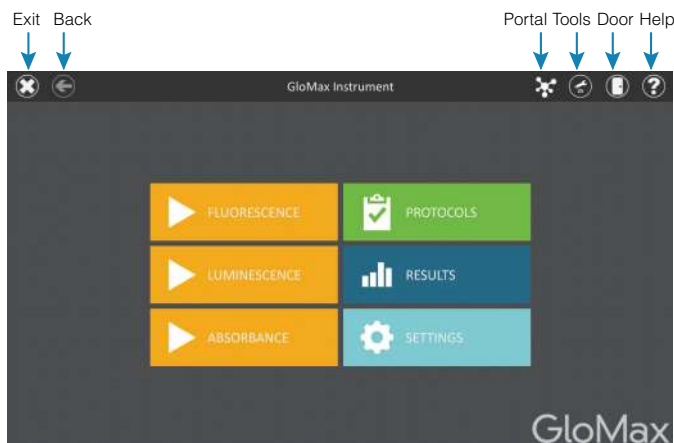

Figure 9. GloMax® Explorer 'Home' screen.

3.A. Tablet PC Home Screen (continued)

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® Explorer User Interface software and returns to the Windows® Operating System.

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

Portal. This icon indicates that the GloMax® Software is connected to Portal software.

Tools. Tapping this button expands a list of available tools such as turning the **Heater** On/Off; accessing the **Injectors** to Prime, Reverse Purge and/or Flush; changing the **Aperture** between 96- and 384-well settings; changing and/or viewing configurations for **Filters** (both excitation and emission filters); turning the **Shaker** On/Off and accessing the instrument information (**About**).

Door. This button toggles the open/closed status of the door on the GloMax® Explorer Instrument.

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

3.B. Quick Read Screens

Quick Reads are intended to allow users to perform a basic single-step measurement very easily. Simply define the plate map, select the indicated options for the selected quick read (e.g., excitation/emission wavelengths for fluorescence, integration time for luminescence, filter wavelength for absorbance). Open the door, insert your plate and press the **Start** button in the lower right corner to begin the plate read.

Figure 10. GloMax® Explorer 'Fluorescence Quick Read' screen. On the plate map, blue wells are selected.

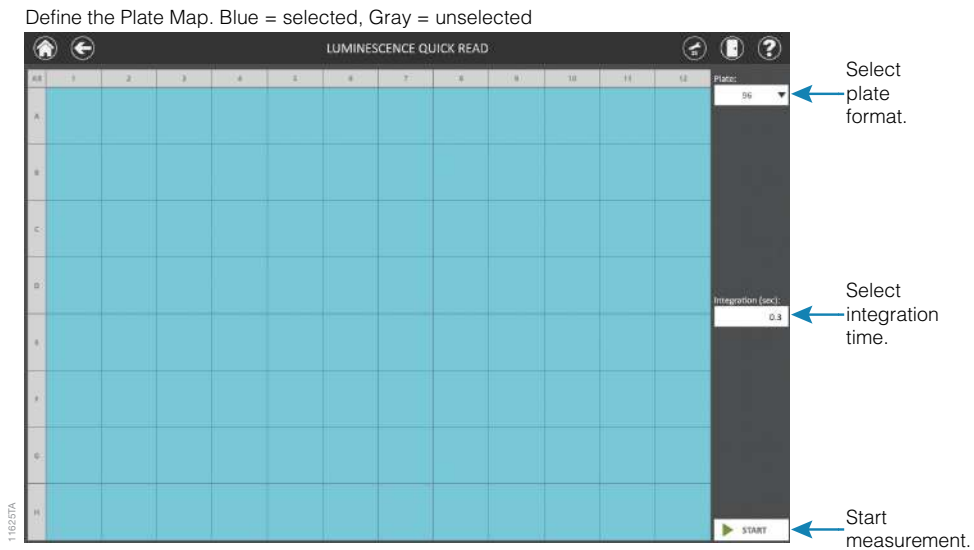Define the Plate Map. Blue = selected, Gray = unselected

Figure 11. GloMax® Explorer 'Luminescence Quick Read' screen.

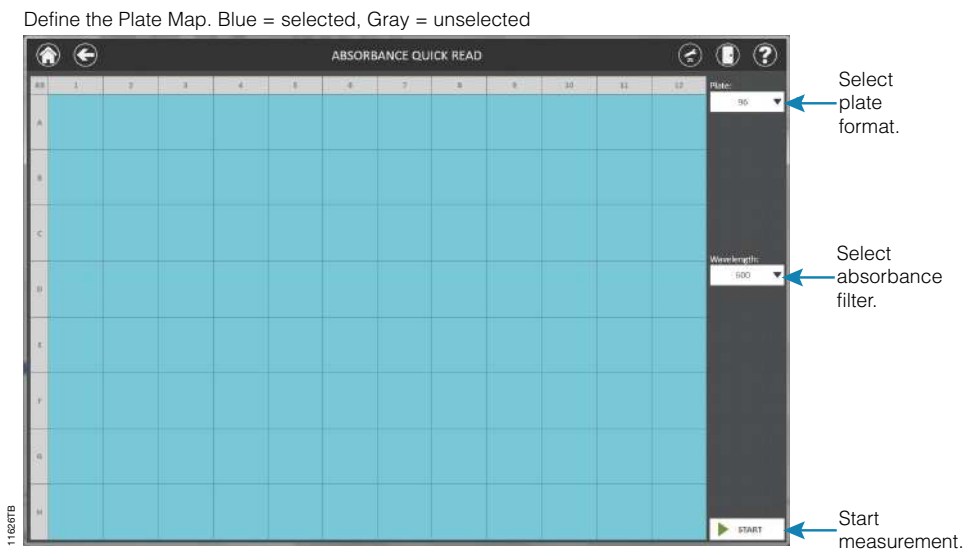Define the Plate Map. Blue = selected, Gray = unselected

Figure 12. GloMax® Explorer 'Absorbance Quick Read' screen.

3.C. Protocols Screen

Touch **Protocols** from the 'Home' screen to access the list of protocols currently present in the software or create a new protocol.
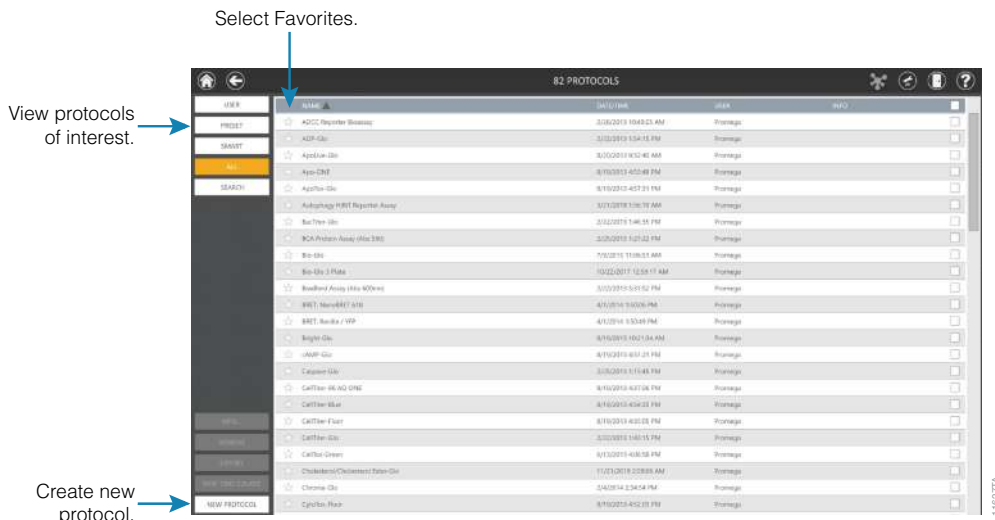

Figure 13. GloMax® Explorer 'Protocols' screen.

Protocols are displayed in a table format with several columns of information. Touch any of the column titles at the top of the screen to sort the list of protocols in increasing or decreasing order by that column's contents.

Column	Description
☆	Protocols can be marked as favorites by touching the star on the left side of the protocol entry. Favorite protocols are automatically shown at the top of the protocols list the next time you access the 'Protocols' screen.
Name	The Name column displays the name of the protocol.
Date/Time	The date and time that the protocol was created is shown in the Date/Time column.
User	The username of the individual who created the protocol.
Info	Additional identifying information entered by a user for this protocol.
☐	Protocol selection checkbox. When performing actions (e.g. Info..., Remove, Export), use the checkbox to select the methods to which the action will apply. The checkbox shown in the table header can be used to toggle all of the checkboxes on or off for displayed methods.

Filtering the List of Protocols

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. Only protocols that correspond to the selected filter button will be displayed.

Further refinement of the displayed protocols is available using the **Search** button. After pressing the **Search** button, an on-screen keyboard is displayed to enter a keyword. This keyword is searched within the Name, User and Info fields. All protocols which contain the keyword in any field are displayed. To remove the keyword, press the **Search** button again, press the **Backspace** button on the on-screen keyboard, and then press the **Enter** button.

Adding Searchable Information to Protocols

Select one or more protocols to which information should be added using the checkboxes to the right of each protocol entry. When one or more protocols are selected, the **Info…** button becomes active. Press the **Info…** button on the bottom left side of the screen to open the 'Info' screen (Figure 14). Touch the User Info text box to display an on-screen keyboard. Enter any text you want associated with the selected protocol(s) and press **OK** or **Enter** on the on-screen keyboard. Press the **OK** button on the 'Info' screen to associate this text with the protocol(s) or press the **Cancel** button to discard any changes. If text is already present in the Info column for a protocol, adding different text using the 'Info' screen will replace the previous text for that protocol.
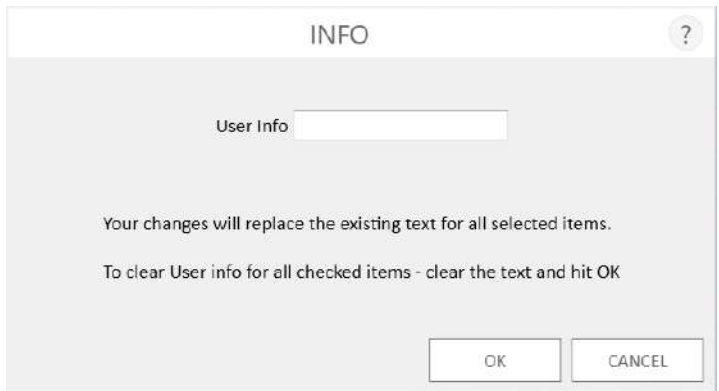
Figure 14. 'Info' screen. After selecting a protocol(s) and pressing the **Info…** button, the 'Info' screen is displayed. Touch the User Info text box to show an on-screen keyboard. Enter any identifying text to associate with the selected protocol(s), then press **OK** or **Enter** on the keyboard. Press the **OK** button on the 'Info' screen to associate this text with the selected protocol(s) or press the **Cancel** button to discard any changes.

Removing Protocols

Removing protocols from the GloMax® Software has several restrictions:

• Only user-defined protocols may be removed.

• Administrators are allowed to remove protocols

• Based on software preferences, users may be allowed to remove protocols (See Section 3.H)

Select one or more protocols to be removed from the software using the checkboxes to the right of each protocol entry. When one or more user-defined protocols is selected, the **Remove** button becomes active.

Note: If a combination of user-defined, preset or smart protocols is selected, the **Remove** button will not become active. Only user-defined protocols may be removed from the software.

Press the **Remove** button to remove all selected protocols from the software. You will be asked to confirm the request to delete protocols (Figure 15).
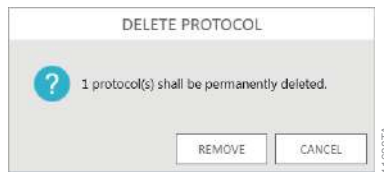

Figure 15. Delete Protocol message from the GloMax® Explorer software.

Exporting Protocols

It is possible to export user-defined protocols from one installation of the GloMax® Software for import into a separate installation of the GloMax® Software. Exporting protocols has two restrictions:

• Only user-defined protocols may be exported

• Only administrators have permission to export protocols

Note: If the operator only has user permissions in the GloMax® Software, the **Export** button will not be displayed on the 'Protocols' screen.

Select one or more protocols to be exported from the software using the checkboxes to the right of each protocol entry. When one or more user-defined protocols is selected, the **Export** button becomes active.

Note: If a combination of user-defined, preset or smart protocols is selected, the **Export** button will not become active. Only user-defined protocols may be exported from the software.

Press the **Export** button to export all selected protocols from the software. A 'Select Folder' file browser is displayed (Figure 16). Using the yellow and red rectangle buttons, you can select the folder location where the exported protocol(s) will be saved. The current path is indicated by the yellow rectangles at the top of the 'Export Folder' screen. Any folders present within the selected directory are displayed as red rectangles in the main portion of the screen. Touch the **Drive** button to navigate to the drive location of the desired folder. Touch the red folder buttons to navigate to the desired folder location. Once a path has been defined, touch the **OK** button to export the protocol(s) to the specified path, or touch **Cancel** to return to the 'Protocols' screen without exporting.
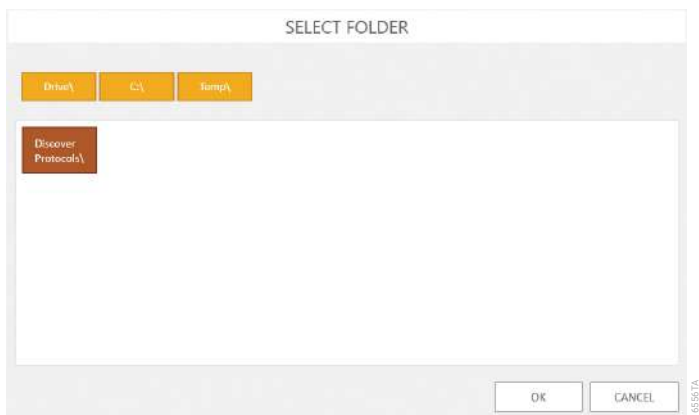
Figure 16. 'Select Folder' screen. When exporting a user-defined protocol(s), select a folder location to which the exported protocols should be saved.

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.
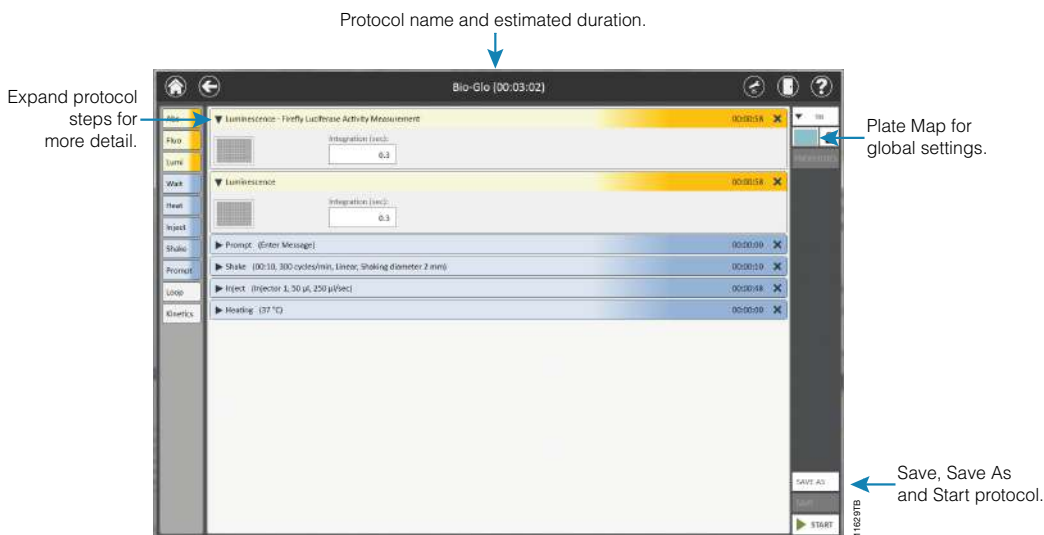

Figure 17. GloMax® Explorer 'Protocol' screen.

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 13). To edit an existing protocol, select a preset or user-defined protocol from the 'Protocols' screen (Home → Protocols).

2. You will be prompted to name the protocol. You also may provide a description, if desired (Figure 18).
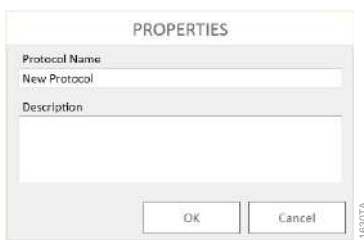
Figure 18. New Protocol name prompt from the GloMax® Explorer software.

3. Build your protocol by dragging and dropping protocol functions from the left panel onto the **Protocol Window** (Figures 19 and 20). Individual protocol functions are described in the Protocol Functions section below. Use the **Properties** button on the right to modify the name and description of the protocol.

Figure 19. GloMax® Explorer 'New Protocol' screen showing drag and drop feature to create custom protocols.

Figure 20. GloMax® Explorer 'New Protocol' screen showing a step added to the protocol.
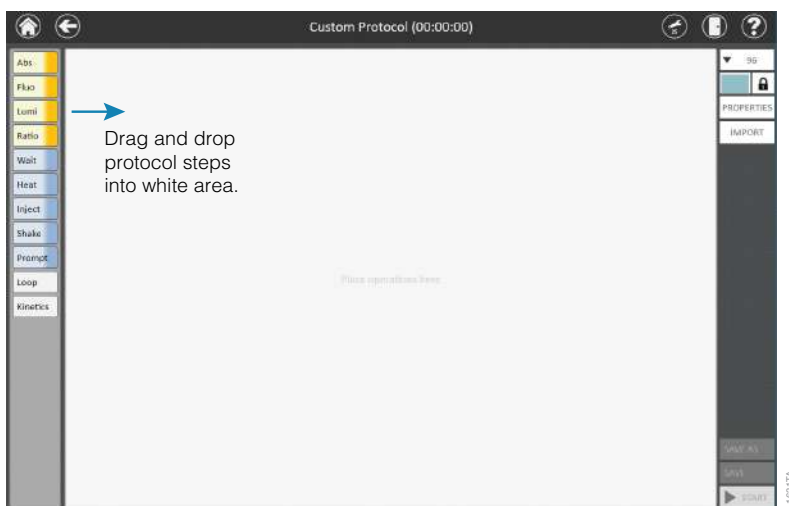
4. Select filters, integration times and plate map (see below) as you build the protocol.

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 (Figure 21).

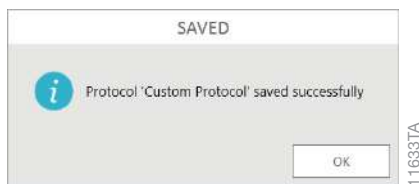8. To run the protocol, press the **Start** button in the lower right corner of the screen.

Figure 21. GloMax® Explorer New Protocol Successfully Saved user message.

3.C.   Protocol Screen (continued)

Plate Maps

Note: If the plate map editor is locked, consult with your site administrator to see whether the option to prevent users from modifying plate maps has been enabled on your system.

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 (Figure 22). 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.
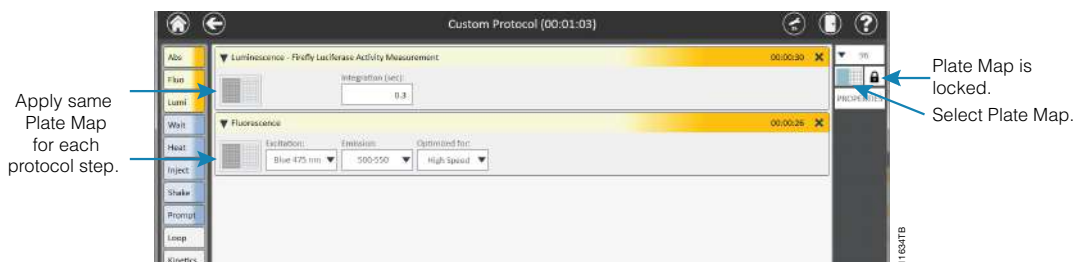

Figure 22. When the plate map is locked, the map is applied to each step of the protocol.

When the plate map is unlocked, each step of the protocol can have a different plate map (Figure 23). 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.
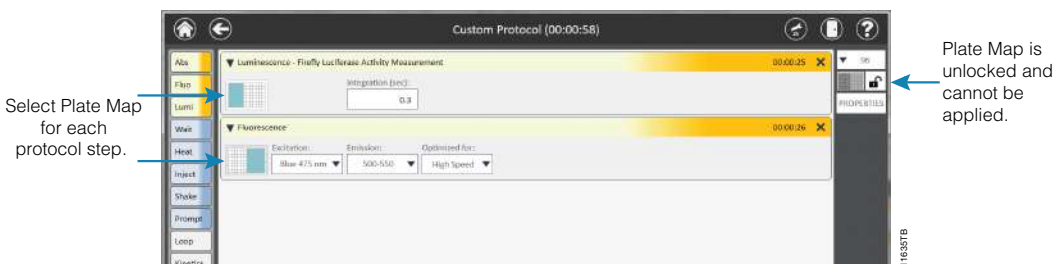
Figure 23. When the plate map is unlocked, a different plate map can be created for each step.

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 23, step 1 of the protocol has columns 1−5 selected, and step 2 has columns 7−12 selected. However, the global plate map has columns 1−6 selected. When locking the protocol, each step will revert to the global plate map (columns 1−6) or to whatever new plate map is selected.

It is possible to import a plate map file to define a global plate map for a protocol. Follow the steps for Importing a Plate Map in Section 3.E.

Luminescence and Fluorescence Integration Times

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

Fluorescence reads may select **High Speed**, which uses a 0.1 second integration time, or **High Sensitivity**, which uses a 0.3 second integration time.

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 24. GloMax® Explorer New Protocol Functions.

3.C.   Protocol Screen (continued)

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 25. Wait function screens.

Heat Function

Heat the plate by using the **Heat** function. To prewarm the heater prior to the measurement read, select **Heat** from the **Tools** icon of the menu bar, and select **Wait** in the Heating step. If **Wait** is selected in the protocol, the measurement read will begin only when the temperature has reached the set point. If **Wait** is not selected, the protocol will proceed whether or not the heater has reached the set point.

Enter the desired temperature, in degrees Celsius, and between 25°C and 45°C. The heater will maintain temperature within 1°C of the set point.

Note: The instrument is fan cooled, so the temperature cannot be set lower than the ambient temperature of your laboratory.

Figure 26. The Heat Function.

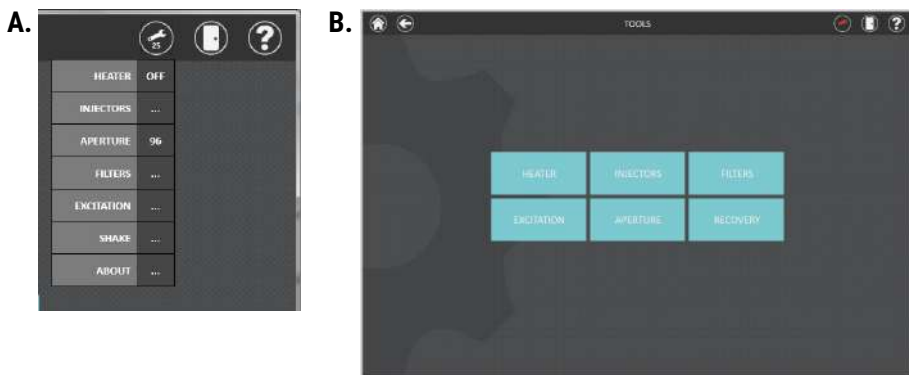The Heater may also be accessed from the **Tool** icon in the menu bar.

Figure 27. Accessing the Heater from the Tools icon in the menu bar.

Note: The heater will continue to remain ON after the run unless it is turned OFF or the PC is disconnected from the instrument.

Inject Function

Dual Injectors are an optional accessory for the GloMax® Explorer 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.

Injections may be performed into 6-, 12-, 24-, 48- and 96-well plate formats.

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.
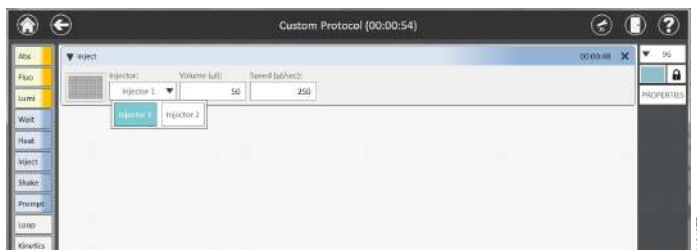

Figure 28. Inject Function.

3.C. Protocol Screen (continued)

Shake Function

For assays that require shaking to efficiently mix reagent prior to the measurement add a **Shake** step into the protocol. Select the shaking duration (minutes), the shaking speed (cycles per minute), and the shaking pattern (linear or orbital). The shaking duration can range from 0–10 minutes, and the cycles per minute can range from 100–500. Select the shaking diameter as 1, 2 or 3mm for all shaking speeds and patterns. Shaking parameters may need to be optimized based on well size, volume of liquid within the well and shaking time.

> Shaking Speeds:
> 100–200 cycles per minute is considered Low.
> 300–400 cycles per minute is considered Medium.
> 400–500 cycles per minute is considered High.

(!) Note: The instrument is not intended to be used as a long-term shaking incubator, and long-term shaking may damage the instrument.

Figure 29. Shake Function.

Prompt

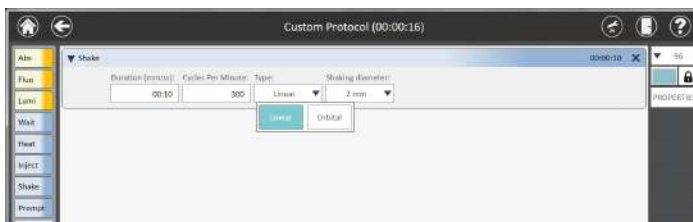Use a message **Prompt** to provide the user with instructions. Tap **Enter Message** in the prompt, and a keyboard will appear for the user. Type a user message, then tap **OK** to enter it into the protocol.
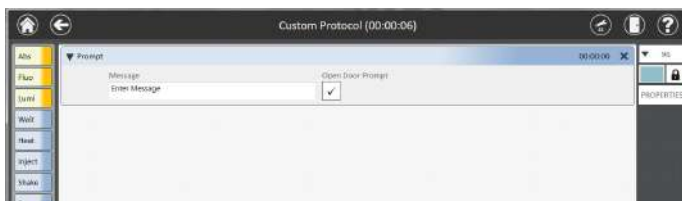

Figure 30. Prompt Function.

When the **Open Door Prompt** box is checked, the 'Prompt' screen shown in Figure 31 appears to the user during protocol, with the option to open the door.

If **Open Door** is selected, the door will open, and the screen will offer the user a choice to **Close Door**. When **Close Door** is selected, the door will close, and the prompt will offer the user a choice to **Open Door** or **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.
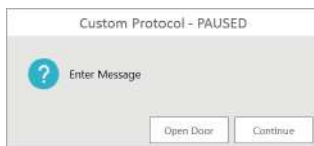

Figure 31. 'Prompt' screen with the Open Door option.

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.

Notes:

a. 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. Loops can be used with all detection modes, protocol functions and plate types. A maximum of 100 loops can be performed within a single loop step.

b. The Time Course function allows for Loop protocols which may generate very large data sets (e.g., potentially 1,000 reads or more, depending on available space on the PC). See the Time Course Function section for more details.

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

Figure 32. 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.

3.C. Protocol Screen (continued)

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 33. Loop function with detection modes selected.

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 detection modes, plate types, and protocol functions except for heat, shake and user prompt functions. If shaking and/or heating is desired in a kinetic protocol, they must be applied to the entire plate and therefore be placed outside of the kinetic step. Loops may not be placed within a kinetic step and kinetic steps may not be placed within Loops. A maximum of 250 kinetic reads in 1-unit increments can be performed within a single kinetics step. For example, 10 readings with a 1-second interval means that 1 reading is taken every 1 second for 10 seconds.

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

Figure 34. 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.

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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.
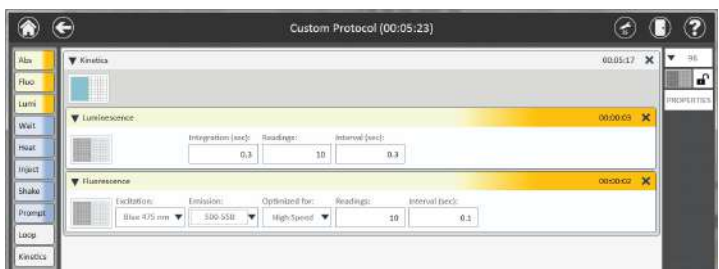

Figure 35. Steps contained within a kinetic function.

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.

Time Course Function

The Time Course function allows Protocols to be performed over a fixed time interval and can be used to collect very large data sets compared to the standard 100 iteration maximum when using the Loop Function. The Time Course function saves and exports the results after each read iteration directly to the PC instead of saving it within the GloMax® Software. Therefore, potentially 1,000 data reads or more may be generated using this function depending on available PC disc space. This function can be used with all detection modes and plate types. All protocol steps are also compatible except for Loop and Kinetic steps.

1. To create a new Time Course protocol, from the 'Protocols' screen, tap the Protocol selection box of the desired Protocol, then tap the **New Time Course** button at the bottom of the screen (Figure 13).

   Note: Only one protocol at a time may be selected for the **New Time Course** button to appear. If more than one protocol is selected, the **New Time Course** button will remain inactive.

3.C. Protocol Screen (continued)

2. Once a New Time Course is selected for a desired protocol, the Time Course screen will appear (Figure 36).

Figure 36. Time Course screen.

3. Select the desired number of iterations and the time interval between iterations (in minutes). For example, ten iterations with a 5-minute interval means that the entire plate map is read every 5 minutes for a total of ten times. The estimated protocol time will be calculated and displayed.

4. Select the **Plate Type**.

5. Select the **Plate Map** (Figure 37).

   Note: A global plate map is used, meaning for each iteration the same plate map is used.
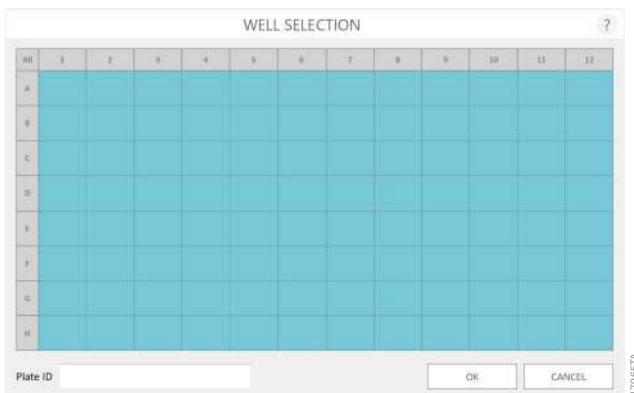

Figure 37. 'Well Selection' screen.

6. If desired, a Plate ID (identifier) may be entered by tapping and either typing an identifier into the field using the on-screen keyboard or using a barcode scanner.

   Notes:

   a. If a Plate ID is entered into the Plate Map screen, the result file name will include this information by default.

   b. Selecting **Import** allows the user to define the plate map as described in Section 3.D, Importing a Plate Map.

7. Select **OK**.

8. Select the **Start** button to begin the protocol.

3.D. Running a Protocol

Three general types of protocols are available within the GloMax® Software: Smart Protocols, Preset Protocols and User-Defined Protocols. 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.E, Analysis of Results.

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.

Preset and User-Defined Protocols

Preset protocols are provided by Promega with settings specific to Promega cell-based and biochemical assays. User-defined protocols are protocols created by a laboratory to meet a specific laboratory need. Running and analyzing both of these protocol types follows the instructions below.

3.D. Running a Protocol (continued)

Time Course Protocols

As the Time Course protocol begins, a status bar will indicate the progress of the run (Figure 38). After each iteration, the results will be exported to the export folder so the user may view and analyze the results in real-time, if desired. The export folder is specified by the Administrator settings (see Section 3.H, Administrator Settings).

Figure 38. Time Course status bar.

The results can be viewed in real-time within the 'Live View' tab in the Time Course screen (Figure 40).

Figure 40. Time Course 'Live View' tab.

Importing a Plate Map

Prior to starting a protocol, the user may choose to modify the global plate map by using the import function to define the plate being used for this specific assay. At a minimum, plate maps must contain a column of information defining the well location associated with wells in the assay plate. However, plate maps are also able to specify additional data associated with the assay plate that can define the plate map settings required for data analysis after the protocol. The following table specifies the information that can be imported with the plate map.

Data Type	Requirement	Description
Well	Required	Well location in the plate occupied by a sample. Wells can be specified in A1–H12 format or 1–96 format. When specifying wells in 1–96 format, well locations flow down columns (e.g., 1 = Well A1, 2 = Well B1, 8= Well H1, 9 = Well A2).
Sample ID	Optional	The sample identifier associated with the sample in the specified well.
Concentration	Optional	The concentration associated with the specified well. For example, when defining a standard curve or a compound dilution series, the concentration of the sample within the well can be specified.
Type	Optional	The sample type associated with the specified well. Allowed types include: Unknown, Known, Blank, Control 1, Control 2. Sample types correspond to the well types allowed for Analysis (see Section 3.G, Analysis of Results).
Dilution	Optional	The dilution factor applied to the sample in the specified well. This value is used in combination with analyses that interpolate sample concentrations based on a standard curve.
Volume	Optional	The volume of the sample in the specified well. This value is used in combination with analyses that interpolate sample concentrations based on a standard curve.

Importing a Plate Map from a File

After opening a protocol, follow the steps below to import a file that defines the plate map. The file must contain a table of columns that specify the data types to be imported. A single header row with titles for each column may be present in the file. Minimally, this file will contain columns specifying the Well location for each sample in the plate. The file does not require a specific file extension and may be an Excel, tab-delimited text or comma-delimited text file. Follow the steps below to import a plate map file.

3.D. Running a Protocol (continued)

1. From the GloMax® Software 'Home' screen, tap the **Protocols** button.

2. Select a preset or user-defined protocol from the 'Protocols' screen (see Section 3.C) or create a new protocol (see Section 3.D).

3. Tap the **Import** button located on the right side of the 'Protocol-specific' screen (Figure 41) to display the 'Sample Data Import' screen (Figure 42).
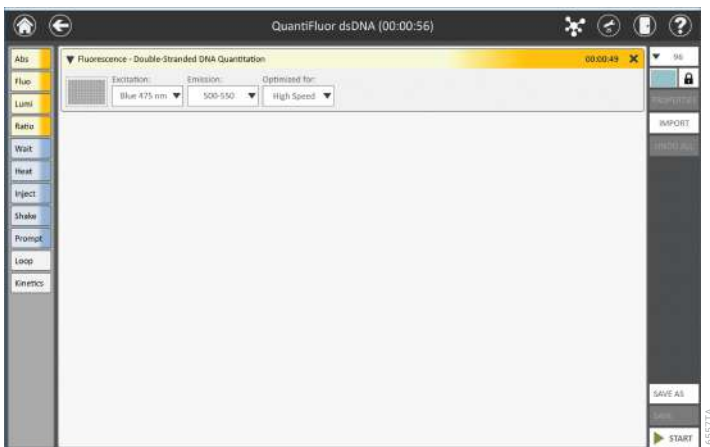

Figure 41. Protocol-specific screen. After selecting a preset or user-defined protocol, the individual steps of the protocol are displayed on a protocol-specific screen. Press the **Import** button on the right side of the screen to import a plate map.
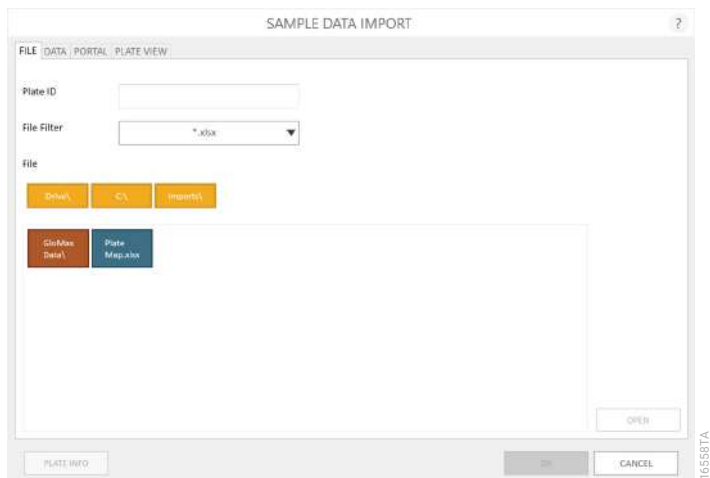

Figure 42. 'Sample Data Import' screen. First screen shown when importing a plate map into the GloMax® Software.

4. On the 'Sample Data Import' screen (Figure 42) provide the following information:

Field	Requirement	Description
Enter Plate ID	Optional	Enter or scan a plate identifier for the plate map file to be imported. The Plate ID is present on the Sample Information tab of Excel exports of the results file. Alternatively, the Plate ID can also be entered on the Plate Map screen.
Select File Filter	Required	The file filter determines the file extensions that are displayed in a folder when you select a file. Options are *.xlsx, *.csv;*.tsv;*.txt, *.xls, and *.* (to show all files). The filter selected will be saved as a default value for the next time a plate map file is imported.
Select File	Required	Using the yellow and red rectangle buttons, you can select the path to the plate map file. Touch the **Drive** button to navigate to the drive location of the desired folder. The current path is indicated by the yellow rectangles at the top of the Select File area. Any folders present within the selected directory are displayed as red, and files that have the extension selected in the file filter are shown in blue. Select the blue plate map file that you wish to import.

5. Once a file has been selected, tap the **Open** button to open the file and automatically move to the Data tab on the 'Sample Data Import' screen (Figure 43).
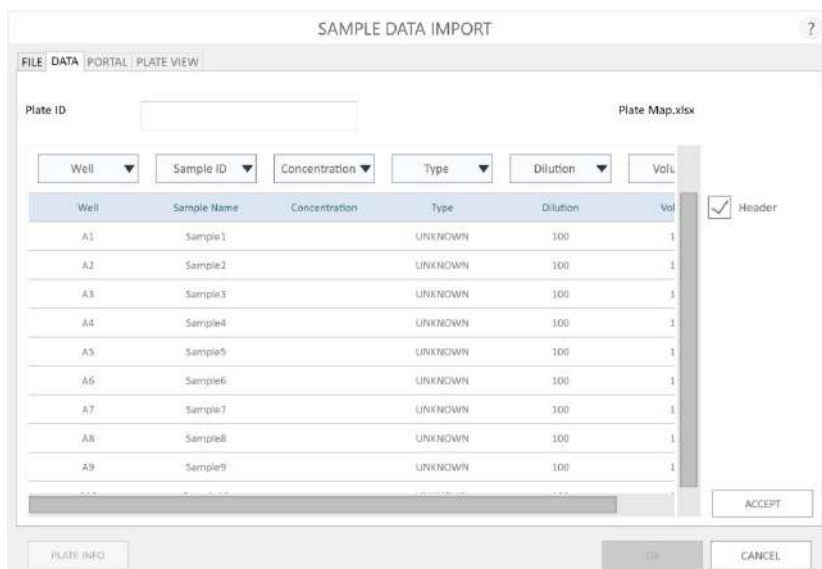

Figure 43. Data tab on the 'Sample Data Import' screen. Choose the type of data present in each column of the plate import file and then press the **Accept** button.

3.D. Running a Protocol (continued)

6. The Data tab on the 'Sample Data Import' screen allows the user to identify the information present in each column of the file. At the top of the tab is the Plate ID text box, which displays any Plate ID which had been entered on the File tab. If no Plate ID was entered, the Data tab provides another opportunity to enter or scan a Plate ID for this import file. Alternatively, the Plate ID can also be entered on the Plate Map screen. On the top right side of the Data tab is the name of the file that was selected.

   A table displaying the columns of data found in the import file is shown in the main portion of the screen. Select the type of data present in each column of the file using the drop-down menu at the top of each column. The data types that can be selected are: Well, Sample ID, Concentration, Type, Dilution, Volume and X. You must sel.ect which column contains the Well information; all other data types are optional. For columns which should be ignored during import, select **X** from the drop-down menu.

   If your import file has a header row that provides descriptive titles for each column, check the Header box on the right side of the table to ignore the Header row during import. When the Header box is checked, the first row of the table will be shaded light blue.

   All selections made on the Data tab are saved and become the default values selected the next time you import a plate map file.

7. Once all data fields are identified, tap the **Accept** button to perform the import of data from the file. An 'Import' screen is shown summarizing the results of the plate import including the Plate ID, plate format, number of samples present in the file, and the data source for the import file (Figure 44). Tap **OK** to dismiss the 'Import' screen.

8. The Plate View tab is displayed showing a representation of the sample ID and concentration data imported from the file (Figure 45). Sample IDs are shown at the top of the well and any concentration data is shown at the bottom of the well. Three buttons are located at the bottom of the screen:

   a. Tap the **Plate Info** button to view a 'Plate Info' screen summarizing the same information which was present on the 'Import' screen.

   b. Tap the **OK** button to accept the imported information and use it to specify the well layout and data for the protocol. The 'Sample Data Import' screen closes.

   c. Tap the **Cancel** button to discard any imported information or well layout and revert the protocol to using its originally-specified well layout. The 'Sample Data Import' screen closes.

9. Once the 'Sample Data Import' screen has closed, the user can proceed to run the method as described in Starting a Protocol.
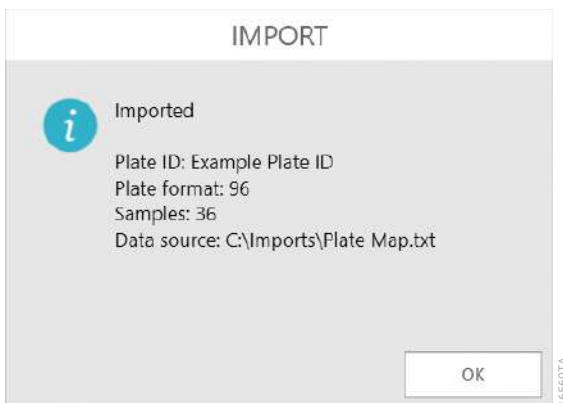
Figure 44. 'Import' screen. The 'Import' screen displays a summary of information from the import of a plate map file.
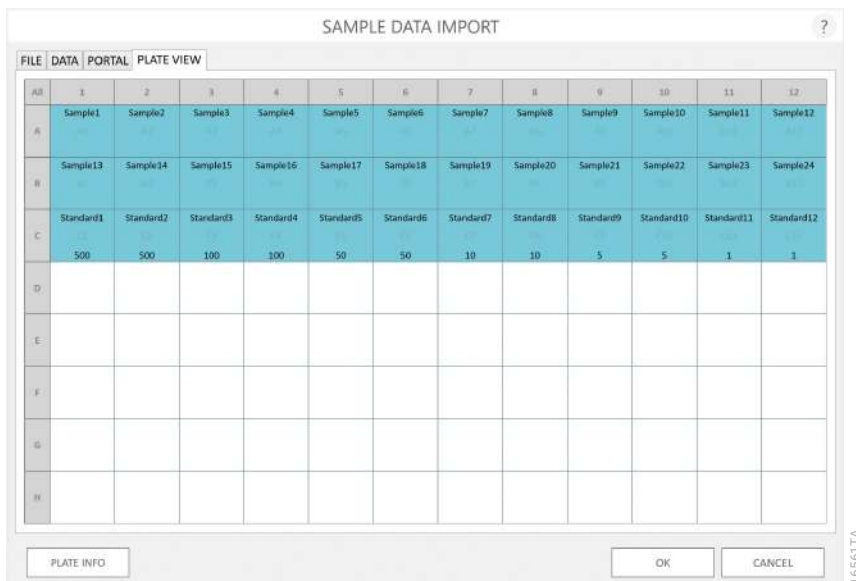

Figure 45. Plate View tab. A graphical representation of the plate map file that was imported. Sample ID and Concentration information are displayed.

3.D. Running a Protocol (continued)

Importing a Plate Map from Portal Software

After opening a protocol, follow the steps below to import plate map information from the Portal software. Portal software is a repository of sample and reagent tracking information that is typically installed in combination with the Maxprep™ Liquid Handler (Cat.# AS9100, AS9101, AS9200, AS9201) as part of a modular automation system of Promega instrumentation. Retrieval of plate map information for an assay (e.g., QuantiFluor® Fluorescent Dye-based quantitation) that was prepared on the Maxprep™ Liquid Handler and stored in Portal can be achieved following the steps below:

1. From the GloMax® Software 'Home' screen, tap the **Protocols** button.

2. Select a preset or user-defined protocol from the 'Protocols' screen (see Section 3.C) or create a new protocol (see Section 3.D).

3. Tap the **Import** button located on the right side of the 'Protocol-specific' screen (Figure 46) to display the 'Sample Data Import' screen (Figure 47).
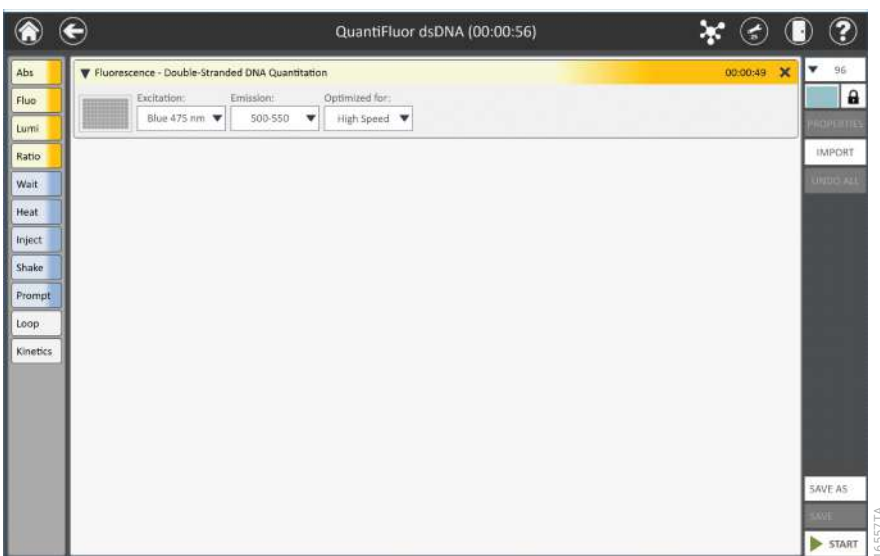

Figure 46. Protocol-specific screen. After selecting a preset or user-defined protocol, the individual steps of the protocol are displayed on a protocol-specific screen. Press the **Import** button on the right side of the screen to import a plate map.
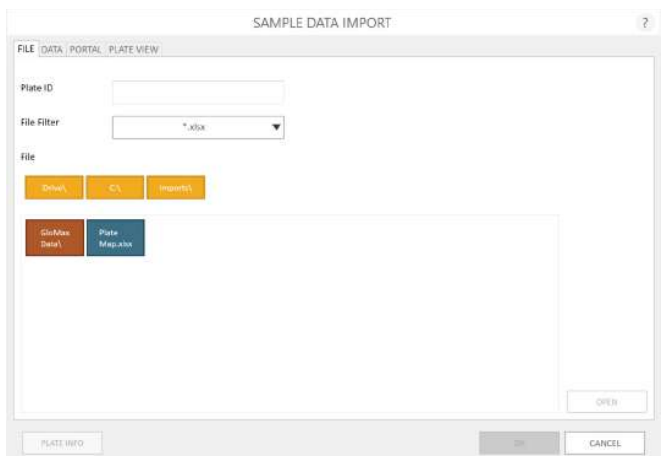
Figure 47. 'Sample Data Import' screen. First screen shown when importing a plate map into the GloMax® Software.

4.   From the 'Sample Data Import' screen, tap the Portal tab (Figure 48).

5.   Scan or enter the plate ID into the Enter Plate ID text box. Tap the **Search** button to search the Portal software for the records associated with the Plate ID.

6.   If the search is successful, a 'Portal Data' summary screen is shown indicating the method that was used to create the plate map, the date on which the method was completed and the number of samples on the plate (Figure 49). Tap the **OK** button to dismiss the 'Portal Data' screen

7.   Tap the **Import** button to import the plate map retrieved from the Portal software and open the Plate View tab. An 'Import' screen is shown, summarizing the results of the plate import including the Plate ID, plate format and number of samples retrieved (Figure 50). Tap **OK** to dismiss the 'Import' screen.

8.   The Plate View tab is displayed showing a representation of the sample ID and concentration data imported from the file (Figure 51). Sample IDs are shown at the top of the well and any concentration data is shown at the bottom of the well. Three buttons are located at the bottom of the screen:

a.   Tap the **Plate Info** button to view a 'Plate Info' screen summarizing the same information which was present on the 'Import' screen.

b.   Tap the **OK** button to accept the imported information and use it to specify the well layout and data for the protocol. The 'Sample Data Import' screen closes.

c.   Tap the **Cancel** button to discard any imported information or well layout and revert the protocol to using its originally specified well layout. The 'Sample Data Import' screen closes.

9.   Once the 'Sample Data Import' screen has closed, the user can proceed to run the method as described in Starting a Protocol.
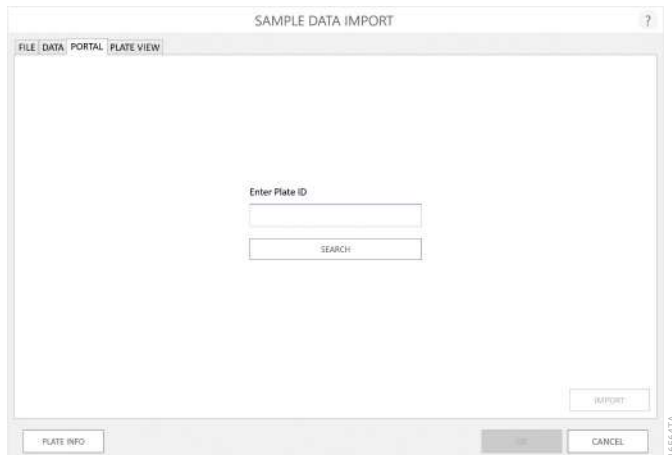
3.D. Running a Protocol (continued)

Figure 48. Portal Tab on the 'Sample Data Import' screen. Use the Portal tab to retrieve plate map information from the Portal software.
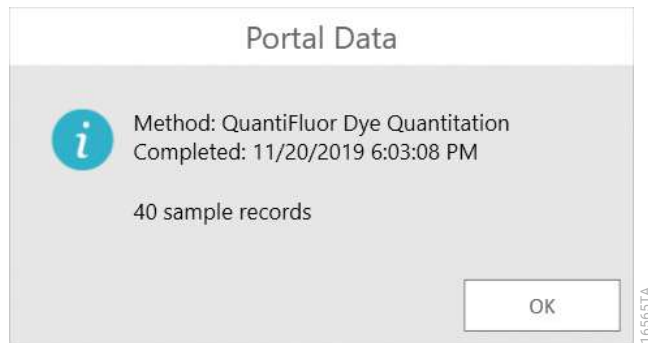

Figure 49. 'Portal Data' summary screen. The 'Portal Data' screen presents a summary of the data that was retrieved from the Portal software.
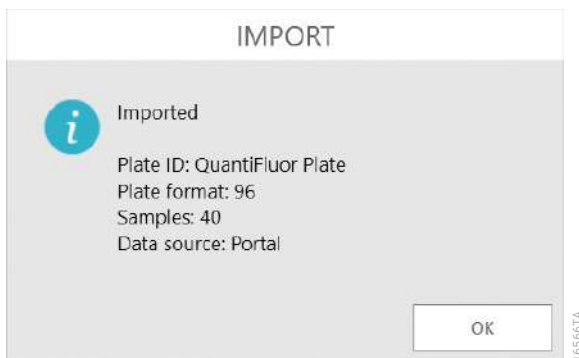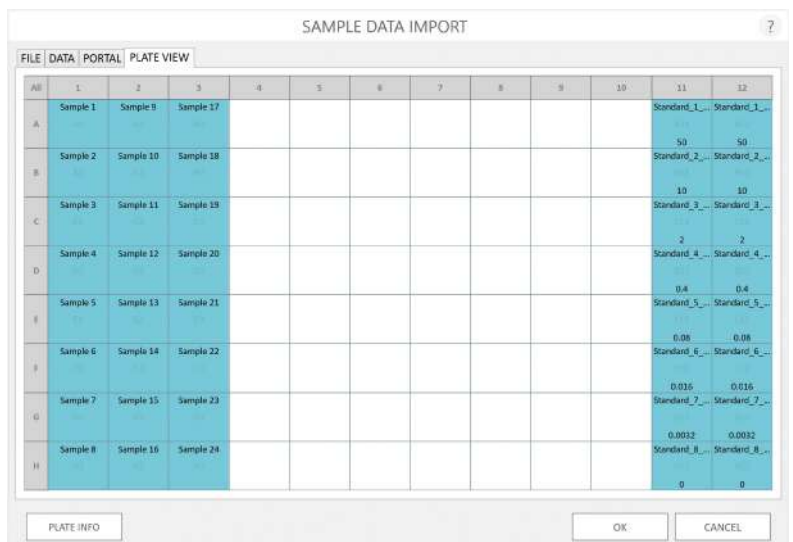
Figure 50. 'Import' screen. The 'Import' screen displays a summary of information retrieved from the Portal software.

Figure 51. Plate View tab. A graphical representation of the plate map file that was retrieved from the Portal software. Sample ID and Concentration information are displayed.

3.D. Running a Protocol (continued)

Clearing Plate Map Information

After importing plate maps from a file or the Portal software, you can retain the well map for the plate but discard all sample identifying information. Tap the **Well Map** button on the protocol-specific screen (Figure 46) to open the 'Well Selection' screen (Figure 52). On the 'Well Selection' screen, press the **Clear** button to discard sample specific information but retain the well map. The **Clear** button is only displayed after a plate map has been imported.

Discarding Protocol Changes

Any changes that have been made to a protocol can be discarded before that protocol is saved. After changes have been made to a protocol, the **Undo All** button becomes active. Tap the **Undo All** button on the protocol-specific screen (Figure 46) to discard all changes since the last save and reload the protocol. This will discard changes to protocol steps and plate maps.

Figure 52. 'Well Selection' screen.

Starting a Protocol

1. Press the **Start** button on a Preset or User-Defined protocol to begin the process of running a protocol.

2. If the protocol contains steps that require injectors, the 'Protocol Validation' screen will appear (Figure 53), allowing the user to prime the injectors before starting the protocol. Tap the **Prime** button to open the 'Prime Injectors' screen (see Section 4.B, Operating the Injector System, for injector priming instructions). Tap the **Start** button to start the protocol without priming the injectors. This assumes that the user has primed injectors with the reagents to be injected before starting the protocol. Tap the **Cancel** button to cancel this protocol run and return to the protocol-specific screen.
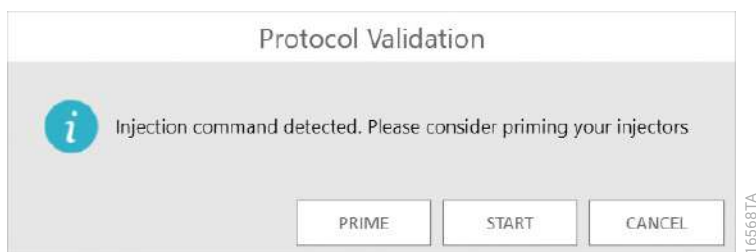

Figure 53. 'Protocol Validation' screen. When a protocol contains injector steps, the 'Protocol Validation' screen is displayed to allow the user to prime the injectors before starting the protocol.

3. The user is requested to provide a name for the protocol run on a 'Start Protocol' screen. By default, the name for the run is 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.

4. 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.

5. When injectors have been used in a protocol, the 'Clean Up' screen is displayed after the protocol is completed (Figure 54). Tap the **Flush** button to open the 'Flush' screen allowing the user to flush the injectors at the completion of the method (see Section 4.B, Operating the Injector System for injector flush instructions). Tap the **Cancel** button to close the 'Clean Up' screen and complete the method without flushing the injectors.

   Note: To prevent clogging of the fluid lines, we recommend flushing the injectors after each use.
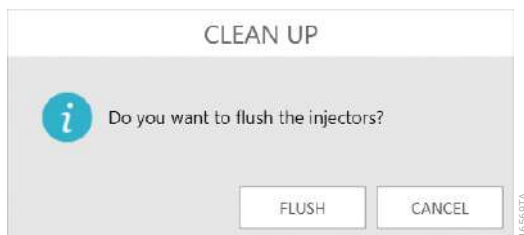

Figure 54. 'Clean Up' screen. When a protocol that uses injectors is completed, the 'Clean Up' screen is displayed allowing the user to flush the injector system.

3.D. Running a Protocol (continued)

6. 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 55, Panel A). The software automatically scales the color selection, assigning the highest values red and the lowest values blue, along a gradient (Figure 55, Panel B). 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. The results may be viewed in decimal or scientific notation format by selecting the **Data Format** button next to the heat map button. Whichever data format is selected also will be used when the results are exported.

A.

B.

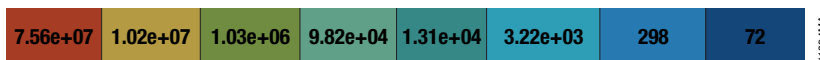| 7.56e+07 | 1.02e+07 | 1.03e+06 | 9.82e+04 | 1.31e+04 | 3.22e+03 | 298 | 72 |

Figure 55. Results plate map with heat map display (Panel A) and example of heat map colors applied to the results in the plate map (Panel B).

Within the plate map, each individual sample may be viewed by tapping the well of interest (Figure 56). For Absorbance measurements, both the Reference wavelength value and Experimental wavelength value are reported. Reference values are subtracted from the Experimental values, and this calculation is also reported in the result file.

Kinetic results display a graphical representation of the data during the course of the kinetics read (Figure 57). 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.
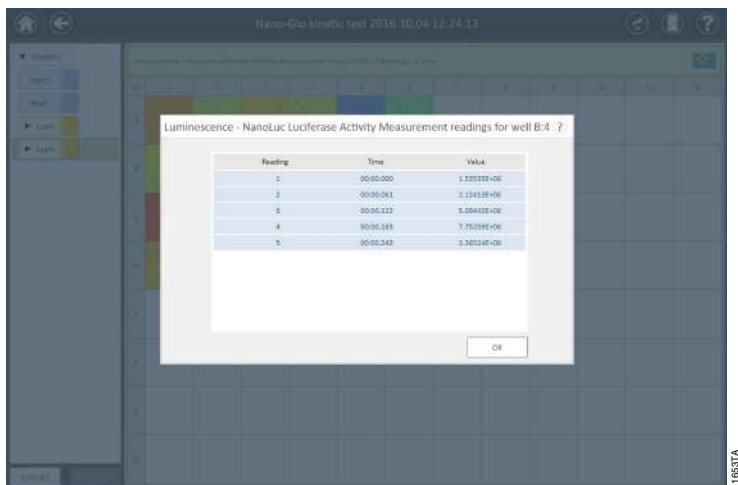
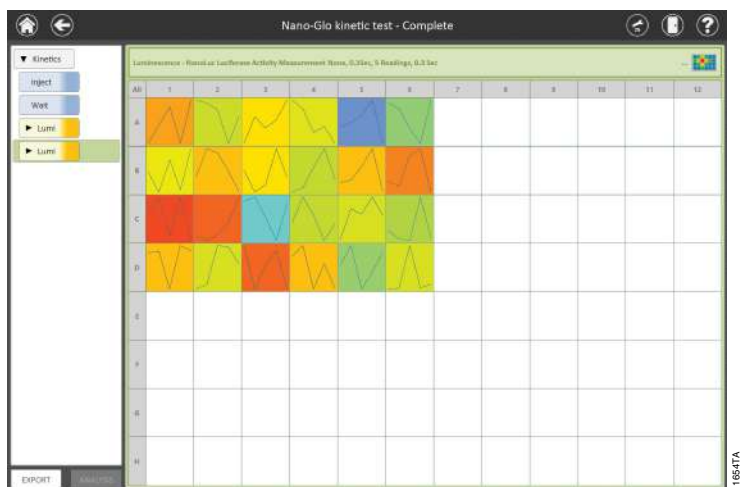**Figure 56. Example of individual well result for kinetic data.**

Figure 57. Results plate map for kinetic data.

7. 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 57).
Analysis functionality is described in Section 3.F, Analysis of Results. For certain result types (e.g., Basic protocols containing kinetic reads as well as Time Course protocols), 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 57). The software will export the data to the manual export folder specified by the Administrator settings (see Section 3.H, Administrator Settings). Results generated from Time Course Protocols are automatically exported to the PC in .csv format, not within the GloMax® Software. The Results screen provides a link to the file pathway where the results are stored. When interfacing with a laboratory information management system (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 58). 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 58. 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.

The exported Excel® file can be opened directly within Microsoft Excel® or Excel® viewer (Figure 59). 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.
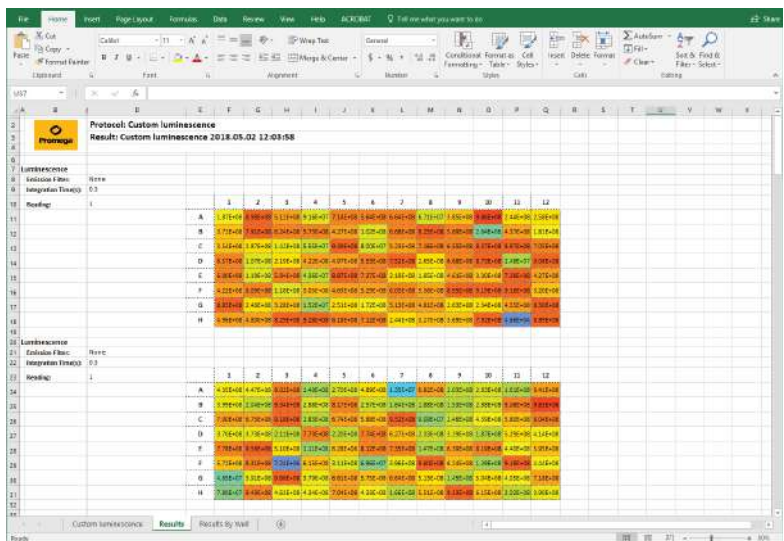

Figure 59. Results export to Microsoft Excel® workbook.

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) **Note:** For protocols containing more than 1 read type, each read type will be in separate tabs.	**Table format of data from all reads. Columns include:**	
	Read Type	Luminescence, Fluorescence or Absorbance
	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	
Sample Information (if entered)	Display of Plate ID and plate map information imported into the protocol.	

8. When a standard protocol is completed, 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. Results from Time Course protocols are saved directly on the PC in the folder location specified by the Administrator. A link to the file path is found in the 'Results' screen.

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

The 'Results, Time Course, 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, Time Course, 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, Time Course, 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.

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

'Results, Time Course, Templates and Analyses' Screen Functions

The functions present on the 'Results, Time Course, Templates and Analyses' screen allow users to **Export, Import** and **Remove** items (Figure 60), 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.
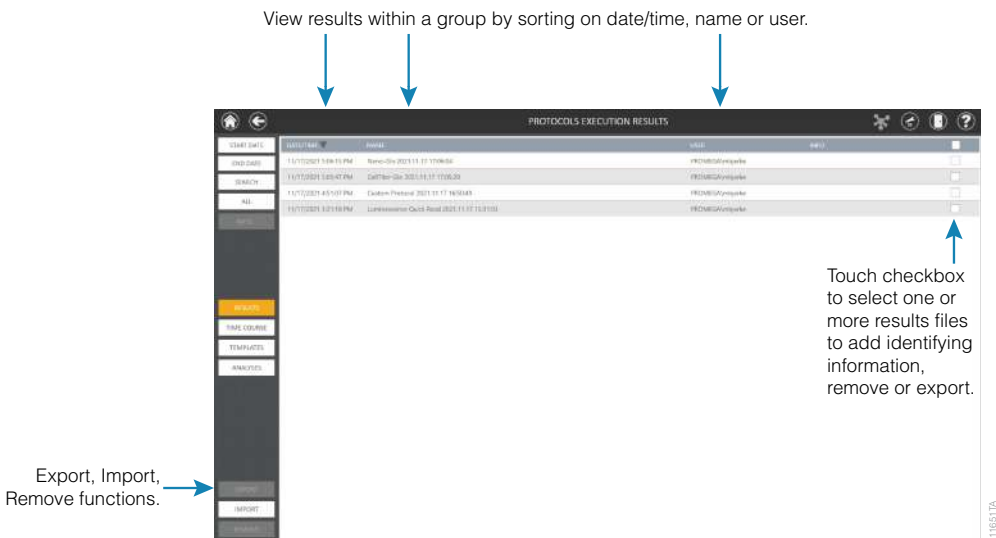
View results within a group by sorting on date/time, name or user.

Touch checkbox to select one or more results files to add identifying information, remove or export.

Export, Import, Remove functions.

Figure 60. 'Results, Time Course, Templates and Analyses' 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 Analyses 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). Result files can be exported in comma delimited (.csv), Microsoft Excel® (.xlsx), Adobe PDF (.pdf) and a proprietary data format (.raw) that can be imported into the GloMax® Software on another PC. 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.

Results generated from Time Course Protocols are automatically exported to the PC in .csv format, not within the GloMax® Software. The Results screen provides a link to the file pathway where the results are stored.

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 61).

   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.
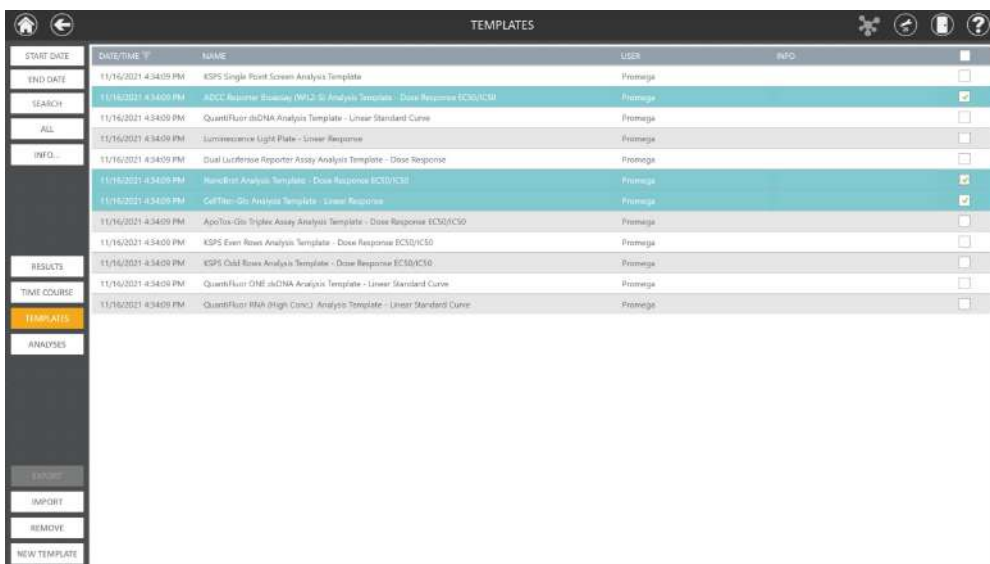

Figure 61. Functions of the 'Results, Time Course, Templates and Analyses' screen. From the 'Results, Templates and Analyses' screen, you can **Export** or **Remove** one or more list items, **Import** a result, template or analysis (.raw, .template, .analysis) file or create a **New Template**.

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, Time Course, 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 62).

   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.

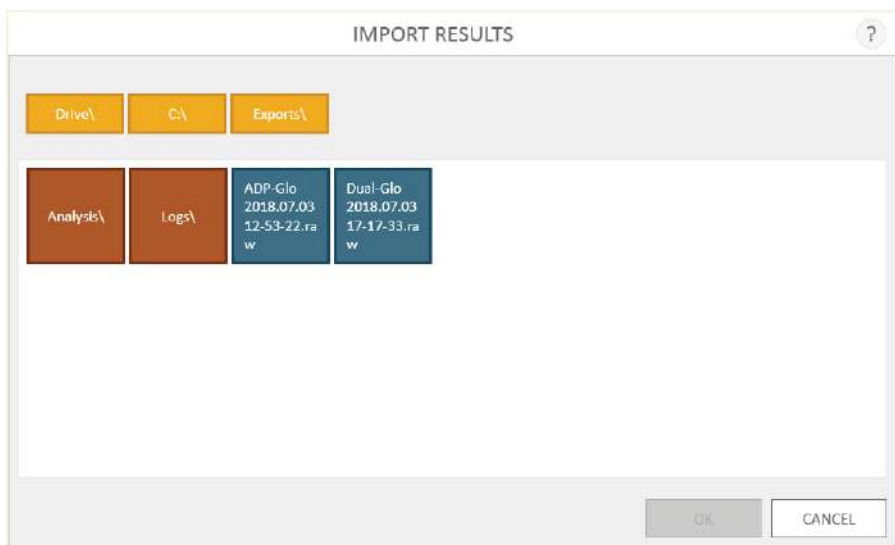   e.   Touch **OK** to import the selected file(s) into the list.

Figure 62. Importing Results, Templates or Analyses. Use the file browser screen to browse to the location of the desired import file.

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, Time Course, Templates and 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 check box 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.

3.F.   Analysis of Results (continued)

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 '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 63).
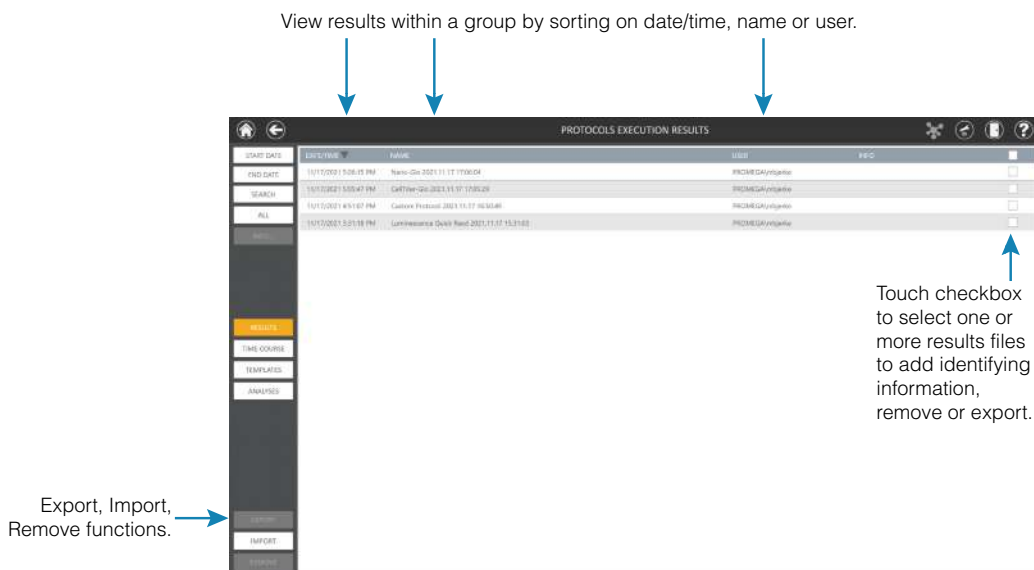
View results within a group by sorting on date/time, name or user.

Touch checkbox to select one or more results files to add identifying information, remove or export.

Export, Import, Remove functions.

Figure 63. The 'Results, Time Course, 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. 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.
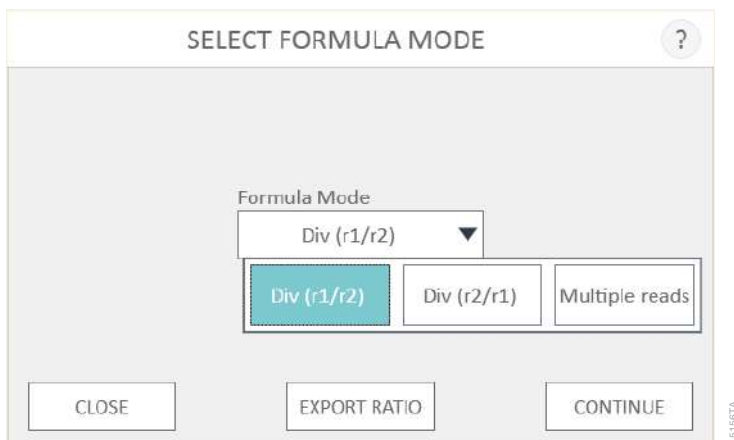

Figure 64. Compute a ratio of a two-read result file, or select Multiple reads to analyze each read separately.

3.F. Analysis of Results (continued)

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.

   Note: If you have imported a plate map that specifies the Sample ID, Type, Concentration, Dilution and/or Volume of the wells on the plate, selecting the **New** button will open a template with all of the information from the imported plate map prepopulated. If all information is specified in the plate map import, you can simply select the analysis curve fit type and run the analysis more easily.

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. Select the plate format for the new analysis template from the drop-down list on the 'Select Plate Type' screen, and touch **OK**. Options include: 6-, 12-, 24-, 48-, 96- and 384-well plates (Figure 65).

Figure 65. The 'Select Plate Type' screen. When creating a new analysis template, the first step is to select the plate format for the analysis template from the drop-down list on the 'Select Plate Type' screen.

4. The 'New Template' screen will open with analysis options on the left side and a plate map on the right side (Figure 66).
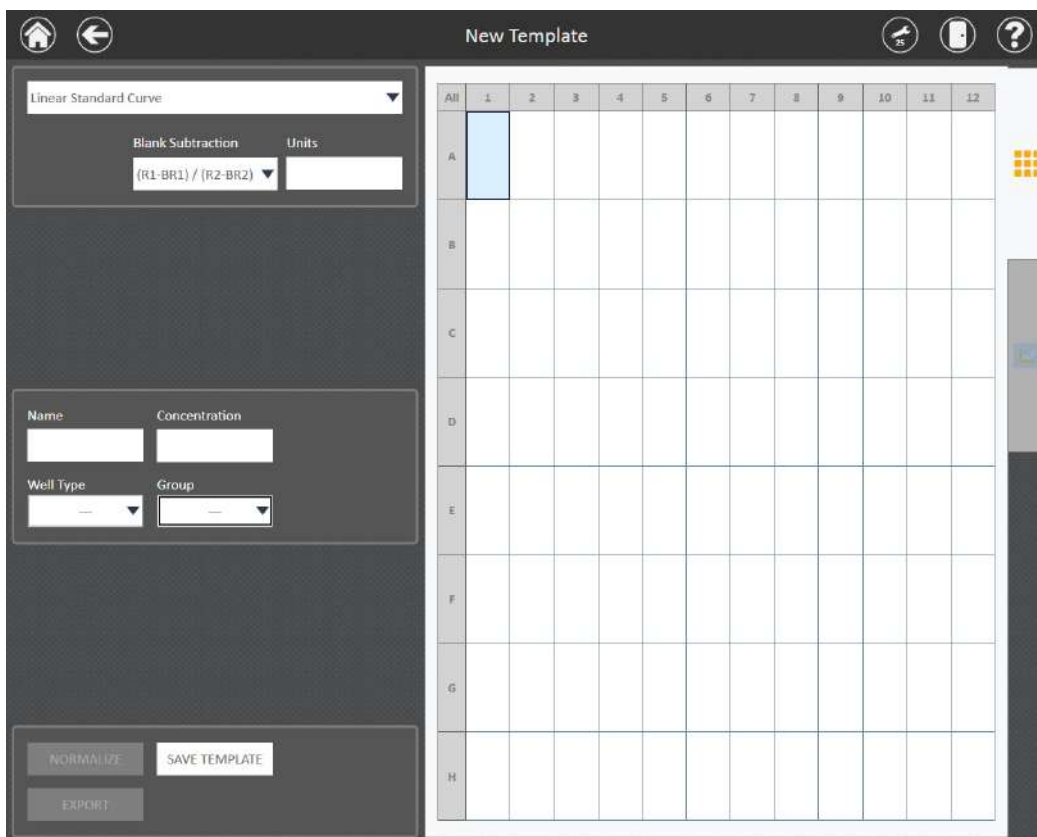
Figure 66. New Template creation. From this screen the user will define the curve fit type, units, well types, concentrations/dilution factors and names in the analysis template.

3.F. Analysis of Results (continued)

Creating a New Analysis Template (continued)

5. 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 tables below highlight each analysis curve fit type, the function of each analysis and the formula used.

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	$f(x) = B + \left(\dfrac{T - B}{1 + 10^{(logIC50 - logx)S}} \right)$
Five-Parameter Curve	Nonlinear regression; interpolate Unknown concentration from curve; EC_{50}/IC_{50} determination	$f(x) = B + \left(\dfrac{T - B}{(1 + 10^{(logIC50 - logx)S})S} \right)$

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	$f(x) = B + \left(\dfrac{T - B}{1 + 10^{(logIC50 - logx)S}} \right)$
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	$Z\text{´-}Factor = 1 - \left(\dfrac{3(\sigma_1 + \sigma_2)}{|\mu_1 - \mu_2|} \right)$

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.

6. 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.

7. 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 67). 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.

Creating a New Analysis Template (continued)
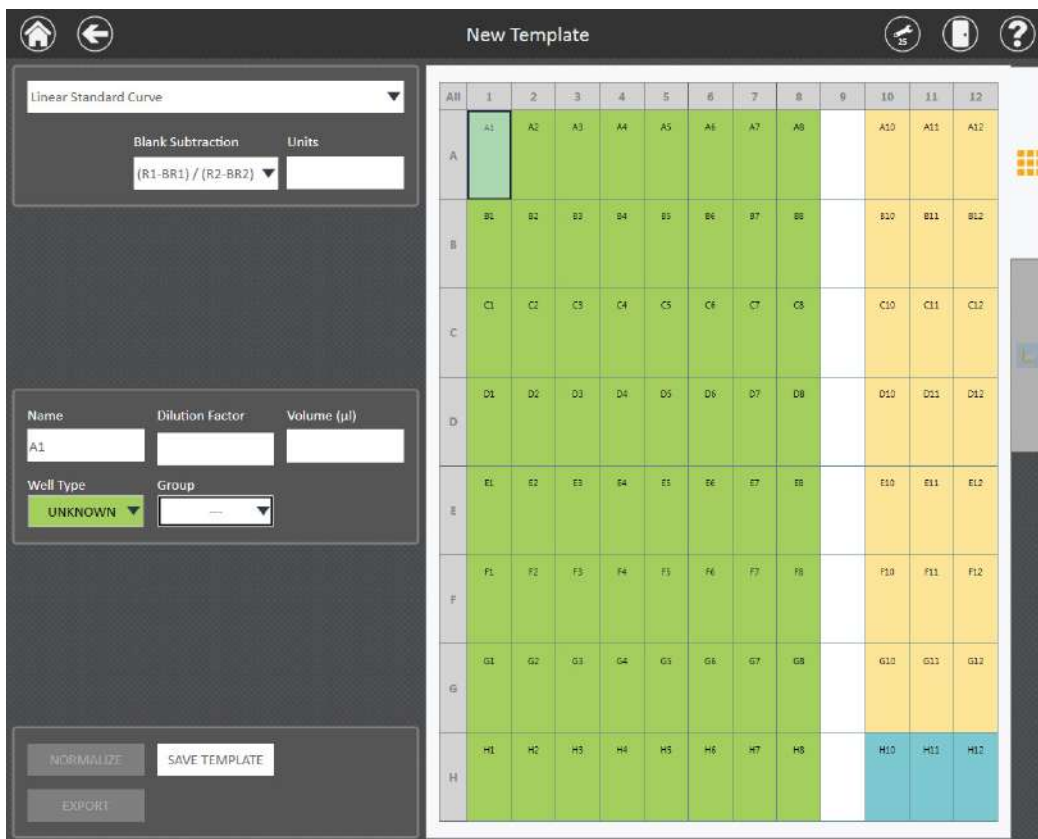
Figure 67. Template with well designations assigned. In this figure unknown, known and blank well designations have been assigned across a plate.

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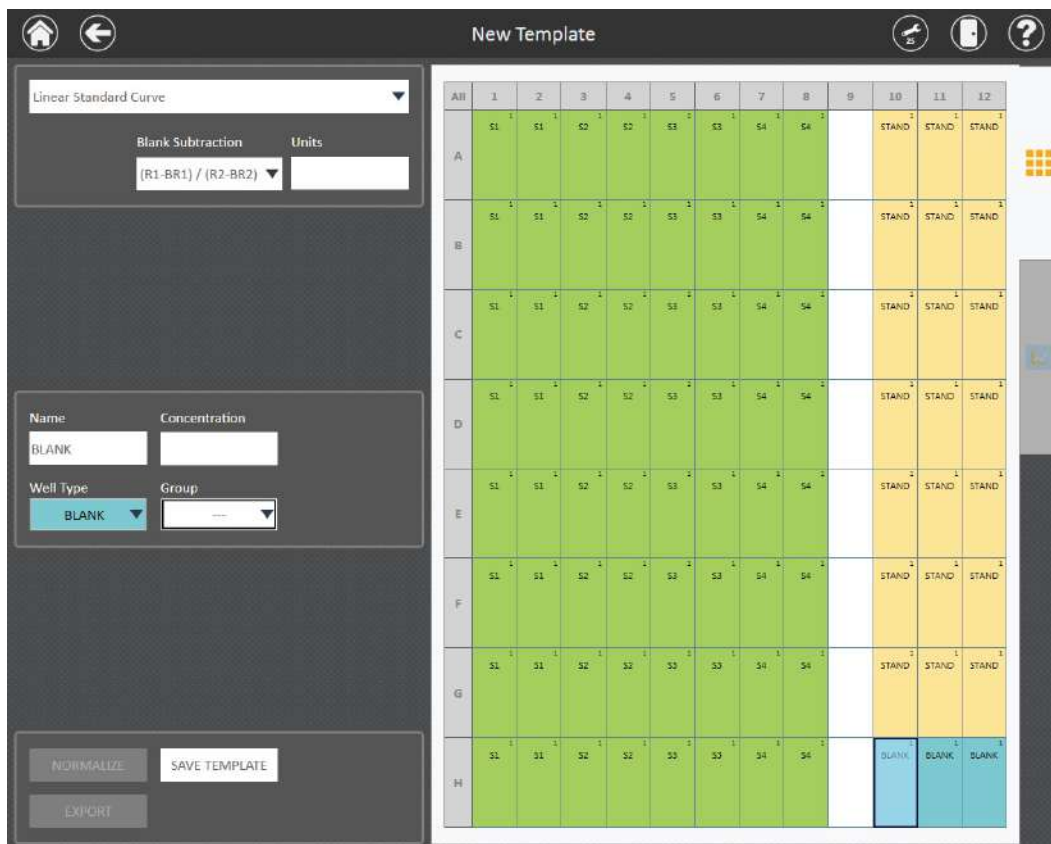
Two blank options are included for dual-read result files:

(R1−BR1)/(R2−BR2) or (R2−BR2)/(R1−BR1): Pending how the ratio of the dual-read result is computed (Figure 59), 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.

8.   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 68).

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 68. 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.

Creating a New Analysis Template (continued)

9. 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 69). 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.
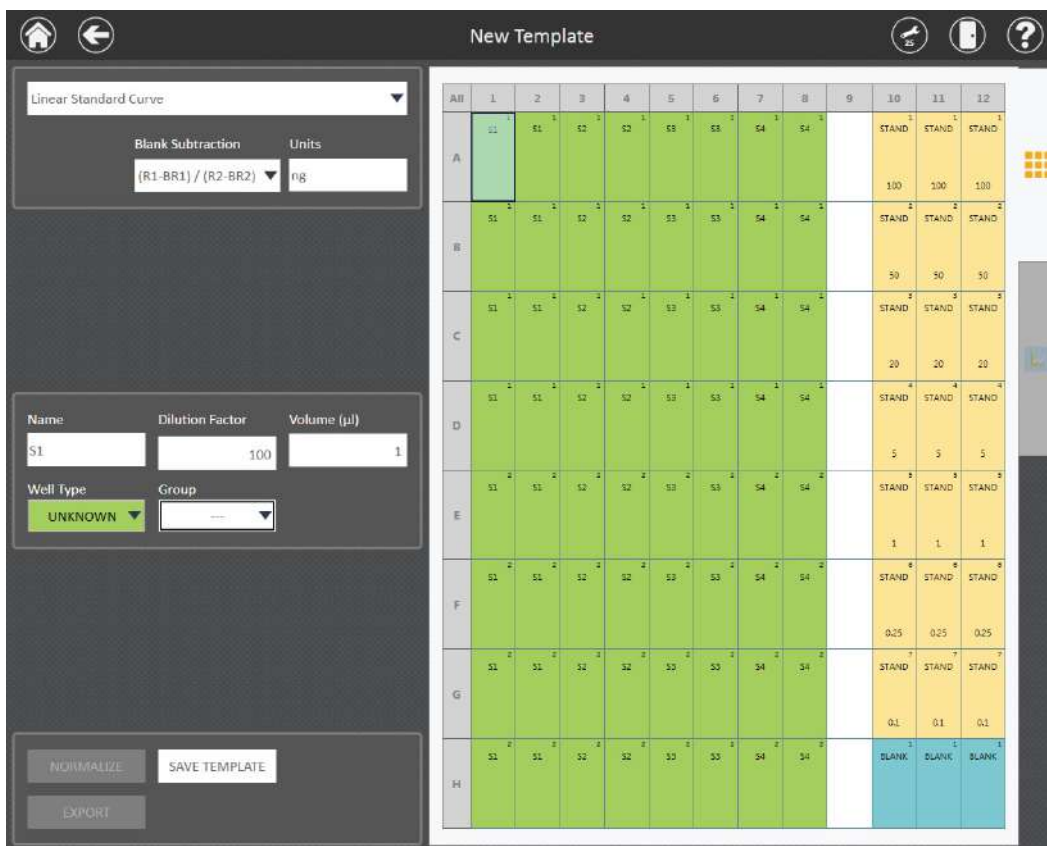
Figure 69. Concentrations and dilution factors. In this figure, concentrations have been applied to the standard curve replicates (shown at the bottom of each well). Dilution factors have been applied to the Unknowns (100 for wells A1−D8, 200 for wells E1−H8). A volume of 1µl has been assigned to the Unknown wells.

10. 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 menu, 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.
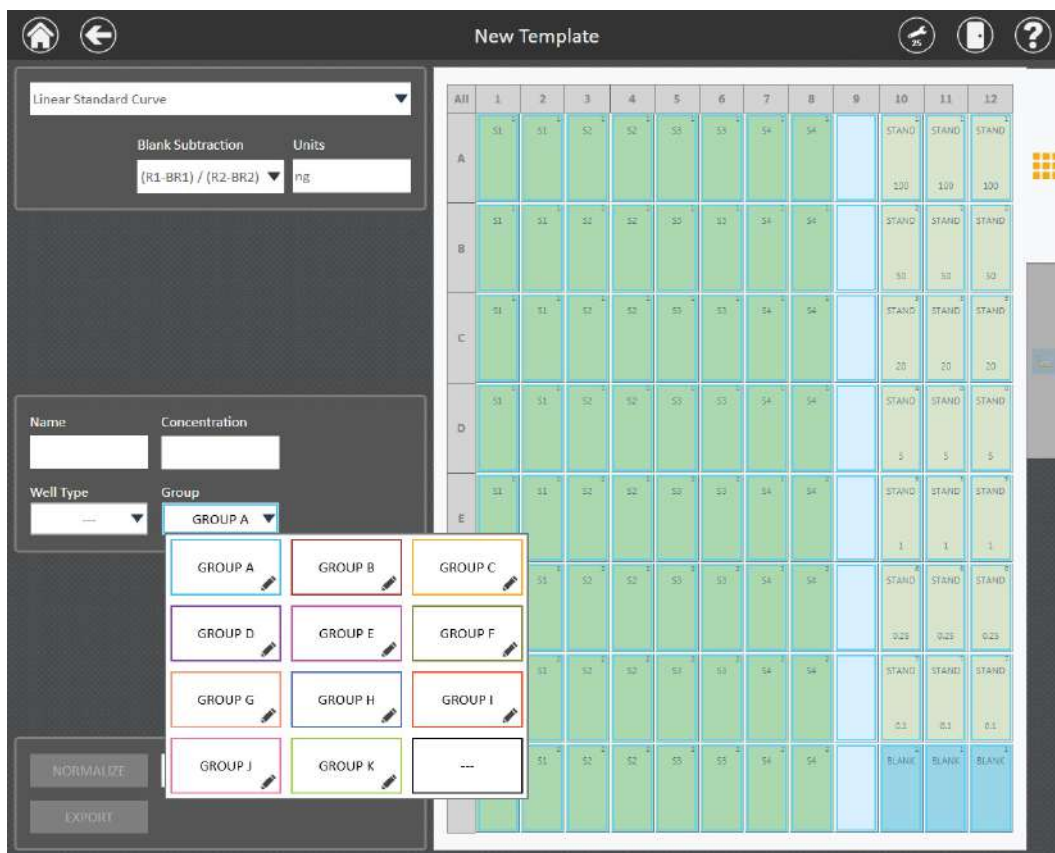
Figure 70. Use Group to define an experimental data set. The entire plate was selected (wells A1 through H12) and Group A applied. Up to 11 groups may be selected at a time.

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 71).
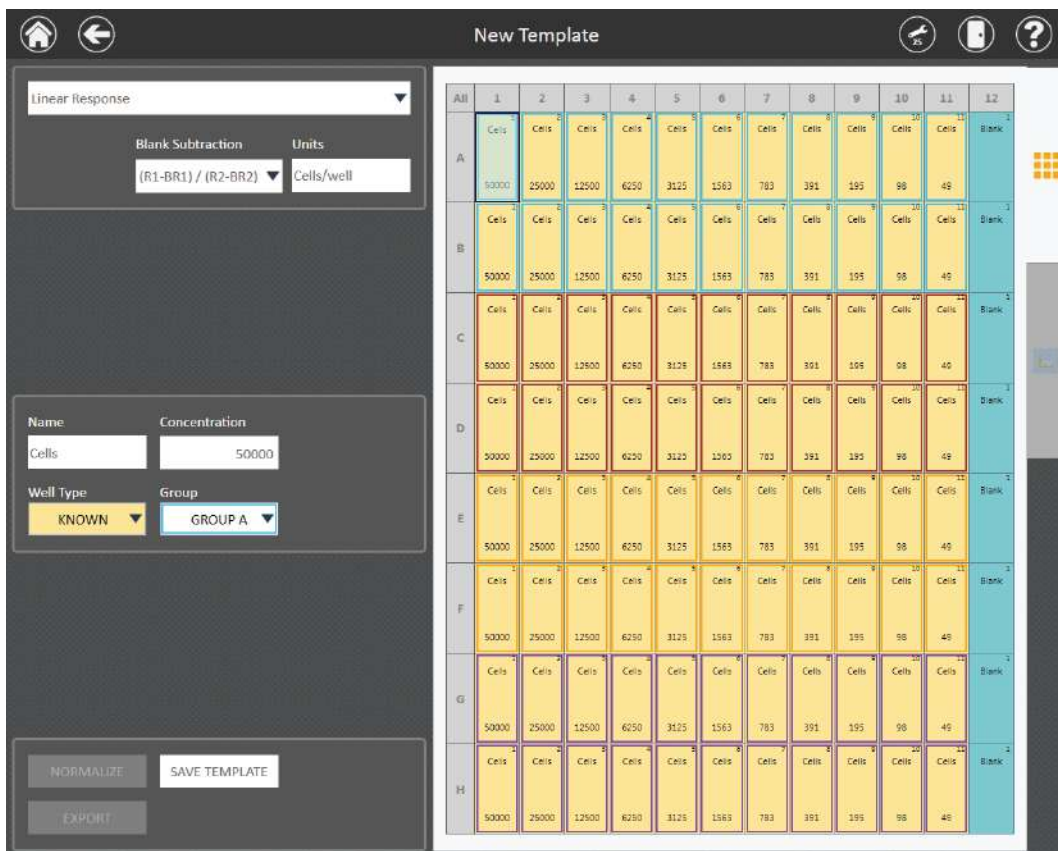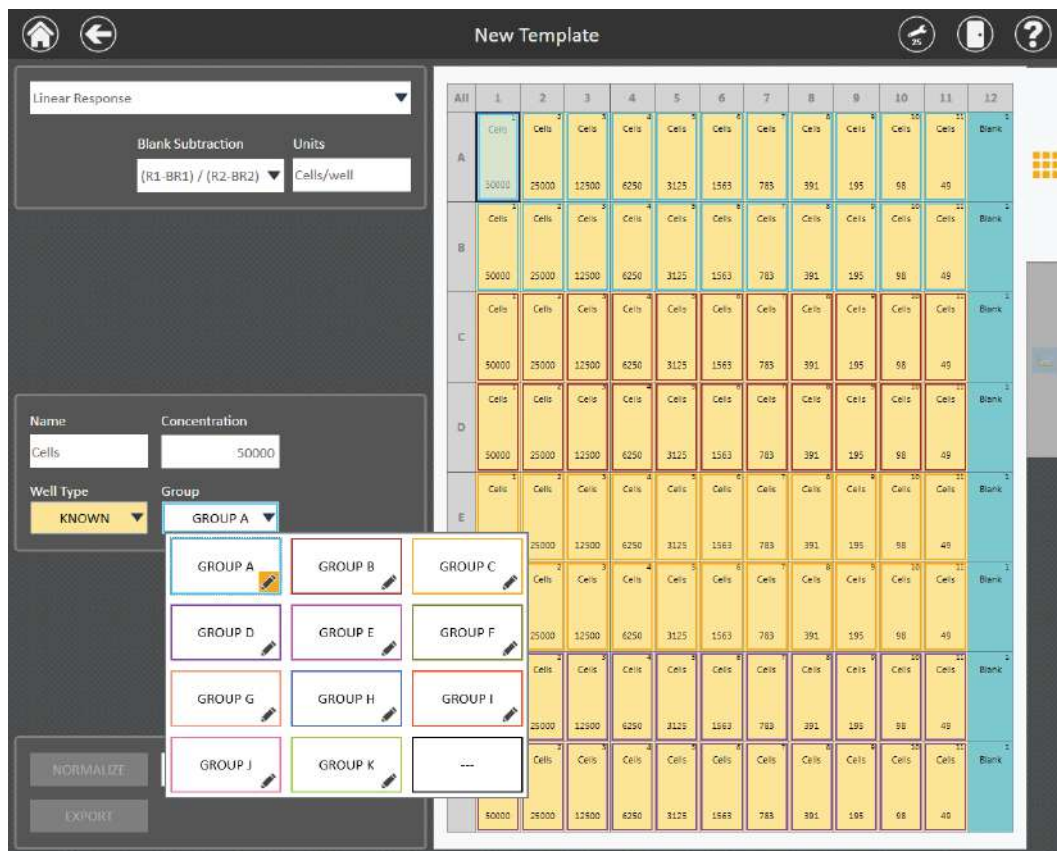

Figure 71. Multiple experimental data sets. When creating an analysis template with multiple experimental data sets, select all the wells that are part of each data set (containing Known, Unknown and Blank wells that should be analyzed together) and assign a group from the Group drop-down menu. A unique 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 72). Edited Group name will be shown in the graph legend for the respective curve (Figure 73).

Figure 72. Select the icon in the lower right corner of each Group to edit the group label.

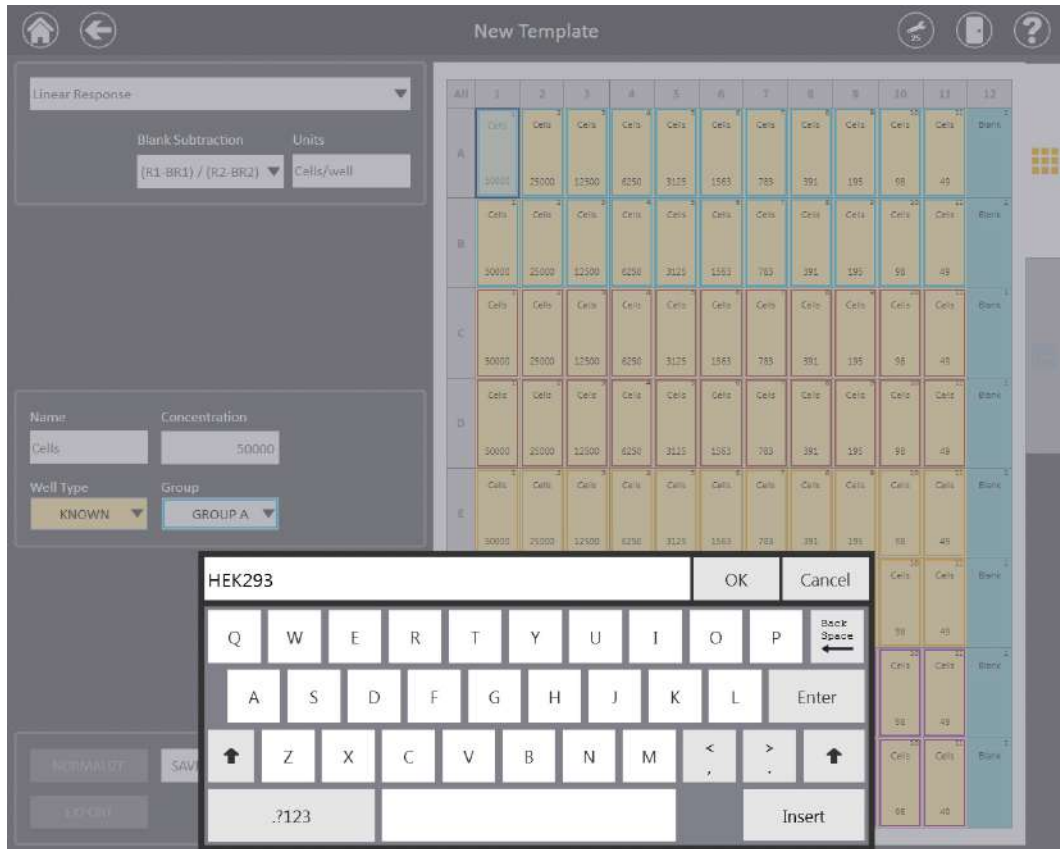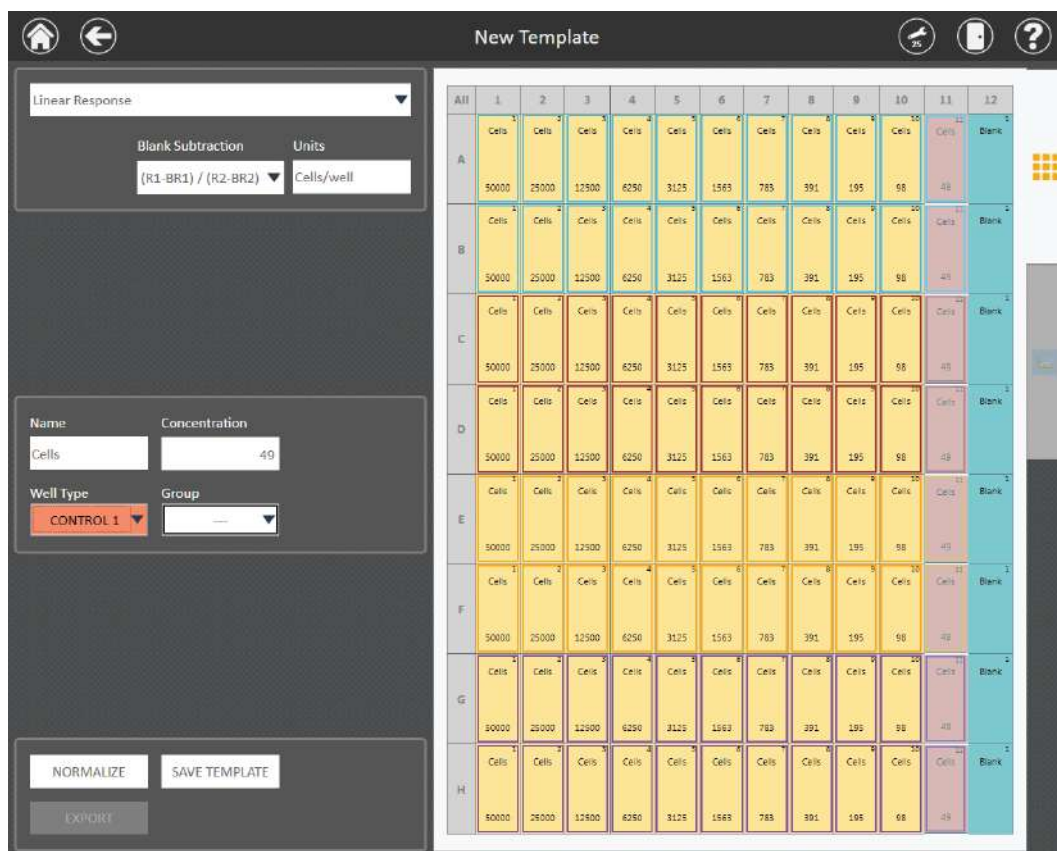### Creating a New Analysis Template (continued)

Figure 73. Type a new name for the Group label. Edited text will appear in the Group drop-down menu and in the graph legend.

11. 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 74). **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 74. 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 75). 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 75).

  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.
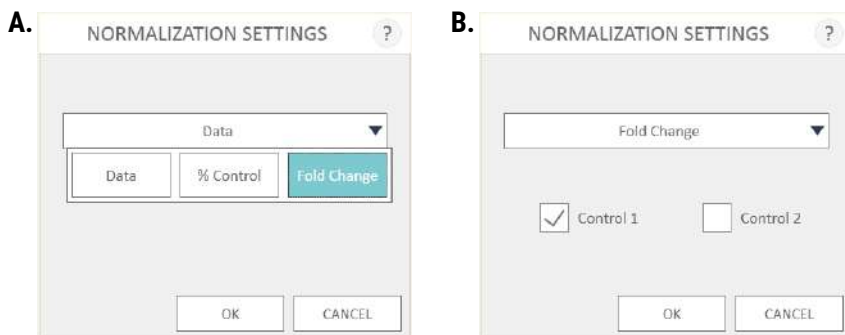
Figure 75. Data normalization. Panel A. There are two options for data normalization, **% Control** and **Fold Change**, and an option to undo normalization, **Data**. After selecting the normalization mode, normalization will automatically assign the control that is present on the plate. **Panel B.** 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.

12. 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 76). 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.
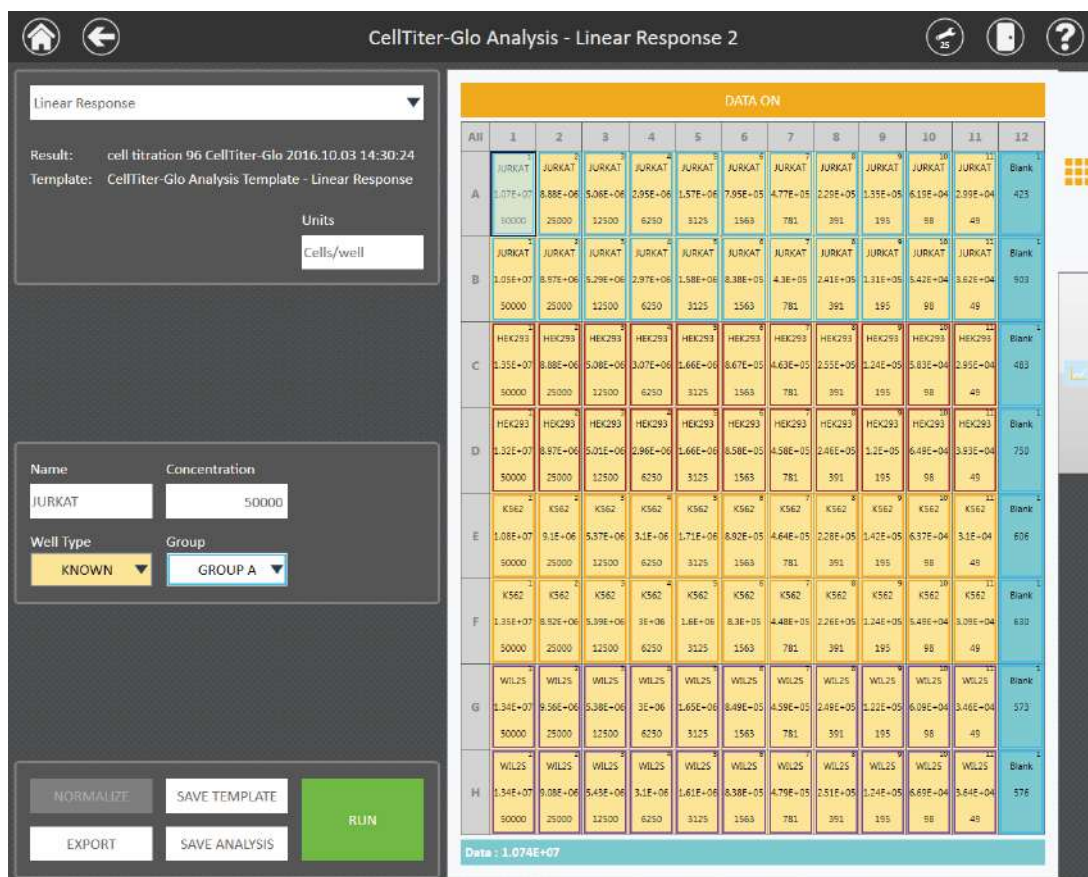

Figure 76. Once a template has been applied to the data, touch the Run button to analyze the results.

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.

3.F. Analysis of Results (continued)

Performing an Analysis (continued)

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.

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	$f(x) = B + \left(\dfrac{T - B}{1 + 10^{(logIC50 - logx)S}} \right)$	R^2, IC_{50}	Slope, Bottom, Top
Five-Parameter Curve	$f(x) = B + \left(\dfrac{T - B}{(1 + 10^{(logIC50 - logx)S})^S} \right)$	R^2, IC_{50}	Slope, Bottom, Top, Asymmetry Factor (S)
Dose Response EC_{50}/IC_{50}	$f(x) = B + \left(\dfrac{T - B}{1 + 10^{(logIC50 - logx)S}} \right)$	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	$Z´\text{-}Factor = 1 - \left(\dfrac{3(\sigma_1 + \sigma_2)}{|\mu_1 - \mu_2|} \right)$	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 76).

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 77).

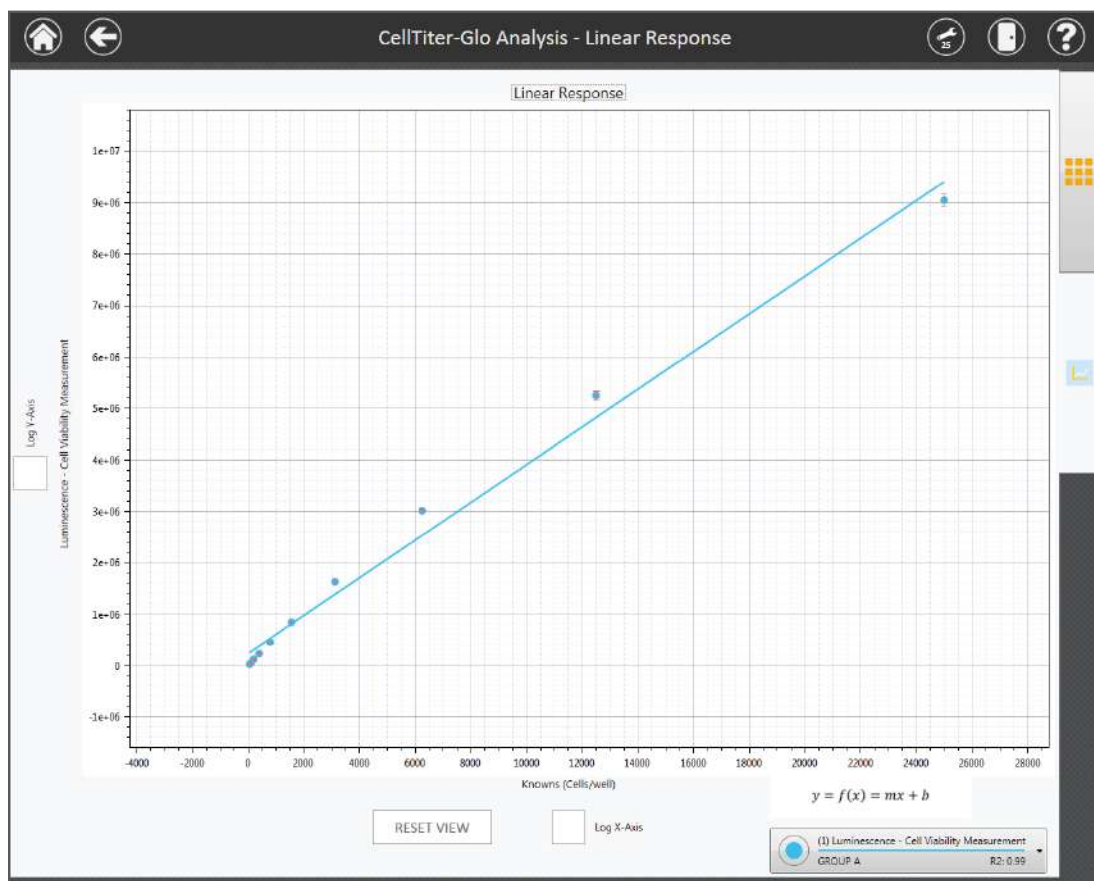**Figure 77. After selecting the Run button to analyze an experimental data set, the graphing tab on the right side of the screen becomes active.** Touch the graphing tab to view analysis results. From this tab, Axes can be displayed as linear or log format, axis and graph titles can be modified, and the graph can be panned or zoomed. Touch **Reset View** to return the graph to the default view.

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 78, 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 78, 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 78, Panel B). Add the curve back to the graph by touching the empty circle.
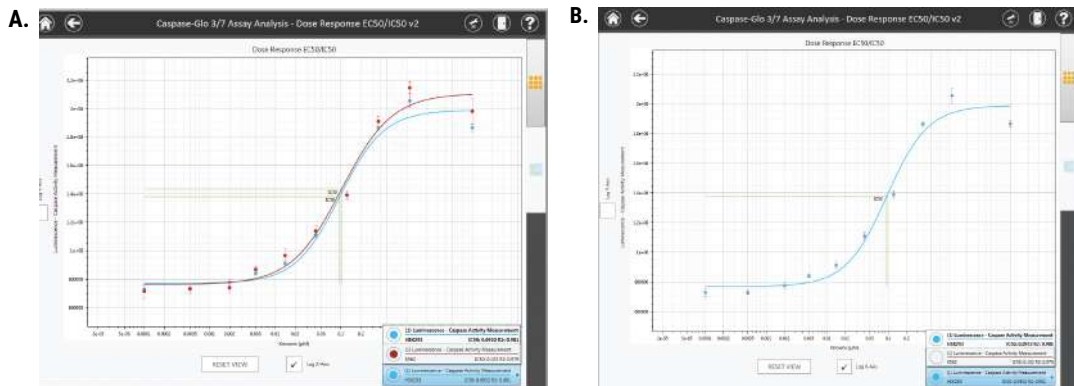

Figure 78. Colors represent groups; curves represent reads of each group. Panel A. Two groups are represented on the graph, with one read for each group. **Note:** Edited group names are shown on the graph. **Panel B.** Touching the symbol for any curve will remove that curve from the graph. Touch the 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.

Exporting Concentration Data from an Analysis to Portal Software

The GloMax® Software supports the export of interpolated concentration data to Portal software. Analysis curve fit equations that support interpolation of concentrations are: Linear Standard Curve, 2nd Polynomial, 3rd Polynomial, Power Regression, Four-Parameter Curve and Five-Parameter Curve.

If you have used one of these curve fit types and are connected to Portal software, a **Portal...** button is displayed beneath the **Run** button. After the analysis has been run, the **Portal...** button becomes active. To export sample concentration data from the analysis to Portal software, follow the steps below:

1. After running the analysis and assessing your data, press the **Portal...** button to open the 'Portal Data Export' screen (Figure 79).

2. The 'Portal Data Export' screen (Figure 80) lists all the concentration assays into which concentration data can be imported. Concentration assays are described in the *Portal Access Technical Manual #*TM549. Only assays which have a single concentration target are listed on the 'Portal Data Export' screen. Select the concentration assay into which concentration data should be imported.

3. Press the **Export** button to export assays into Portal software. A summary screen is presented that indicates the number of samples that were exported.

3.F.   Analysis of Results (continued)

Exporting Concentration Data from an Analysis to Portal Software (continued)
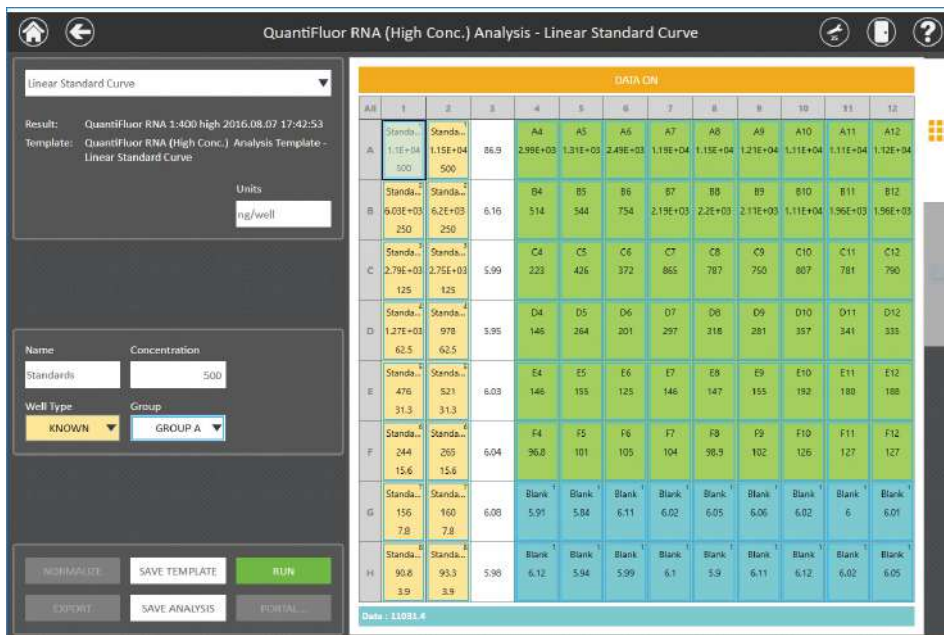

Figure 79. Analysis screen displaying the Portal button.
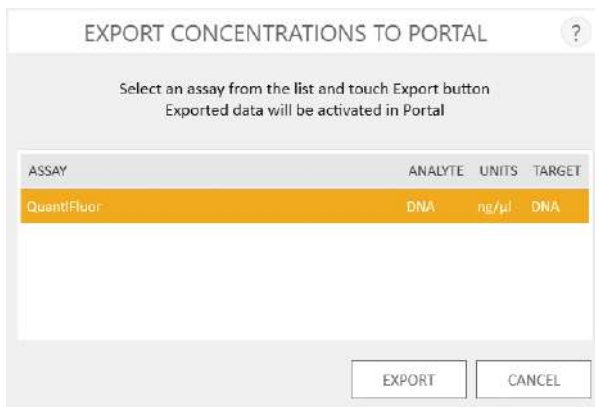

Figure 80. 'Portal Data Export' screen. Select the concentration assay into which concentration data should be imported and press the **Export** button.

3.G. 'Settings' Screen

Figure 81. The GloMax® Explorer 'Settings' screen.

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 82. 'About GloMax® Explorer' screen located on the Settings menu. This figure provides example information only. Your instrument information may vary.

3.G. Settings Screen (continued)

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 (Figure 83, Panel A) or using the **Tools** button on the 'Settings' screen (Figure 83, Panel B).
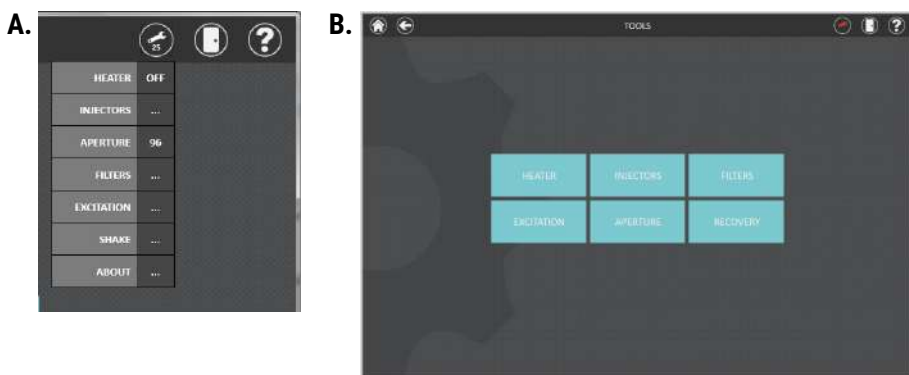

Figure 83. Accessing Tools. Panel A. Accessing the tools from the menu bar. **Panel B.** 'Tools' screen accessed by pressing the **Tools** button on the 'Settings' screen.

Heater

Enter the desired temperature in °C between 25–45°C. The heater will maintain a temperature within 1°C of the set point.

Note: The instrument is fan-cooled. The temperature cannot be set lower than the ambient temperature of your laboratory.

Figure 84. Heater Symbol.

The Heater will remain on after the run unless manually turned OFF by the user or the PC is disconnected from the instrument.

Injectors

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

Injector System Specifications

Number of Injectors	Two Injectors
Dispense Volume Range	5−200μl in 1μl increments
Plate Compatibility	6-, 12-, 24-, 48- and 96-well plates
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).

Filters

1. To change filter slides for fluorescence, select the **Reconfigure...** button.

Figure 85. Initial screen showing instrument filter configuration.

3.G. Settings Screen (continued)

2. Manually open the plate door, and using the Phillips-Head Screwdriver, loosen the two screws at the bottom sides of the door (Figure 86).

3. Next, pull the front access door toward you to remove the door (Figure 86).

4. Remove the filter paddle by gently pushing it in and then up. The slide should pop up so that you can remove it.

5. Tap **Next** to continue.

Figure 86. Filter Configuration procedure.

6. Several Filter Configuration options exist when you are configuring for fluorescence (Figures 87–92).

7. Add the appropriate Filter Paddle by inserting it in with the reverse process that you used to remove it.

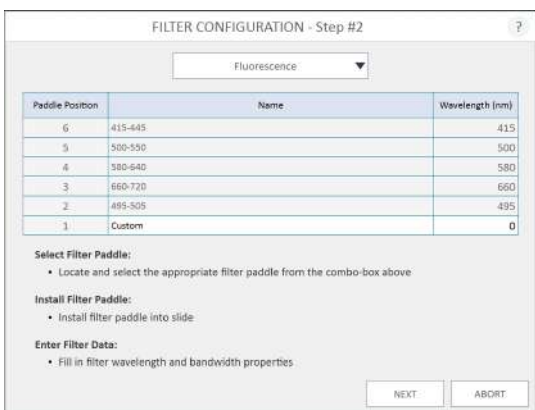8. Tap **Next** to complete the reconfiguration.

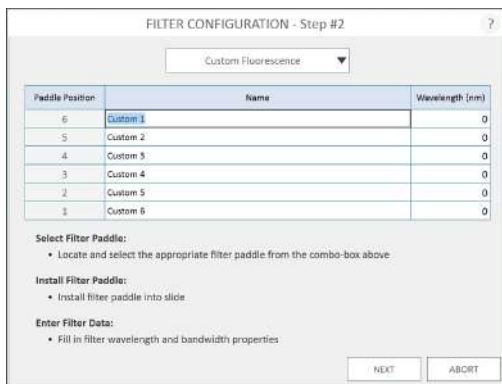**Figure 87. Filter configuration procedure (part 1).**

Figure 88. Filter configuration procedure (part 2).

9. Hold down the plate door, align the front access door and tighten the two screws at the bottom of the front access door to hold the door in place.

Figure 89. Replacing the hatch door.

Absorbance Filters

GloMax® Explorer (Cat.# GM3500) comes preinstalled with 5 Absorbance filters in the Absorbance Filter Wheel. When performing an Absorbance read, the instrument will automatically use the correct filter based on the filter specified in the protocol. If multiple filters are used in a protocol, the instrument will automatically switch between filters, based on the protocol settings.

Custom Filters

Custom emission filters for Fluorescence may be obtained from Semrock (**www.semrock.com)** or Chroma Technology Corporation (**www.chroma.com)**. Filters must be a maximum of 5mm thick and have a diameter of 12.5 to 12.7mm. Or filters may be obtained by contacting Promega Technical Services (**techserv@promega.com**).

Custom excitation modules must be obtained by contacting Promega Technical Services (**techserv@promega.com**).

3.G. Settings Screen (continued)

Excitation

1. To add a custom fluorescence excitation module, hold down the plate door, and using the Phillips-Head Screwdriver, unscrew the two screws at the bottom sides of the door (Figure 90).

2. Next pull the front access door toward you to remove the door (Figure 90).

3. Remove the Excitation module by unscrewing the thumb screw. The excitation module should slide forward so that you can remove it.

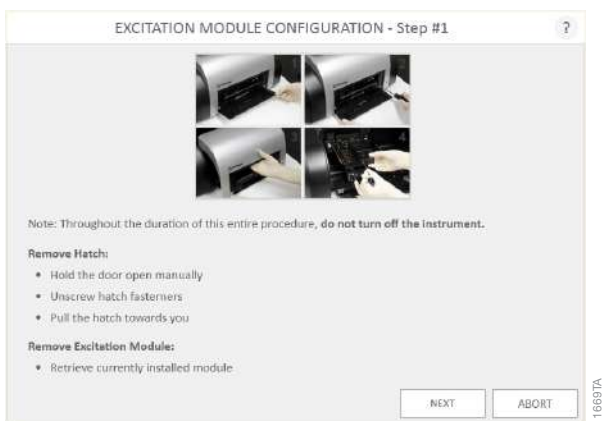4. Tap **Next** to continue.

Figure 90. Custom Fluorescence Excitation Module configuration procedure.

5. Enter the name, wavelength and bandwidth information for your custom excitation module.
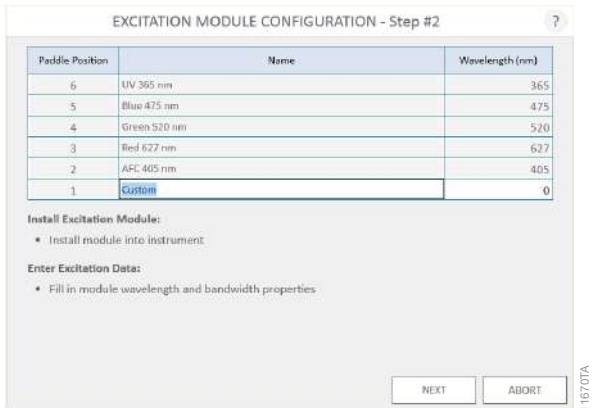

Figure 91. Setting name, wavelength and bandwidth.

6. Tap **Next** to complete the configuration.

7. Hold down the plate door, align the front access door and tighten the two screws at the bottom of the front access door to hold the door in place.

Figure 92. Replacing the hatch door.

Aperture

Note: Aperture usage and any instruction to change the aperture applies only to luminescence methods.

The Aperture refers to the interior well mask within the instrument used to reduce cross talk from neighboring wells in the plate.

There are two Apertures: 96-well and 384-well. Lower density plates (6-, 12-, 24- and 48-well plates) should use the 96-well aperture. The instrument comes with the 96-well Aperture preinstalled.

The instrument will indicate which Aperture is currently installed. This status can be viewed in the **Tools** icon from the menu bar.

To change the Aperture, follow the instructions in the software.

1. The currently installed Aperture is displayed at the top of the window. To change the Aperture, select **Load 96** or **Load 384** as desired.

2. The door will open automatically.

3. Place the Aperture Plate with the corresponding Aperture loaded with metal pins up and toward the back of the plate, exactly as indicated in Figure 93. Place the Aperture in the front position of the Aperture Plate, with the silver screws facing upright, exactly as indicated in Figures 93 and 94.

4. Follow the on-screen steps.

3.G. Settings Screen (continued)

Aperture (continued

Figure 93. Aperture loading instructions screen.

Figure 94. Aperture Plate with 384-well Aperture Fitting in the front position.

Recovery

Recovery provides the user the ability to manually control the instrument axes in case of a severe plate jam. In the event of a plate jam, the instrument will automatically recover itself when either the **Door** button is selected, a Protocol is started, or if the instrument power is turned Off/On.

Initialize the head, all axes or eject plate by selecting the appropriate **Start...** button in this screen.

If shipping the instrument for service, press the **Start...** button to the right of the Shipping title. This will home the plate tray to the correct shipping position before the user attaches the red and blue Packing Brackets.
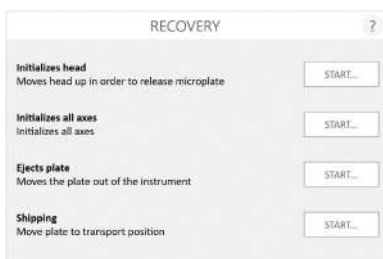

Figure 95. Recovery options.

3.G. Settings Screen (continued)

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.

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 96). 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.
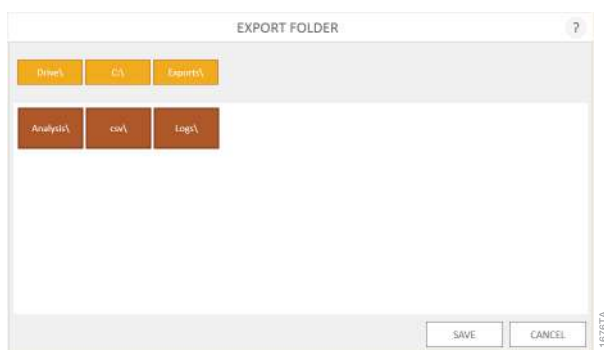

Figure 96. 'Export Folder' screen. Select a folder to which logs will be exported. Press **Save** to export log files.

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, Administrator Settings.

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 97). This button is only visible if the current user has administrator-level access to the GloMax® Software.
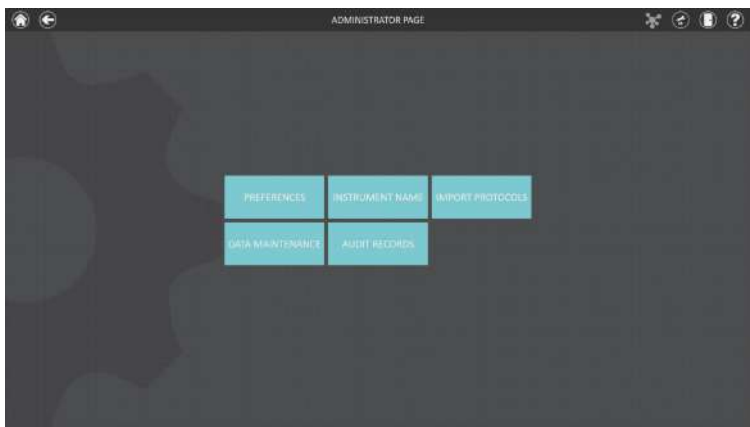
Figure 97. 'Administrator Page' screen.

Preferences

The 'Preferences' screen is where administrators can specify the file types and paths for the export of results and analyses, define user permissions, configure audible and e-mail alerts, and specify the connection information to Portal software. In addition, the administrator can apply scaling factors to fluorescence and luminescence results if desired. The settings present on each tab are described below.

Protocol Settings Tab: On the Protocol Settings tab, the administrator can use the two check boxes to Allow users to modify protocol details and/or Allow users to modify protocol plate maps. By default, these boxes are checked, allowing users to modify protocol details and plate maps. When unchecked, users will not be able to create or modify protocols or modify protocol plate maps, respectively. Even when users are not provided the permission to modify plate maps, they can import plate map files or retrieve plate maps from Portal software prior to a protocol run.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.

Preferences (continued)

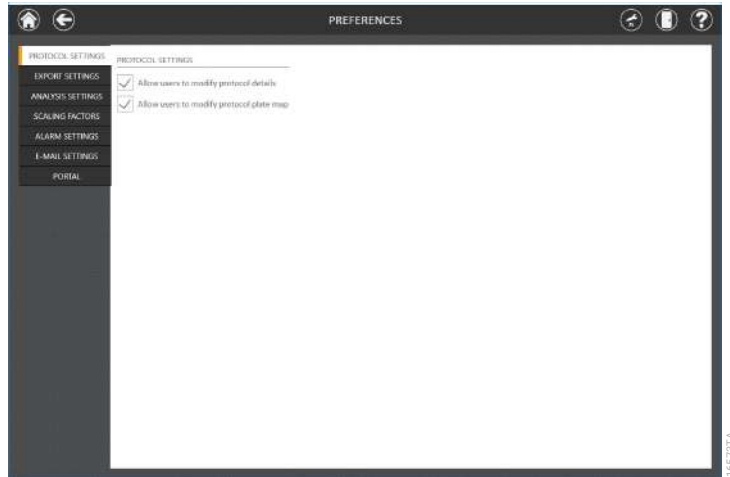**Figure 98. Protocol Settings tab.**

Export Settings Tab: On the Export Settings tab the administrator can define file formats that should be exported for results files. Result files can be exported in comma delimited (.csv), Microsoft Excel® (.xlsx), Adobe PDF (.pdf) and a proprietary data format (.raw) that can be imported into the GloMax® Software on another PC.
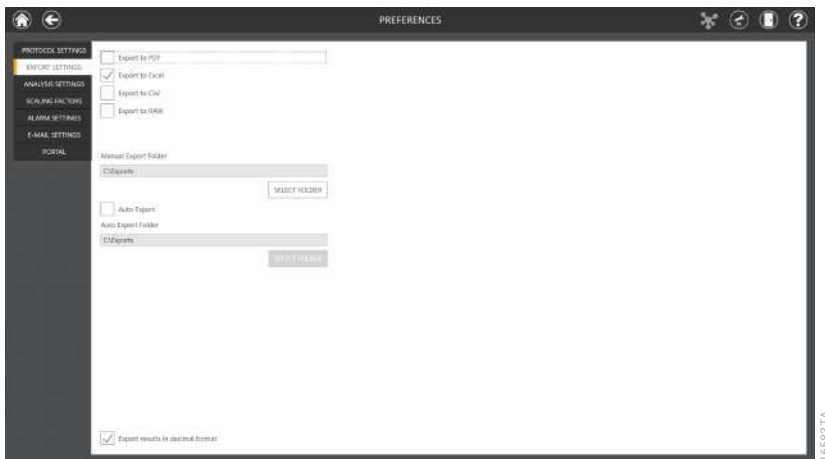

Figure 99. Export Settings tab.

The administrator can choose the folder path to which results will be manually exported. The administrator can also choose whether results are automatically exported after every run and the path to which automatically 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 100). 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 100). 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.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.
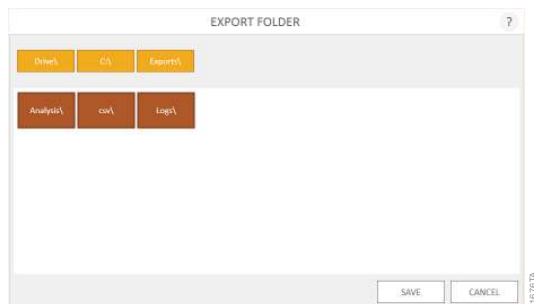

Figure 100. Specifying Export Folder Path. Use the **Select Folder** button to specify an export folder path for export files.

3.H. Administrator Settings (continued)

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 101). 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.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.

Figure 101. Analysis Settings tab. Specify the file formats for export of analyses and the export folder location for templates and analyses.

Scaling Factors

The Scaling Factors tab allows administrators to apply a scaling multiplier to fluorescence and 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 1,000 can be applied independently to Fluorescence and Luminescence data.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.
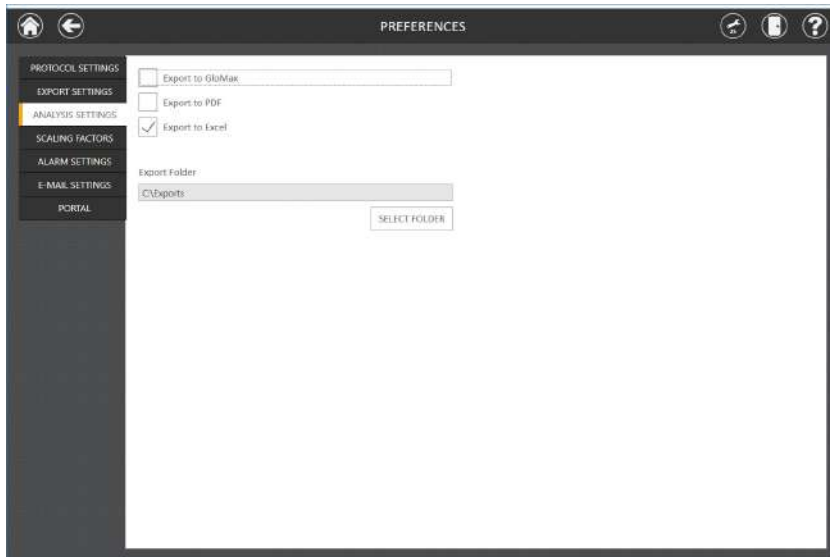

Figure 102. Scaling Factors tab. Administrators can specify a multiplier of 0.001 to 1,000 that should be applied to fluorescence or luminescence data produced by the GloMax® Instrument.

3.H. Administrator Settings (continued)

Alarm Settings

The system has the ability to produce audible alerts upon completion of a protocol and/or when encountering an error during a run. Check the boxes on this tab to specify the conditions that would trigger an audible alert. Audible alerts are played through the speaker on the Tablet PC.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.
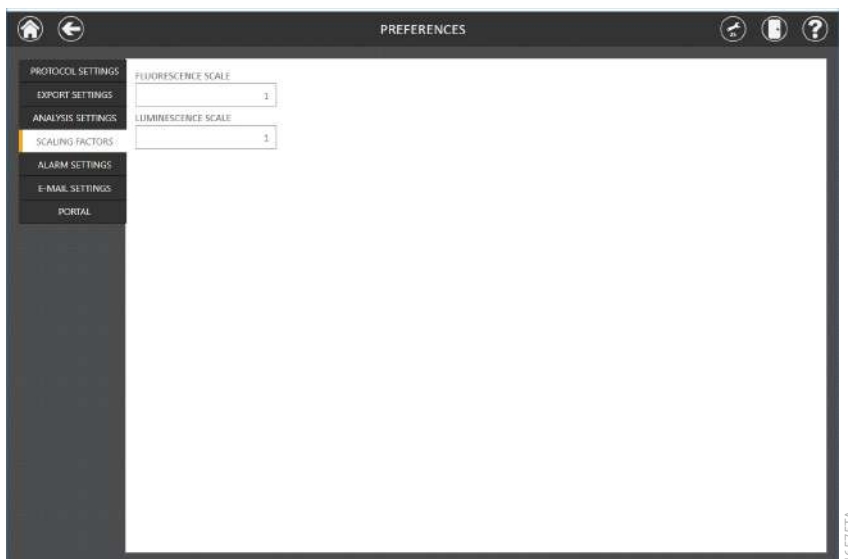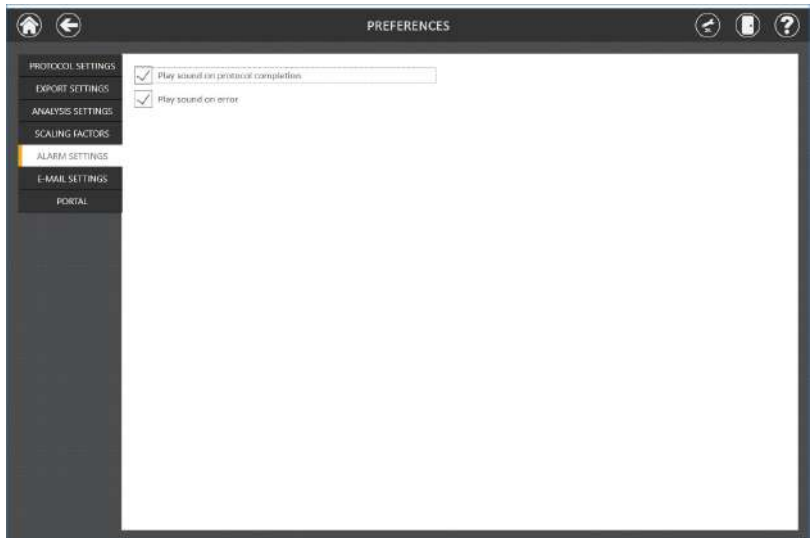

Figure 103. Alarm Settings tab.

E-Mail Settings

The E-mail Settings tab on the 'Preferences' screen is where e-mail server details are specified and where administrators can determine when and to whom e-mail notifications will be sent. It is necessary to fill out the user and server information on the E-mail Settings tab and ensure the Tablet PC has network access to the e-mail server in order to use e-mail notifications. Required e-mail server information on the left side of the screen include:

*   User Name: The name of the user for the e-mail account from which e-mail notifications will be sent
*   E-mail: The e-mail account from which e-mail notifications will be sent
*   Password: The password for the e-mail account from which e-mail notifications will be sent
*   SMTP Server: The SMTP server address for the e-mail account
*   Port: The port that should be used for the SMTP server
*   SSL Encrypted Connection: Checkbox indicating whether the e-mail account uses an SSL Encrypted connection

Note: Contact your IT department to provide the information required to complete e-mail settings.

On the right side of the screen the administrator can specify under what conditions and to whom e-mail notifications will be sent. Options include:

*   Send mail when extraction is completed: Check this box to have e-mails automatically sent to the specified e-mail addresses when an extraction run has been completed.
*   Send mail on error: Check this box to have e-mails automatically sent to the specified e-mail addresses if an error state occurs during an extraction run.
*   E-mail Recipients: Enter the e-mail address(es) separated by a space that will act as the distribution list for e-mail notifications under the conditions that have been selected.

Upon completing the entries for e-mail settings, you can test the validity of the settings by pressing the **Test Connection** button. Pressing this button will attempt to send a test e-mail to the e-mail account and e-mail recipients designated by the settings on this page.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.
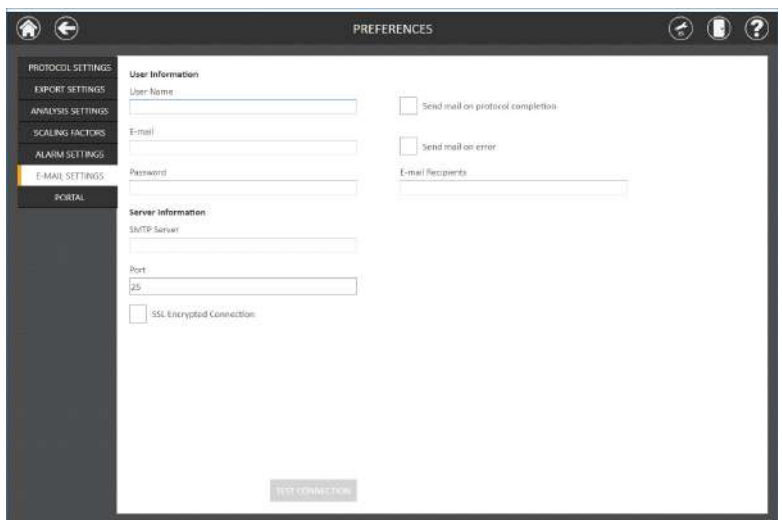
3.H. Administrator Settings (continued)

Figure 104. E-Mail Settings tab.

Portal Settings

The 'Portal' tab presents settings for use of the Portal software to connect multiple instrument modules for the purposes of sample tracking and data sharing. For example, one may perform a QuantiFluor® dye-based reaction setup using the Maxprep™ Liquid Handler (Cat.# AS9100, AS9101, AS9200 and AS9202) and then transfer the plate map information sample IDs from Portal software into GloMax® Software to quantitate the samples. This allows a seamless sample tracking throughout the workflow, without the need to re-enter sample IDs. Following the GloMax® quantitation of the samples, the concentration results can then be transferred back into Portal software. For more information about Portal Software, please contact Promega Technical Services.

Information on the Portal tab will determine whether your system communicates with Portal software and define the server information necessary to connect to Portal software. If you wish to share sample tracking and other method-specific data between multiple modules, check the Enable Portal Sample Tracking checkbox on this tab. In order for your system to communicate with Portal software, enter the following software information:

- Server name: Name of the server hosting the Portal software (Default = Computer Name\PromegaPortal)
- Database: Name of the SQL database containing Portal information (Default = Portal)
- User name: User name necessary to access the Portal software (Default = PortalLogin)
- Password: Password necessary to access the Portal software (Default = PortalLogin)

Once the software-specific information has been entered, press the **Test Connection** button to determine whether the GloMax® Software can successfully connect to the Portal software using the information supplied. A message will be displayed indicating whether the connection was successful. If unsuccessful, confirm that the connection information was correctly entered and try again.

When navigating away from the 'Preferences' screen, the administrator will see a prompt to save any changes that have been made. Touch the **Save** button to save any changes and navigate away from the 'Preferences' screen. To leave the 'Preferences' screen without saving changes, touch the **Don't Save** button. Touch the **Cancel** button to return to the 'Preferences' screen without saving changes.
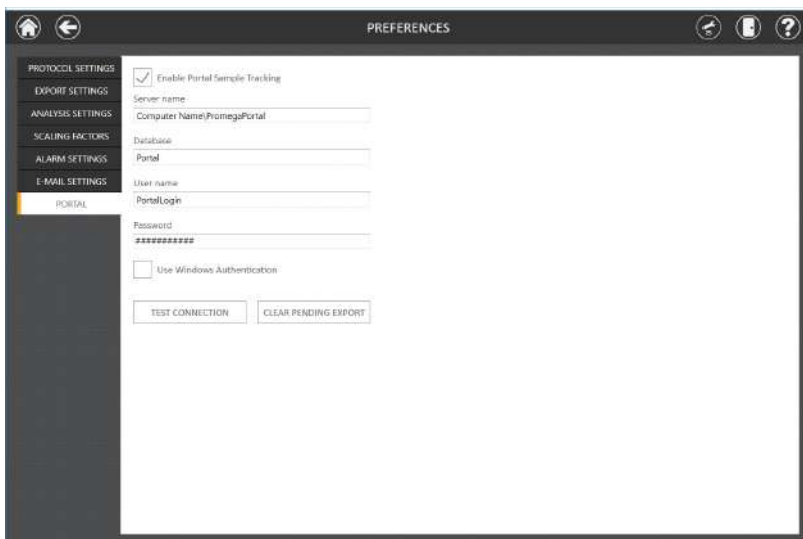

Figure 105. Portal tab.

Instrument Name

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

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

Figure 106. Settings → Administrator screen → Instrument Name.

3.H. Administrator Settings (continued)

Import Protocols

Periodically Promega will release new protocols or updated versions of existing protocols to the Promega web site: **www.promega.com/resources/software-firmware/glomax-systems/glomax-explorer-system-software-and-firmware/**

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

From the GloMax® Explorer Software 'Home' screen, touch the **Settings** button, touch the **Administrator** button on the 'Settings' screen, touch the **Import Protocols** button on the 'Administrator Page' screen, then navigate to the folder location and select the file.

Select on the **Drive** button at the top to view the available drive locations. Then select the specific drive to navigate to the folder location 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 107. Settings → Administrator screen → Import Protocols.

Data Maintenance

Administrators can manage disk space within the GloMax® Software and within the PC by selecting the **Data Management** button within the 'Administrator Page' screen (Figure 108). The export folder size can be viewed and opened. The total number of result files within the GloMax® Software are shown. All result files can be purged from the GloMax® Software, or only results older than 1 week can be purged by tapping the appropriate **Purge** button.

Note: Once results are purged they cannot be retrieved. Ensure result files are saved or achived elsewhere prior to purging them from the GloMax® Software and from the PC.
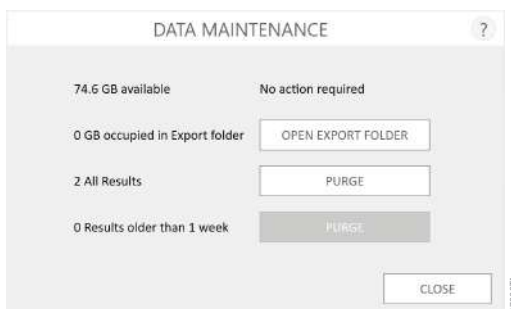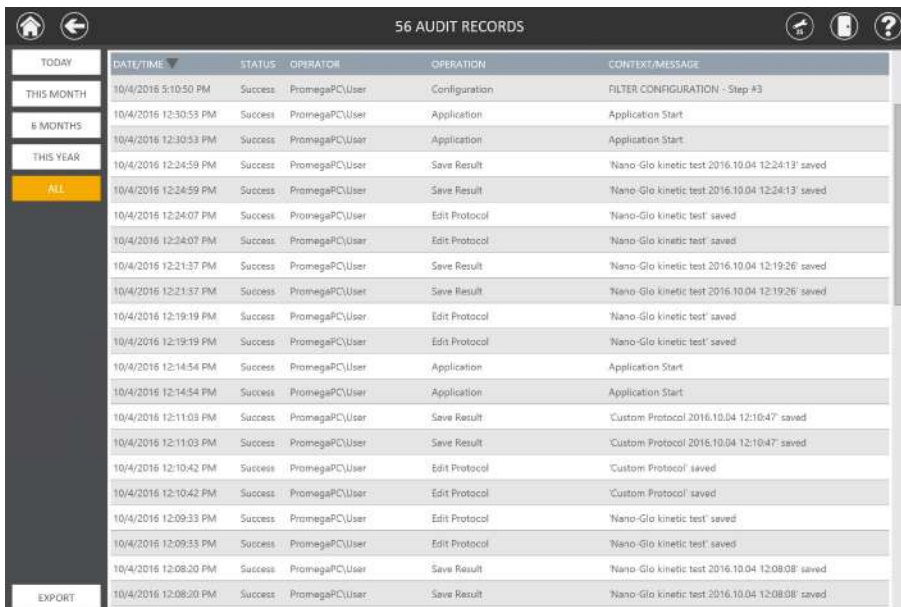

Figure 108. Settings → Administrator screen → Data Management.

Audit Records

Administrators may view a chronological sequence of actions performed with the GloMax® Explorer 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® Explorer 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.

3.H. Administrator Settings (continued)

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

Figure 109. Audit Records screen.

Help

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

Figure 110. Help Screen.

4. Setting Up and Operating the Injector System (optional)

4.A. Setting Up the Injector System

Components

Unpack the GloMax® Dual Injector System with Pump Station. Verify all components and accessories have been received. A component list is enclosed with the Injector System for details. The Injector System components are shown in Figure 111.

Figure 111. GloMax® Dual Injector System with Pump Station and accessories. Shown assembled here are the Injector System Console with Vertical Support Rods, Inlet Tubing Assembly and Inlet Tube Holder. The DB-15 Data Cable, Waste Collection Tray and Outlet Tubing Assembly are also shown.

Injector System Installation
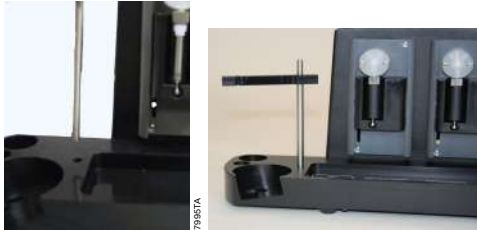
1. Turn off the GloMax® Explorer System. Failure to turn off the instrument may cause damage to the instrument electronics.

2. Place the Injector System on top of the instrument with the four rubber feet within the indentation on the instrument top, and make sure that the Injector System is level.

Figure 112. Positioning the Injector System on top of the GloMax® Explorer System.

4.A. Setting Up the Injector System (continued)

Injector System Installation (continued)

3.	Remove the front panel from the pump station to reveal tubing attachment points.	
4.	Attach the fitting at the end of the outlet tubing assembly to the inside port of the injector pump. Ensure that the line to Injector #1 (left) goes to the inside port of the left pump and the line for Injector #2 (right) goes to the inside port of the right pump.	**Figure 113. Attaching the fitting to the inside port.**
5.	On the injector system console, insert the thicker end of the vertical support rod into the small opening. Press down firmly until the rod clicks into place.	
6.	Slide the inlet tube holder onto the vertical support rod.	**Figure 114 Inserting the vertical support rod and inlet tube holder.**
7.	Attach the fitting at the end of the inlet tubing to the outside port of the injector pump. Ensure that the injector tubing attaches to the correct port. Refer to the diagram located in the front of the pump for details.	
		Figure 115. Injector showing attachment of inlet and outlet tubing fittings.

8.	Pinch the lever on the back of the inlet tube holder to clip the stainless steel tube securely into place.	
9.	Screw the injector fittings into the top of the GloMax® Explorer Instrument.	
	Note: The tubing inside the instrument is installed at the factory.	**Figure 116. Installation of the inlet tube holder clip.**
10.	Plug one end of the DB-15 cable into the back of the injector system console and the other end to the connector labeled Pump Connection on the back panel of the instrument.	
	Note: Use only the cable provided with the instrument. Plugging an unauthorized cable into the connector may result in an electrical short and will void the warranty.	**Figure 117. Cable connection of injector system to GloMax® Explorer Instrument.**
11.	Replace the front panel on the Pump Station.	
12.	Exit the GloMax® Explorer Software and then relaunch software. Turn on the instrument. This will automatically power the Injector System. The injectors should now be recognized by the GloMax® Software. If the injectors are not recognized by the software, then a connection error will be displayed. If this connection error occurs, turn off the Instrument and the Tablet PC. Power the Instrument back on, then turn on the Tablet PC.	

4.B. Operating the Injector System

The injector system will inject reagent into all plate formats except 384-well plates.

Injectors can be used with all detection modes. They can also be used with all Kinetic, Loop and Shaking 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 and for protocols involving shaking where liquid may spill out of the well if shaken too rapidly. 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. The user should determine the volume of reagent necessary to fully prime the injectors. More than 500µl of reagent may be required.

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 83, Panel B), follow the guided instructions to **Prime**, **Reverse Purge** and **Flush** the injectors.
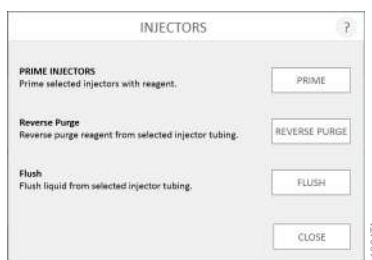
Figure 118. Injector functions (prime, reverse purge and flush).

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 container 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.

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 stainless steel tube through the Parafilm® and into the reagent bottle.

4. Clip the stainless steel tube into the slot on the horizontal bar, and ensure the tube reaches the bottom of the reagent bottle.

5. Tap the **Prime** button shown in Figure 118. The door will open.
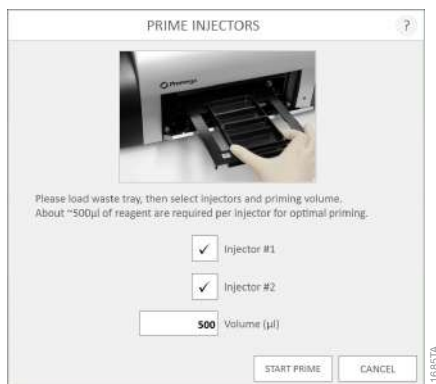
Figure 119. Injector prime function.

6. Place the Waste Collection Tray on the Microplate Sample Tray.

7. Indicate the injector to prime. Set the volume.

8. Tap the **Start Prime** button.

9. After priming is complete, remove the Waste Collection Tray.

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

4.B. Operating the Injector System (continued)

Reverse Purge (Retrieving Unused Reagents from Injectors, optional)

1.   Tap the **Start…** button adjacent to the Reverse Purge option on the Injectors screen (Figure 118). The door will open.
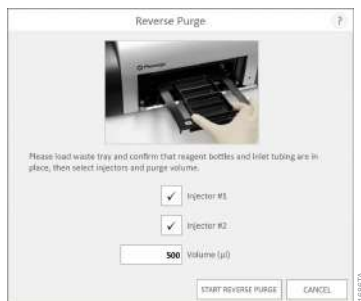
Figure 120. Injector Purge function.

2.   Tap the **Start Reverse Purge** button (Figure 120).

3.   Any reagents left in the fluid lines will be returned to the reagent container.

Flushing the Injectors After Use

1.   Remove the sample plate from the instrument.

2.   Tap the **Flush** button on the 'Injectors' screen (Figure 118). The door will open.

Figure 121. Injector Flush function.

3.   Place the Waste Collection Tray on the Microplate Sample Tray.

4.   Tap the **Start Flush** button (Figure 121).

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: Remove Waste Collection Tray when priming and flushing are complete. See Section 5.D for injector cleaning instructions.

5. Cleaning and Maintenance

5.A. General Instrument Care

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

Tap the **Door** button to automatically open and close the instrument door.

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

5.B. General Cleaning

Turn off the GloMax® Explorer 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 optical head cross talk mask. Immediately clean up any spills. We recommend thoroughly cleaning the interior of the instrument every 30 days as follows:

Remove the Aperture Fitting from the Aperture Plate (Section 3.G). Clean the Microplate Sample Tray (Figure 7), Aperture Fitting and Aperture Plate using a Kimwipes® tissue dampened with 70% ethanol. 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® Explorer 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 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.
    Note: Prepare at least 10ml of ethanol for each injector to be flushed.

2. Place the container of 70% ethanol into the bottle holder. The stainless steel inlet tube should be inserted so that it reaches the bottom of the bottle.

3. Place an empty Waste Collection Tray on the Microplate Sample Tray.

4. From the 'Tools' screen, select **Injectors**. 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. Run the **Flush** protocol nine times with 70% ethanol.

7. Empty and clean the Waste Collection Tray, and place it on the Microplate Sample Tray.

8. Place a container of deionized water on the bottle holder with the stainless steel inlet tube inserted to reach the bottom of the bottle.

9. From the 'Tools' screen, select **Injectors**. Tap the **Flush** button to initiate flushing.

10. Select 9 flush cycles.

11. When all flush cycles are complete, empty and clean the Waste Collection Tray, and place it on the Microplate Sample Tray.

12. Flush the injector 3 times with air. A small volume of water will remain in the injector after the air purge.

5.E Cleaning the Waste Collection Tray

The Waste Collection Tray prevents liquids from splashing or spilling inside the instrument during the Prime and Flush protocols. The maximum volume capacity of the Waste Collection Tray is approximately 50ml. Use care when removing the Waste Collection Tray from the Microplate Sample Tray so that no liquid spills inside the instrument.

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

5.F. Removing or Replacing Inlet and Outlet Plastic Tubing

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

1. Disconnect the inlet or outlet tubing from the injector pump by twisting the gray fitting counterclockwise.

2. Discard the used injector tubing assembly.

3. Twist the fitting of the replacement tubing into the correct port of the injector pump.

5.G. Removing or Replacing Internal Instrument Tubing

Replacement tubing is available. See Section 7.E., Related Products, for ordering information.

1. Disconnect the internal instrument tubing by twisting the gray fitting counterclockwise.

2. Pull the end of the tubing out of the black injector tip holder fitting within the instrument.

3. Discard the used tubing.

4. Twist the gray fitting of the replacement tubing into the correct internal port.
   Note: The left port is for Injector 1. The right port is for Injector 2.

5. Ensure that the gray fittings are fully inserted by making sure that they are completely tightened clockwise.

6. Insert the injector tip into the black injector tip holder fitting until the tip can be seen through the bottom of the fitting.

5.H. Removing or Replacing Stainless Steel Tubing

Replacement stainless steel tubing is available as part of the Injector Inlet Tubing Assembly. See Section 7.E for ordering information.

1. Hold the tan-colored adapter just above the stainless steel tube.

2. Turn the adapter counterclockwise to disconnect it from the gray fitting.

3. Twist and separate the two tan-colored adapters.

4. Pull the stainless steel tube out of the adapter and discard.

5. Insert a new stainless steel tube into the adapter. Allow the tip of the tube to hang over the edge approximately 3–4mm.

6. Twist the second part of the adapter on, and tighten by hand.

7. Attach the adapter to the gray fitting by turning it clockwise and tightening by hand.

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 multiwell 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 is not recommended.
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 **Door** or 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.
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.B).
	Injector speed may not be optimal for the viscosity 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.B).
	Injector tubing is clogged and may need to be replaced. (Section 5.F)
Plate stuck or jammed in instrument	Press **Door** or press **Self Test** on the 'Settings' screen or press **Recovery** in the Tools menu (Section 3.G). Any of these methods can be use to attempt to recover the plate. If the issue is not resolved, contact Promega Technical Services (**techserv@promega.com**).

6.B. Common Problems (continued)

Symptoms	Causes and Comments
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® Explorer software. 4. If the issue is not resolved, contact Promega Technical Services (**techserv@promega.com**).
Unable to modify methods or plate maps	Administrators can restrict users from modifying user-defined methods and plate maps. Check with your site administrator to check whether user permissions have been restricted.
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 as the Multiwell Plate Sample Tray was retracting. Check the instrument door for any obstructions.
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.
	If using 384-well plates, confirm that the 384-well aperture has been installed.
	Confirm the Access Panel is installed correctly. You may find a video tutorial at: **www.promega.com/resources/ multimedia/instruments/glomax-access-panel-installation/**

ymptoms	Causes and Comments
Communication failure with Portal software	In the event of a communication failure with the Portal software, no reports can be generated.
	If a PC is hosting the Portal software, make sure the PC is on and connected to the network.
	Contact your IT department to determine whether a network outage or communication failure has occurred.

6.C. Use of a USB Flash Drive

• Insert a USB flash drive 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 and restart the Tablet PC and the instrument.

7. Appendix

7.A. Configuring the Tablet PC

The GloMax® Explorer Tablet PC touch screen allows the user to make selections from a series of options. Selections may be made by tapping the appropriate option on the Tablet PC screen.

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. 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.

7.A. Configuring the Tablet PC (continued)

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® Explorer 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.

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 window 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 122).
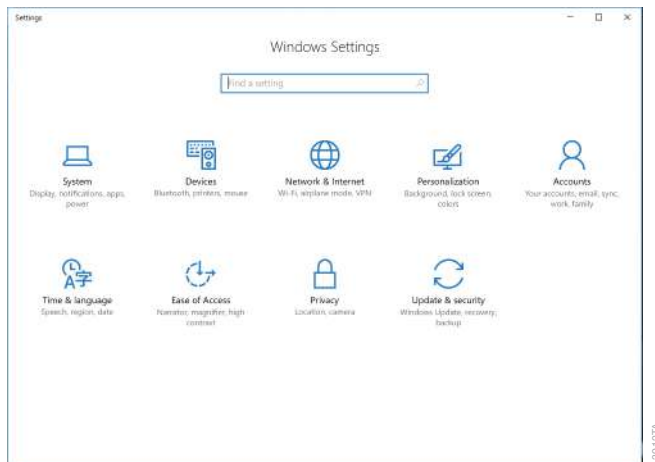

Figure 122. The 'Windows Settings' screen. The 'Windows Settings' screen provides access to multiple functions that can be used to configure options and settings for the Tablet PC.

7.A. Configuring the Tablet PC (continued)

2. *Date and Time (continued)*

c. Touch the **Time & language** button on the 'Windows Settings' screen to open the 'Time & language' screen (Figure 123).

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.
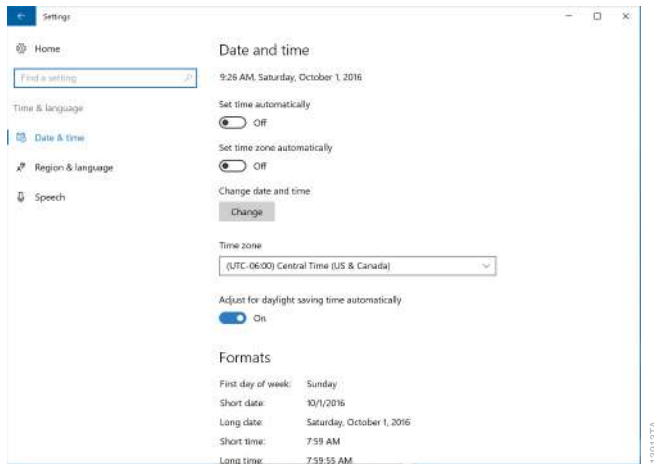

Figure 123. 'Time & language' screen. Settings for Date and time can be modified from this screen.

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 124), use the drop-down boxes to select the appropriate date and time for your location.
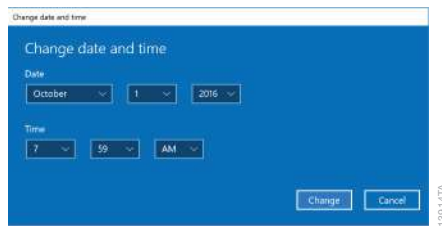

Figure 124. Adjusting date and time. Use the drop-down menus on the 'Change date and time' screen to adjust the displayed date and time on the Tablet PC.

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.

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
- Modify plate maps
- Create and modify protocols
- Specify software settings and preferences
- Set Instrument Name
- Export Audit Records

PromegaUser: Promega Users have the following capabilities:

- Select and run preloaded protocols
- Create and modify user-defined protocols (if allowed by administrator)
- Modify plate maps (if allowed by administrator)
- 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 125, 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 125, Panel B).
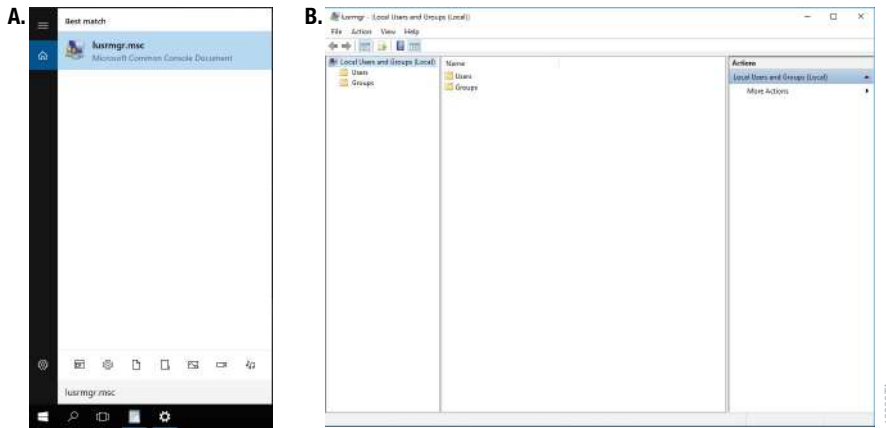
Figure 125. Accessing Users and Groups. Panel A. Touch the **Search** button in the taskbar and enter lusrmgr.msc into the search window to bring up the lusrmgr.msc item. **Panel B.** Touching the **lusrmgr.msc** item from the search list opens the 'Local Users and Groups (Local)' screen.

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.
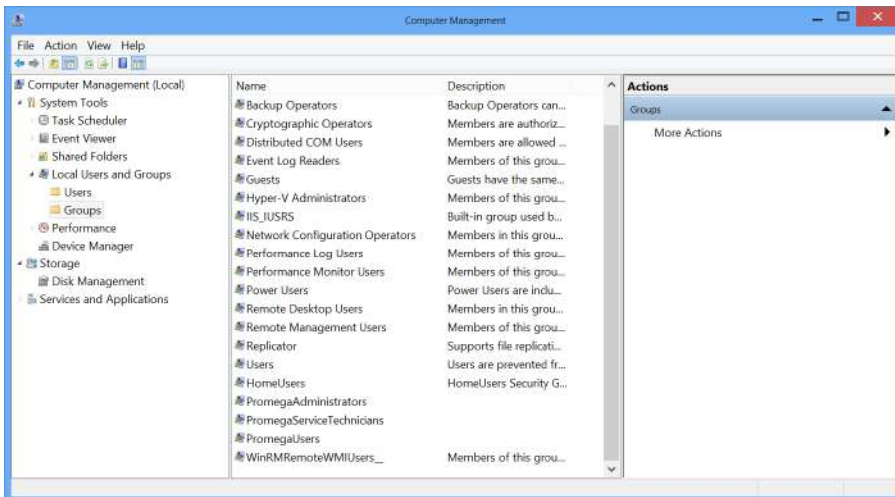

Figure 126. Selecting Groups from the Computer Management screen.

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.
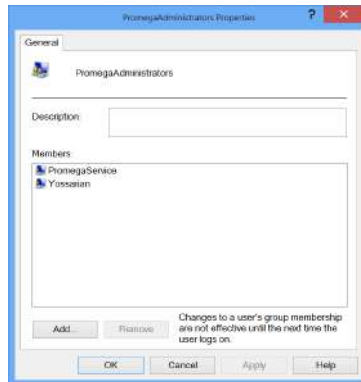

Figure 127. Adding users to the PromegaAdministrators group.

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.
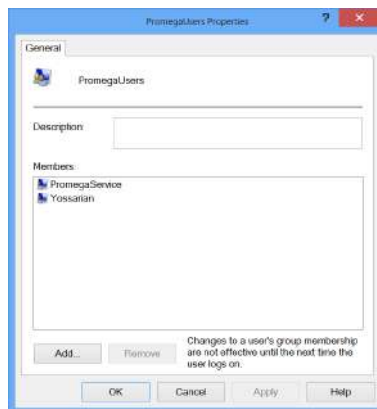

Figure 128. Adding users to the PromegaUsers group.

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 129, 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 129, Panel B).
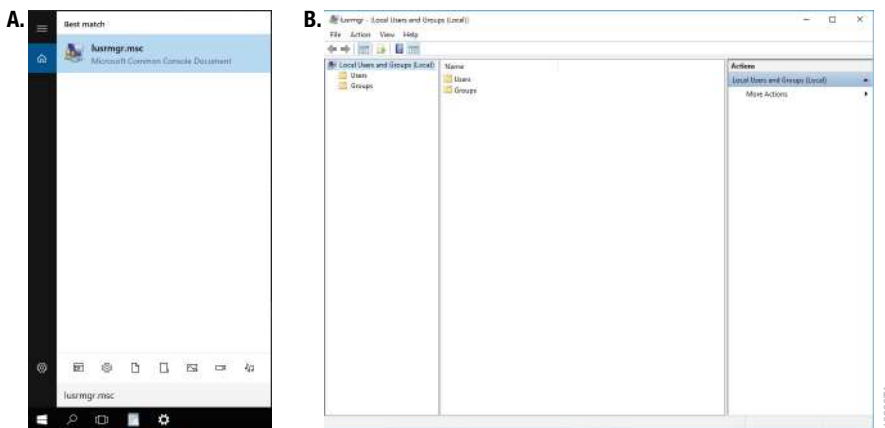

Figure 129. Accessing Users and Groups. Panel A. Touch the **Search** button in the taskbar and enter lusrmgr.msc into the search window to bring up the lusrmgr.msc item. **Panel B.** Touching the **lusrmgr.msc** item from the search list opens the 'Local Users and Groups (Local)' screen.

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.

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 130, **Home → Settings → Administrator**). Administrators can use the on-screen keyboard to manually enter the instrument name (Figure 131). 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 130. GloMax® Software 'Administrator Page' screen.

Figure 131. 'Instrument Name' screen. Administrators can manually enter the instrument name from the 'Instrument Name' screen.