



GMS User Guide

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Overview

This manual for the Generic Measurement System (GMS) contains information regarding the installation and operation of the software.

The GMS automates testing procedures for optical devices. It can be used to test Insertion Loss (IL), Back Reflection (BR), Power (PWR) and Polarization Dependent Loss (PDL).

Supported instruments:

- BR5 Backreflection Meter
- MBR5 Multi-Output Backreflection Meter
- MLT Multi-Output Loss Test Set
- SX4 & SX8 Optical Switches
- PDL5 BR/IL/PDL Meter
- EOTS Environmental Optical Test System

Features:

- Insertion loss, return loss and power testing through optical connectors
- Save results into Excel files with various saving options
- Simple and efficient, requires minimal operator training
- Easy saving, loading, and editing of test profiles
- Includes long-term testing options
- Real-time graphing capabilities

System Requirements:

- Windows 7 or higher
- Microsoft Excel (2007 or greater)
- .NET Framework 4.5
- National Instruments Drivers (for GPIB)

Quick Start Guide

This chapter contains a concise guide of how to quickly set up the GMS and run a test for a single instrument. For a more detailed guide of the software's features refer to the corresponding sections later in the manual.

Main Window

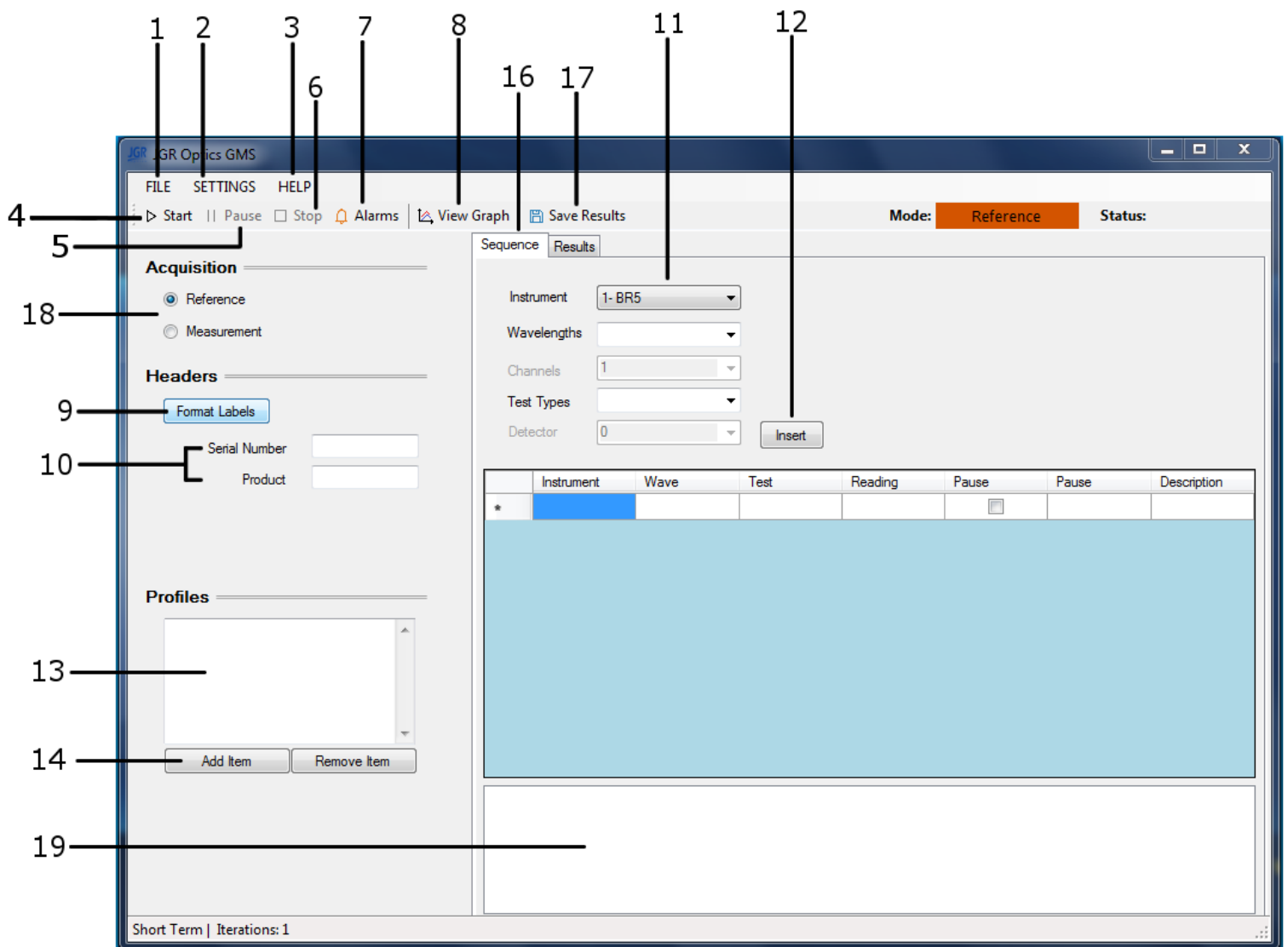


Figure 2.1: The main window of the GMS.

1	File Menu	Contains save/load profiles
2	Settings Menu	Contains forms for software settings
3	Help Menu	Contains information found in the manual
4	Start Button	Initiates the test
5	Pause Button	Pauses the test
6	Stop Button	Stops the test
7	Alarms Configuration	Contains options for setting warnings/failures
8	View Graph	Plot the data collected during testing
9	Format Labels Button	Choose row headers
10	Labels	Header information (ex. Part Number, Serial Number, etc.)
11	Test Parameters	Choose wavelengths, channels, test types, and detectors to test
12	Insert Button	Inserts the specified test (from test parameters) to the list
13	Test Profiles List	A list of profiles the user can load easily. In order to load a profile, select a profile from the list and double click on it.
14	Add/Remove Buttons	Add/remove profiles to/from the list
15	Sequence View	Test information is stored in this grid in a list format. The grid lists the test sequence to be conducted in order from top to bottom
16	Sequence/Results Tabs	Switch between the test sequence window and the results window
17	Save Button	Saves test results presented on the main window
18	Acquisition Value	Switch between taking a reference value or a measurement
19	Test Log	Receive feedback on tests

The table above corresponds to Fig. 2.1 and serves as a guide to the Main Screen of the GMS software.

Configuring Instruments

- The first step is to access the Instrument Settings window (Fig. 2.2), which can be done through the Settings Menu or by pressing Ctrl+I.
- Set the # of instruments to 1 for the purposes of this guide, and select the type of instrument you are testing from the Instrument drop-down menu.
- Select from the Port drop-down menu either Serial or GPIB depending on how the instrument will be connected to GMS.
- Use the Auto Select button (or enter in the serial/GPIB values manually) to establish a connection.
- Press the Test Port button to verify that a connection was established, and select yes when asked to detect values automatically (this can also be changed manually).
- If the instrument fails to communicate through the port, make sure the right COM port is selected. If it continues to fail, turn the instrument off and on then restart the software and try again.

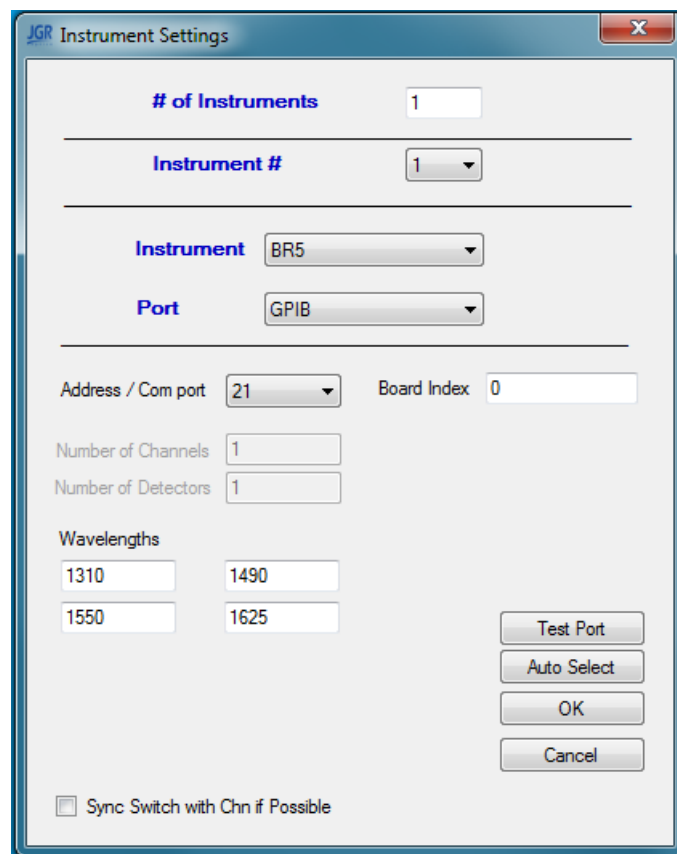


Figure 2.2: The Instrument Settings window for a BR5 connected via GPIB.

Configuring Test Parameters

- The first step is to access the Test Settings window (Fig. 2.3), which can be done through the Settings Menu or by pressing Ctrl+T.
- There are three tabs in this window, Test Format, Test Length and Save Options.
- Under Test Format select the device type, a meter or a switch. If only one device is connected this will be defaulted to the proper device type.
- The test parameter order can be chosen using the drop-down lists labelled 'First:', 'Second:', etc. The available parameters vary depending on the instrument being tested.
- Under Test Length at the top of the window check the box marked 'Enable Long Term Testing' if you wish to run repeated tests on a DUT.
 - If long term testing is enabled, choose between an iteration test or a duration test and input the desired # of iterations or the duration. See Test Length for more details.
- Under Save Options are two tabs labeled Long Term Test and Single Test (Fig. 2.4). For the purposes of this guide select Single Test.
- Select "Save each test result to separate file" under Single Test.

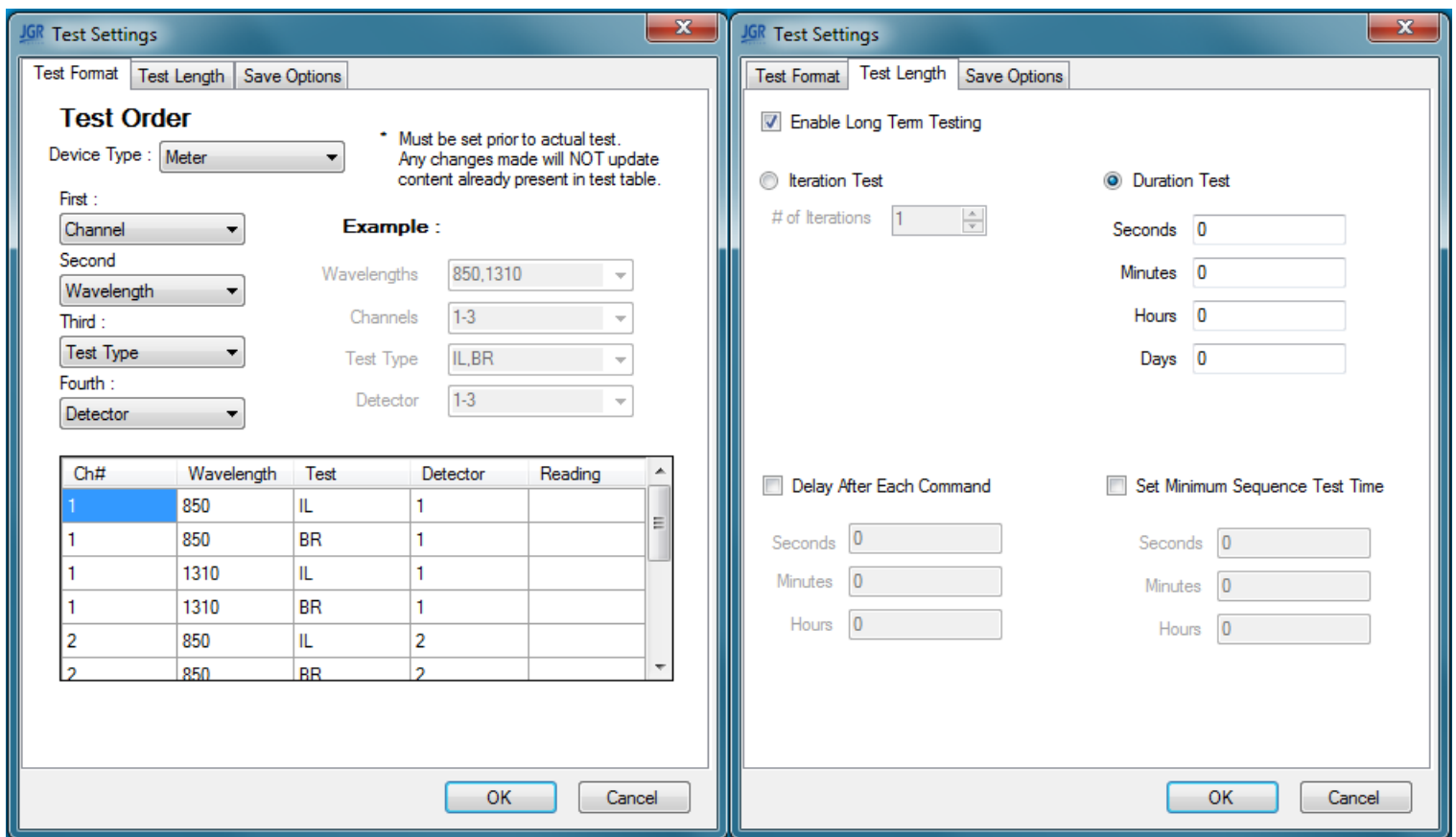


Figure 2.3: The Test Format and Test Length tabs for a meter type device.

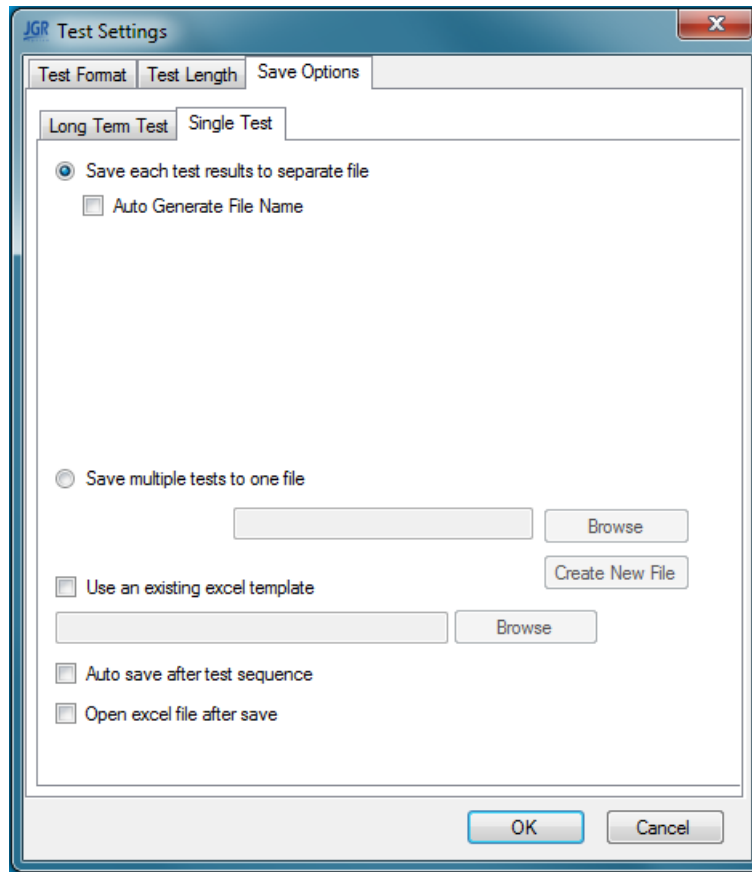


Figure 2.4: The Save Options tab for single tests.

Running a Sequence

- Select the Sequence tab on the main screen so that the desired test conditions can be entered (Fig. 2.5 and Fig. 2.6).
- First select the registered instrument from the Instrument list.
- Select the desired test parameters such as wavelength, channel and test type from the lists below. The three available test types are insertion loss (IL), backreflection (BR) and power (PWR).
- When all the parameters are selected press the Insert button to add a test to the Test List below.

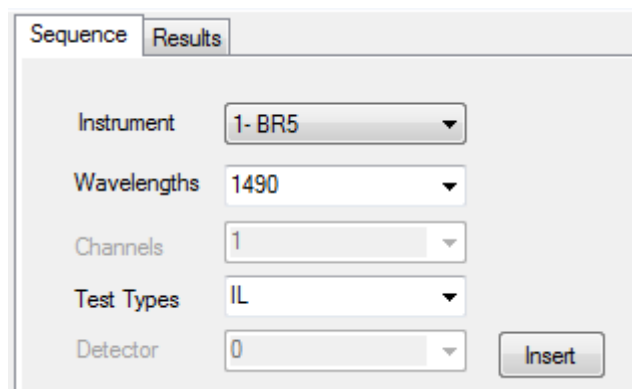


Figure 2.5: An example of a BR5 insertion loss (IL) test at 1490nm.

- Add as many tests as necessary using the previous method, and delete any unwanted tests by left-clicking on the row number and pressing the Delete key.
- A reference value must be taken before any measurements. Ensure that Reference is selected under Acquisition (Fig. 2.1 - 18) and press the Start button. Press Retry in the dialogue box if not satisfied with the value, otherwise press OK.
- For more information on referencing, see [Taking a Reference](#).
- Press the Start button again to run the prepared tests.
- View the tabulated results in the Results tab or press the Save Results button to save results as an Excel file if not specified earlier.

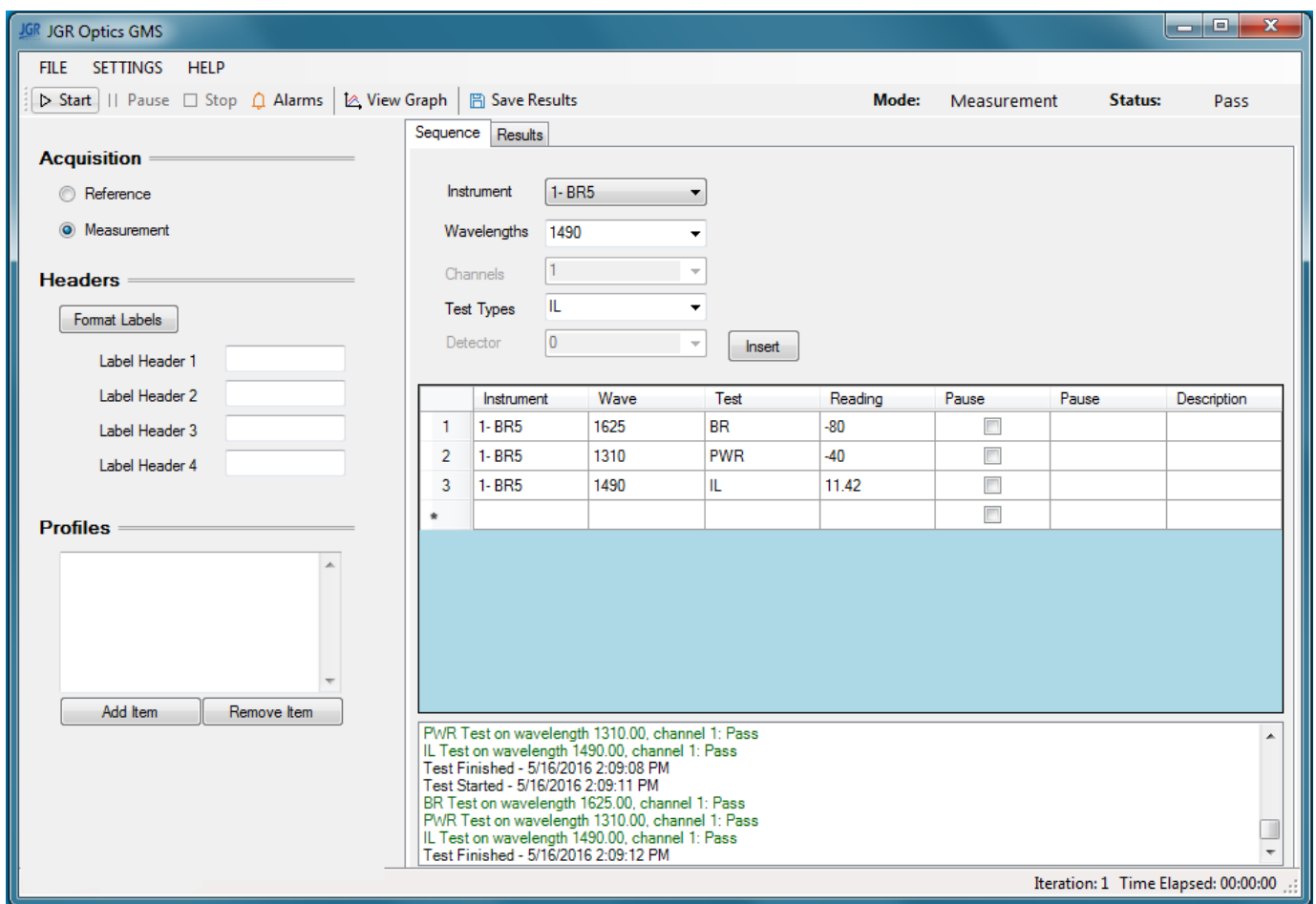


Figure 2.6: Three sample tests run on a BR5 (for BR, PWR and IL) at three different wavelengths (1625, 1310 and 1490). Measurement readings are displayed in decibels (dB).

Software Installation

To install the GMS software run "JGR Optics GMS Setup 3.5.0". Press the Next button on the bottom of the window to proceed through the installation process.

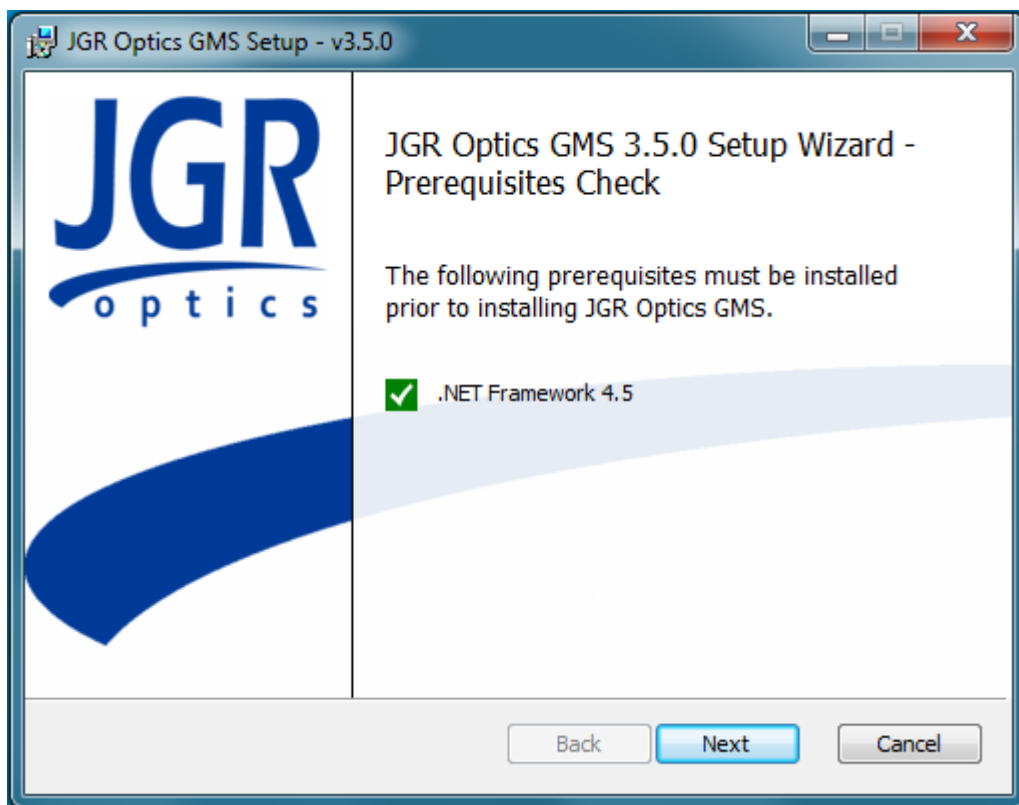


Figure 3.1: Opening window of installation.

- Ensure that all prerequisites are installed on the system (Fig. 3.1).
- Step through the wizard to complete the installation. If the installation was successful you will see the window in Fig. 3.2.

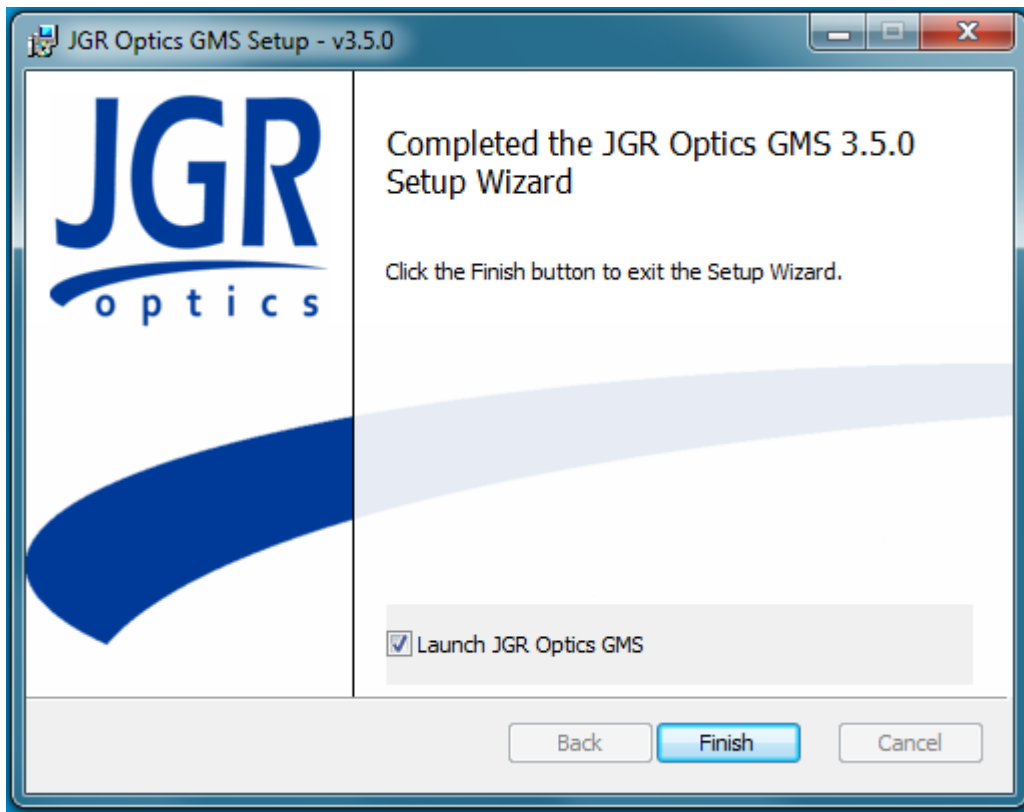


Figure 3.2: Finish the installation and open the GMS.

Software Configuration

Before running any test using the GMS, the software must be configured properly. This includes establishing a connection with the instruments to be used, as well as configuring the test parameters, test length and test save options.

Configuring Instruments

Connecting Instruments

- To set up instruments, first enter the Instrument Settings window through the Settings Menu or by pressing Ctrl+I (Fig. 4.1 and Fig. 4.2).
- Specify the number of instruments to be used. If more than one instrument is being used the user can switch between instruments using the Instrument # drop-down list.
- Use the Instrument and Port drop-down lists to specify which type of instrument is going to be tested and how it will connect to the GMS (either Serial port or GPIB).
- Fill in the appropriate connection port values manually or press the Auto Select button to establish a connection. Use the Test Port button to verify that a connection was made successfully.
- An optional prompt may appear asking to fill in the detected parameter fields. These can also be filled in manually.

After all the instrument settings are configured, click OK to apply and save the settings. These settings are saved in a configuration file and will be loaded each time the software is run.

Note: the instrument settings are saved as part of the software settings and are independent of test profiles (these settings are static and do not change when a different profile is loaded).

Meters vs Switches

The two classifications of devices compatible with the GMS are meters and switches. The device parameter fields depend primarily on which of these two types is being used.

Configuring Meters (BR5, MBR5, MLT and PDL5):

- **Address:** Refers to the GPIB address of the instrument (if using GPIB port) or the COM port of the instrument (if using serial port).
- **Number of Channels:** Refers to the number of output channels available on the meter. Both the MBR5 and MLT have multiple output channels, whereas the BR5 and PDL5 have only one.
- **Number of Detectors:** This setting only applies to the MLT and refers to the number of detectors available on the instrument.
- **Wavelengths:** Type the available wavelength(s) in the boxes using integer numbers only. Up to four (4) wavelengths can be defined.

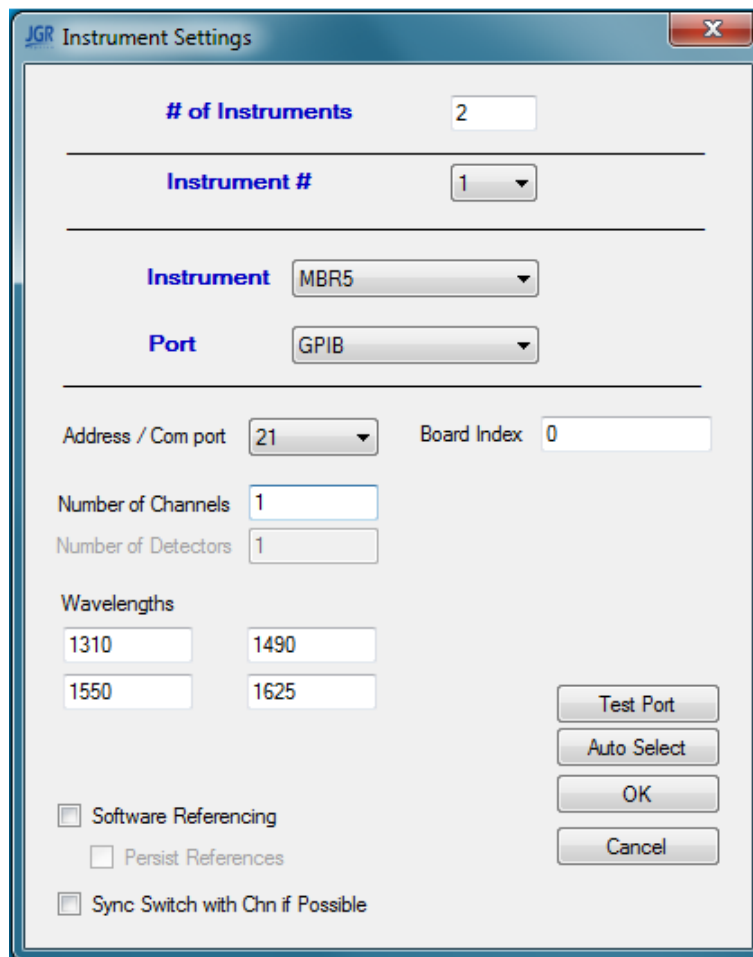


Figure 4.1: The Instrument Settings for an MBR5 meter via GPIB.

Configuring a Switch (SX4/SX8):

- **Address:** Refers to the GPIB address of the instrument (if using GPIB port) or the COM port of the instrument (if using serial port).
- **# of Modules:** Enter the number of modules on the switch being used.
- **Channel:** First select a module number from the # of Modules drop down list and enter the number of channels available for that module. Repeat the operation for all switch modules.

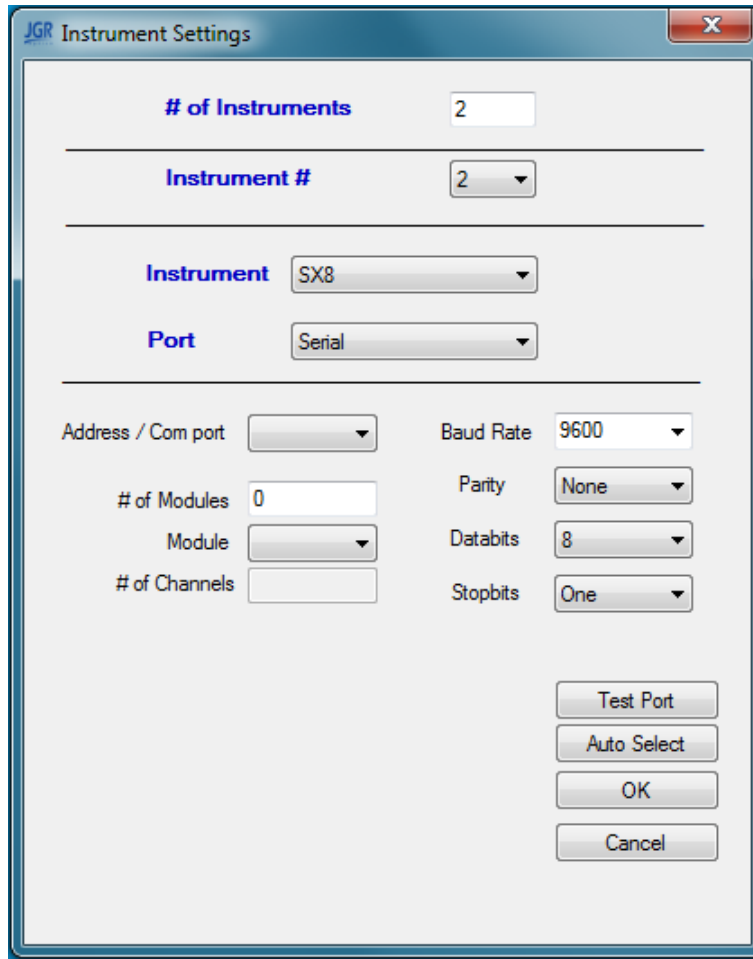


Figure 4.2: The Instrument Settings for an SX8 switch via serial port.

Configuring Test Settings

Now that the instrument(s) have been connected the desired test parameters can be registered. Begin by entering the Test Settings window either through the Settings Menu or by pressing Ctrl+T. The Test Settings window has three tabs: Test Format, Test Length and Save Options.

Test Format is used to order the testing parameters on the main screen. Test Length is used to specify the number of iterations or the duration of a test. Save Options is used to specify where and how the test results will be saved.

Test Format

Ordering Parameter Columns:

- Under Test Format choose the type of device being tested (meter or a switch) from the drop-down list (see Fig. 4.3).
- The next step is to choose how the test parameters will be listed on the main screen test list by ordering the parameter columns order.
- Use the list labeled First for the first column, Second for the second column, etc.

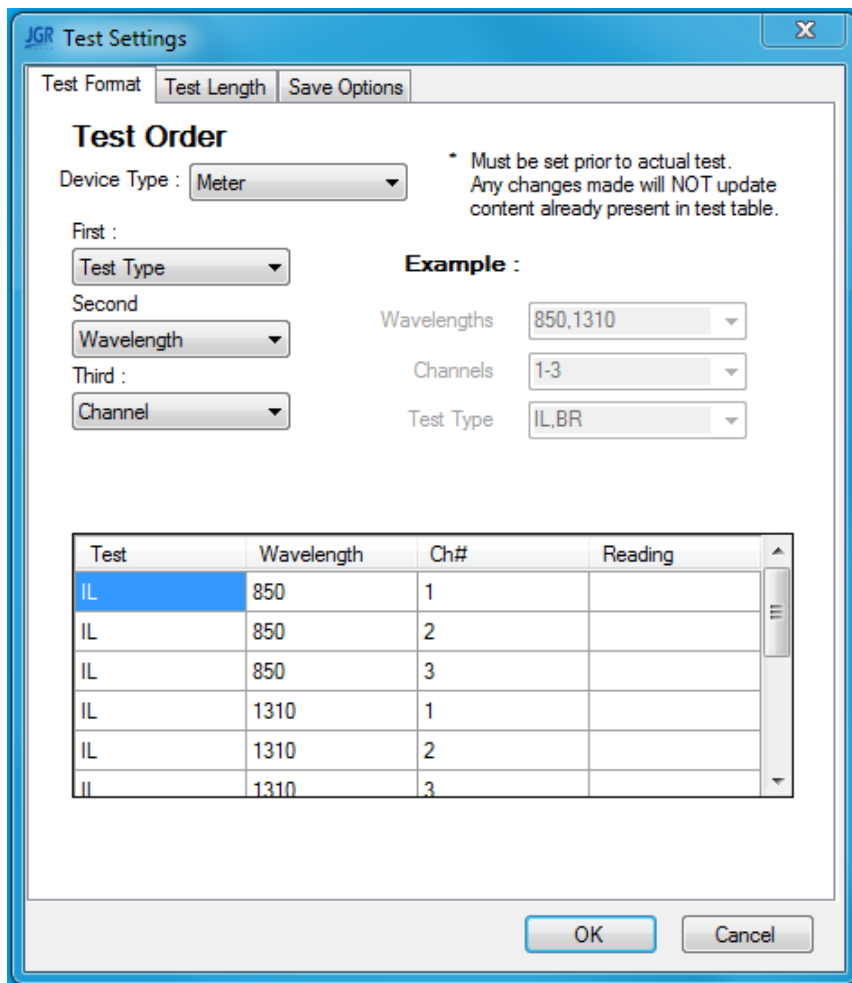


Figure 4.3: The test order for a meter device. An example of the column order is shown at the bottom.

Different Instrument Options:

The drop down lists located on the left and marked from First to Fourth vary depending on the type of instrument chosen.

- **MBR5** - channel, wavelength, and test type.
- **BR5** - wavelength, and test type.
- **MLT** - wavelength, channel, test type, detector.
- **Switch** - none.
- **EOTS** - channel, wavelength, and test type.

The same parameter cannot appear more than once. When a valid format is specified, an example using the selected parameters is displayed on the right side of the window.

Test Length

Setting up an Iteration or Duration Test:

- Under the Test Length tab there is a check-box labeled Enable Long Term Testing (see Fig. 4.4).
- If left unchecked any tests performed will run for a single iteration only.
- Enabling the option allows the user to setup either an iteration test or a duration test.
- Enter in numerical values for the test duration or use the arrows on the # of Iterations text box to specify the desired test length.

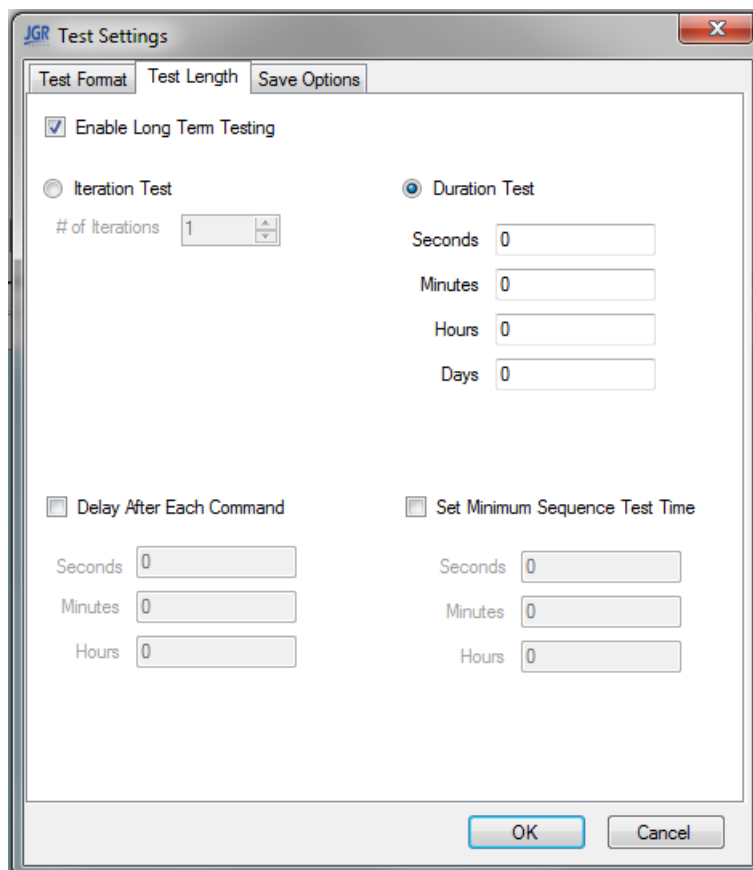


Figure 4.4: The Test Length settings window with long term testing enabled.

Setting Command Delays and Minimum Sequence Times:

- For both of these tests the Delay After Each Command options are made available, as well as the Set Minimum Sequence Test Time options for the Duration Test option.
- Enable the Delay After Each Command and Set Minimum Sequence Test Time options using the check-boxes and enter the desired values into the text boxes.
- The Delay After Each Command option specifies the amount of time the software will wait after executing one command before moving on to the next.
- The Minimum Sequence Test Time can be used to delay the start of multiple sequences. If a sequence with a minimum test time of 45 minutes finishes after 30 minutes, the software will wait 15 minutes before beginning the next sequence.

Save Options

The Save Options tab has two windows, one for a Long Term Test and one for a Single Test (Fig. 4.5 and Fig. 4.6). If the Enable Long Term Testing box was checked in the last step then use the Long Term window, otherwise use the Single Test window.

The user can opt to have the resulting Excel file open upon test completion for either option using the corresponding check-box. Both Long Term and Single Testing allow the use of custom Excel templates. See Custom Excel Templates for more information.

Long Term Save Options:

- To save a long term test simply specify the desired save location and file name using the browse option.
- Specify the saving frequency of the data file by entering a value in minutes.
- The option to append results to an existing file can be opted into using a check-box.

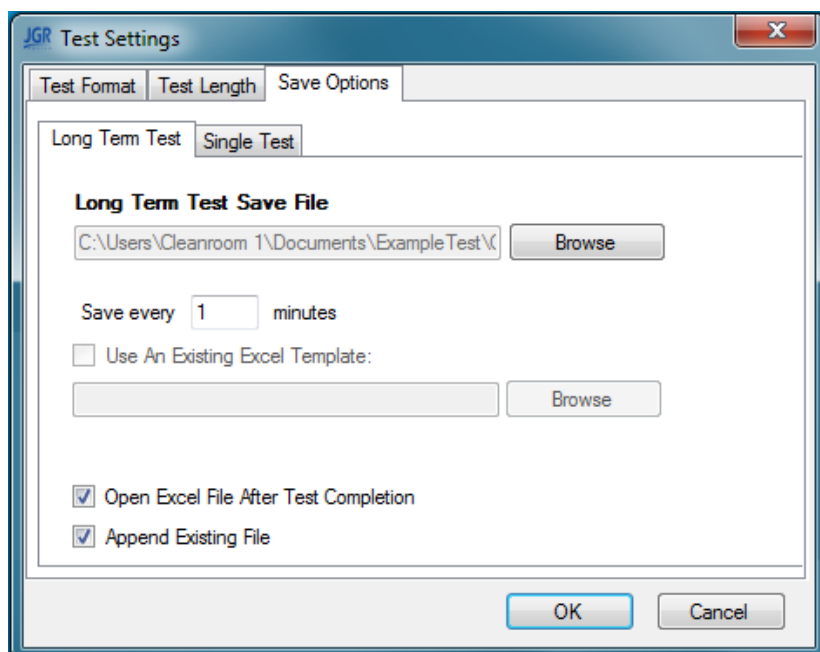


Figure 4.5: The Long Term save options window.

Single Test Save Options:

- The single test option allows the user to either save all test results in a single file or save individual results in separate files.
- When saving results in separate files the option to Auto Generate file names is available, or they can be named later after the tests have been performed on the main screen.

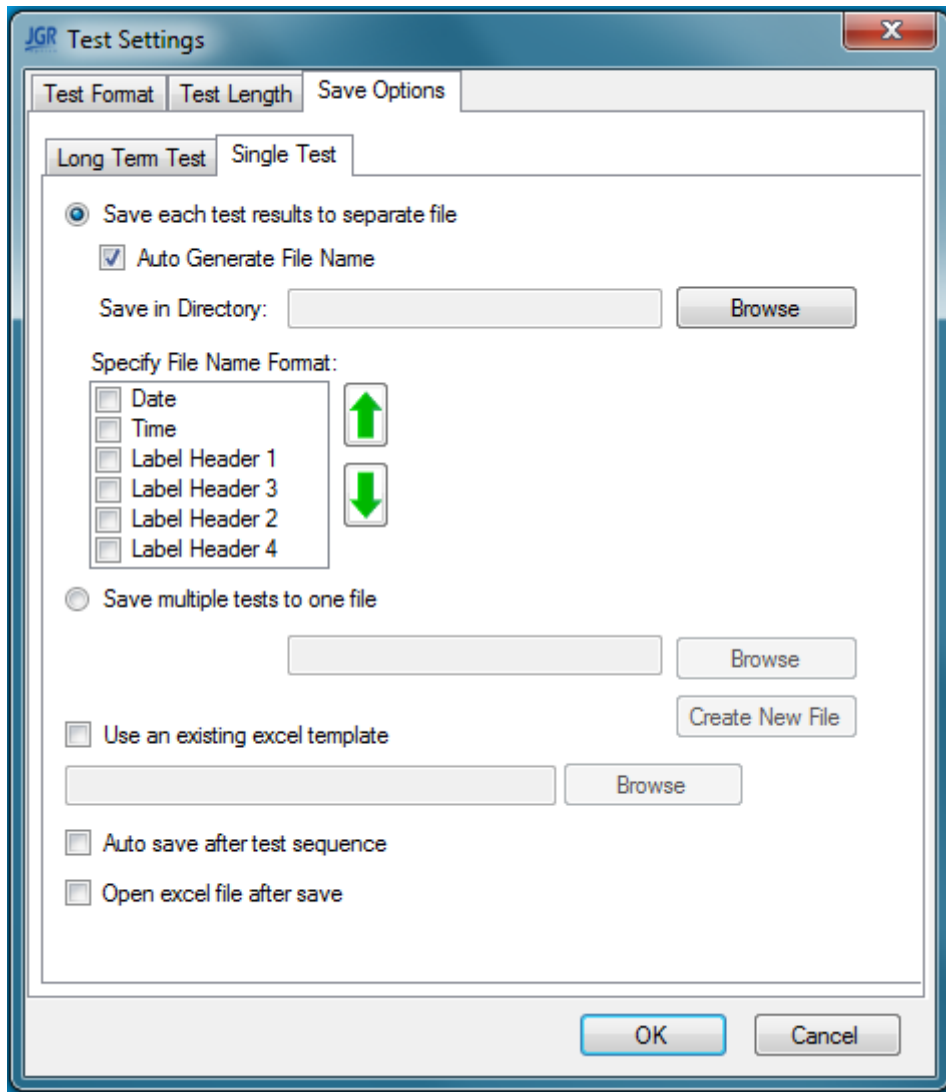


Figure 4.6: The Single Test save options window.

- To make use of the Auto Generate function specify a Save Directory using the browse function and use the File Name Format List by checking the values to be included in the file names.
- When saving multiple tests to a single file simply use the browse function to specify a save location and file name.

Custom Excel Templates

For both save options, Custom Excel templates can be loaded associated with a test profile. Changing the profile will change the template.

- To enable this features select the "Use an existing excel template" check-box found in the appropriate save window (Long Term Test or Single Test).
- To create a custom template the user must first start from a saved Excel results file (Fig. 4.7).
- By default a results file with have two Worksheets, 'Sequence' and 'Results'. To add a Worksheet click the icon to the right of the Results Worksheet tab.
- In Fig. 4.7 a new tab called 'Label' has been added. This is where the customization should occur.

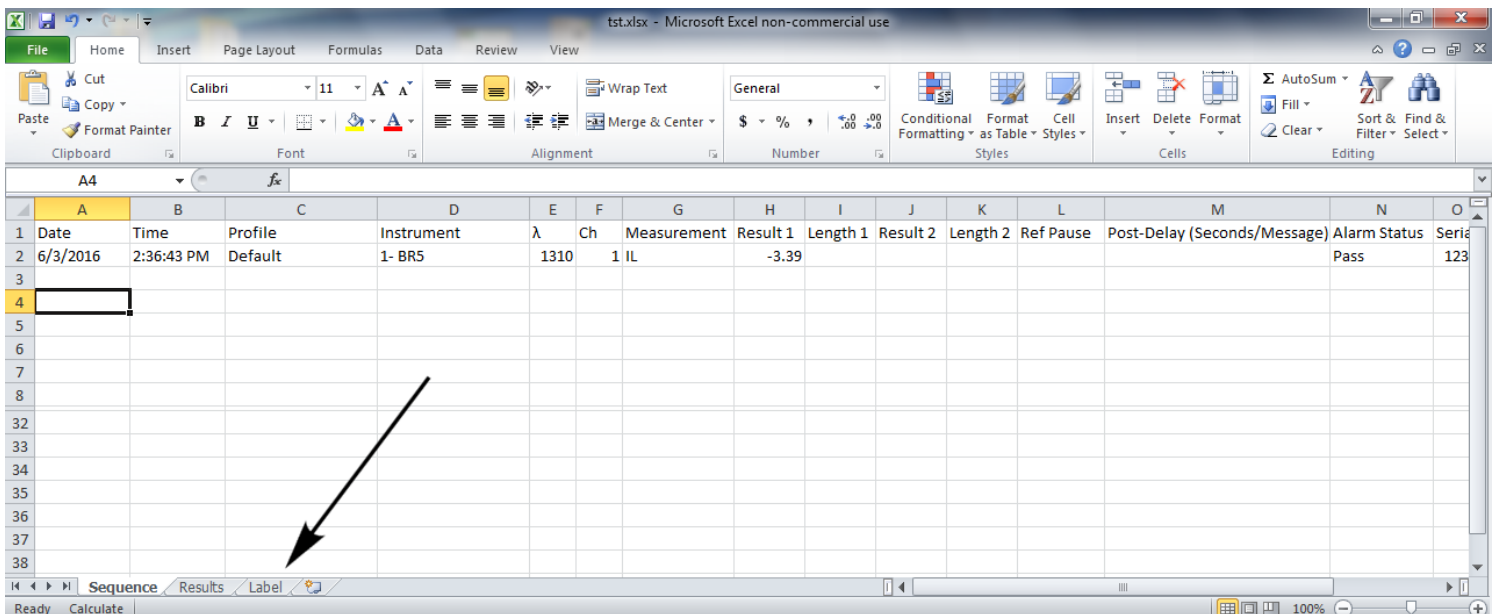


Figure 4.7: An example of a custom Excel template file. Press the new Worksheet button to begin editing a custom Excel Template.

- On the new Worksheet custom formulas and labels can be added that incorporate data from the Sequence and Results Worksheets (Fig. 4.8).
- To incorporate this Excel template into future tests use the Browse function under the Excel template check-box to select the newly created Excel template (Fig. 4.9).
- The test will run as normal but will now save to an Excel file with the user's custom Worksheets and formulas.

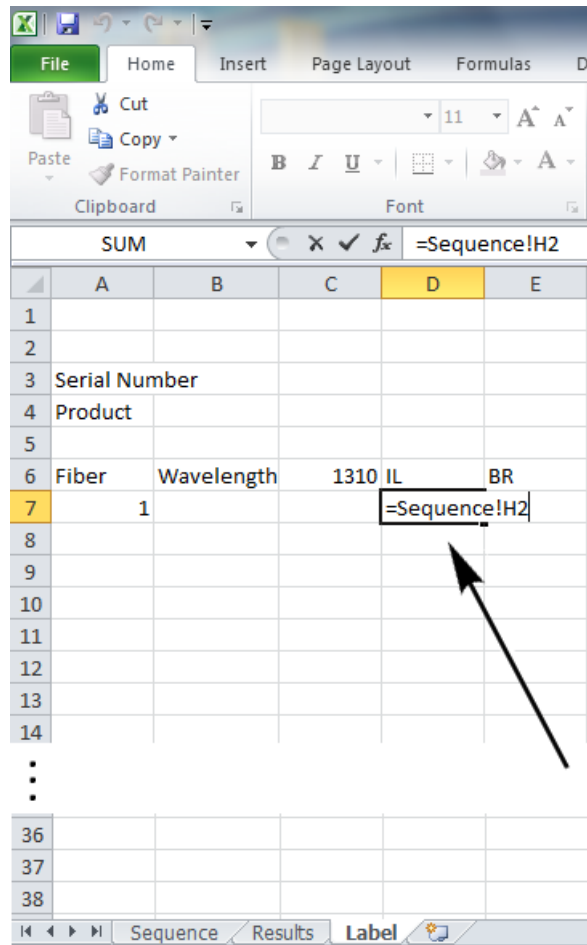


Figure 4.8: An example of a custom Excel template with an added Label Worksheet. The value in cell H2 of the Sequence Worksheet has been added to cell D7 in the Label Worksheet.

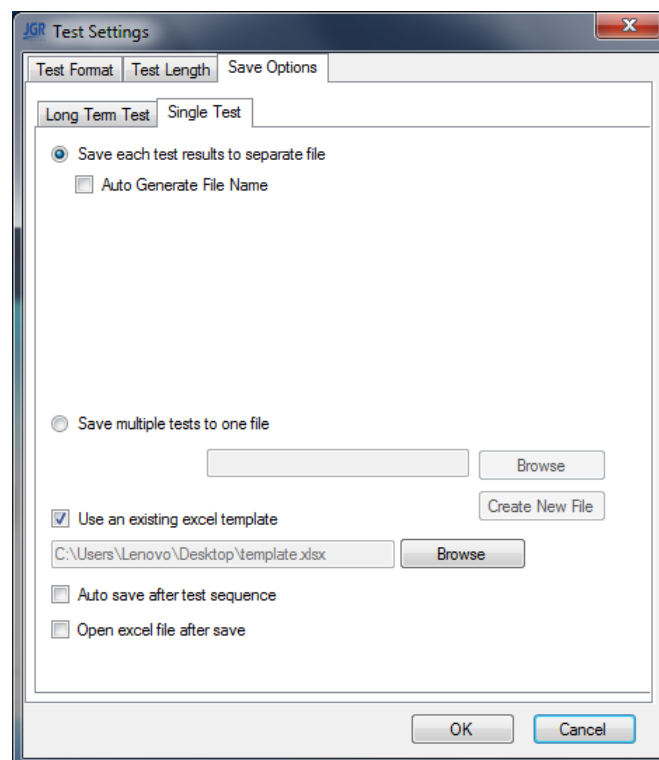


Figure 4.9: Selecting a custom template for use in a test.

Other Settings

Thermometer Settings

This latest version of GMS has the ability to continuously monitor temperature and humidity. GMS is currently compatible with thermometers such as Omega’s iTHX-W3 Temperature and Humidity Chart Recorder, useful when performing long term environmental tests.

- Communication with the thermometer is possible via Ethernet.
- As indicated in Fig. 4.10, only the IP Address and Port have to be provided.
- Enable the thermometer using the check-box, select the desired instrument from the drop-down list and enter corresponding Ethernet settings.
- Verify that a connection was established using the Test Connection button.

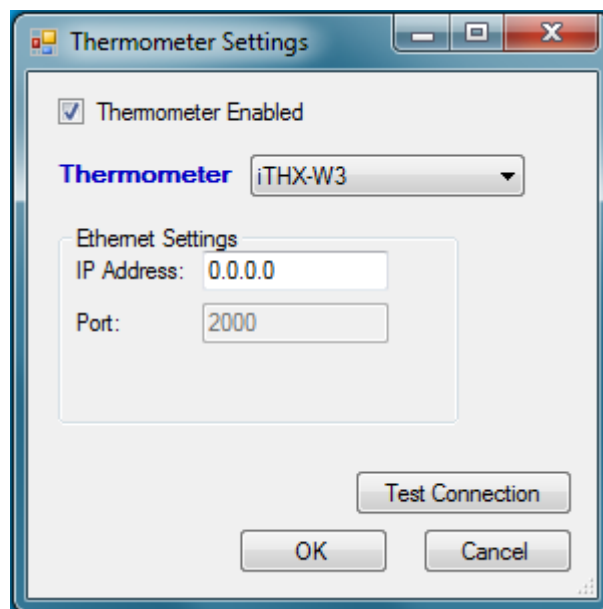


Figure 4.10: The thermometer settings window.

User Interface Settings

Users can customize GMS by specifying keyboard shortcuts, locking interace controls and selecting language and help options.

UI Shortcut Options:

- This menu (Fig. 4.11) can be accessed either through the Settings menu or by pressing Ctrl+U.
- Under Keyboard Shortcuts type in the desired shortcut in the text-box next to the name of the command in question. By default only the Start command is listed.
- Enable Footpedal Shortcuts creates two more command fields, Start (via Footpedal) and Goto 1st Header. Each command can be one character long.
- The Start commands will initiate a test sequence, while the Goto 1st Header command moves the cursor to the first header label text box.

Locking and Disabling Modes:

- Under Interface Options there are three check-boxes: Disable Reference Mode, Disable Headers and Lock Profiles List.
- Disable Reference Mode when clicked removes the Acquisition selection menu on the main screen and defaults any data readings to Measurement and not Reference.
- Disable Headers removes the header and label fields on the main screen.
- Lock Profiles List removes the Add and Remove buttons from the Test Profile List on the main screen, while still allowing the user to load profiles from the list.
- The user can lock all interface controls by accessing Lock Controls from the Settings menu or by pressing Ctrl+L. This will disable all buttons on the main screen except Start, View Graph and Save Results.

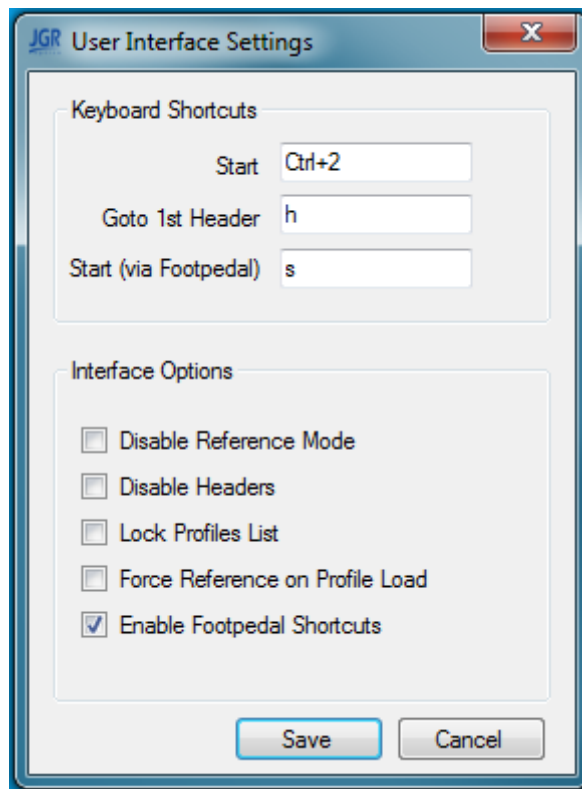


Figure 4.11: The User Interface Settings window.

- The Force Reference on Profile Load check-box will prompt the user to reference the instruments associated with the profile’s test list automatically.

Language and Help Options

- The user can select the software language from the Settings menu under Language. English, French and Chinese are available.
- Under the Help menu is a Help Contents option that leads to this manual.

Setting Up a Test Profile

A test profile describes a sequence of tests to be performed on the instrument and contains additional information required by the user. The test profile contains information regarding the channel, module, wavelength, and detector settings for each test (as applicable to the instrument).

The profile also stores information regarding test Alarms, Test Settings, User Interface Settings and current language. Once the test profile has been configured, it can be used for immediate testing or it can be saved for later use.

Creating a New Test Profile

Saving and Starting New Profiles

- When the program is started, a new test profile is automatically opened. To start a new profile at any time, select "New Profile" from the "File" menu or use the keyboard shortcut Ctrl+N.
- If any changes have been made to the currently opened test profile, you will be asked if you wish to save the changes (see Fig. 5.1).
- Choosing to save the changes will bring up a "Save as" dialog (see Fig. 5.2) if the profile has not been previously saved and named. Choosing to "Cancel" will abort the new profile and will keep the existing profile open.

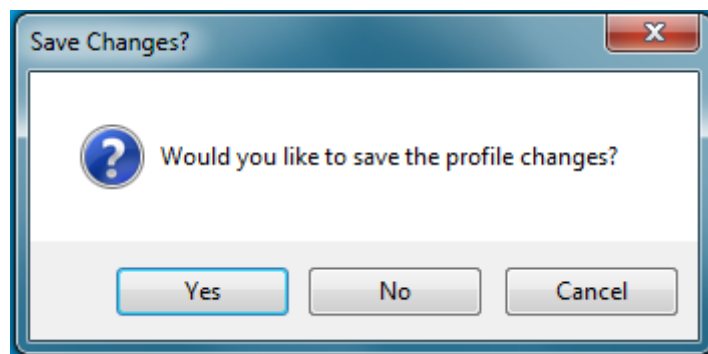


Figure 5.1: This window appears if changes to a previously open test profile were not saved.

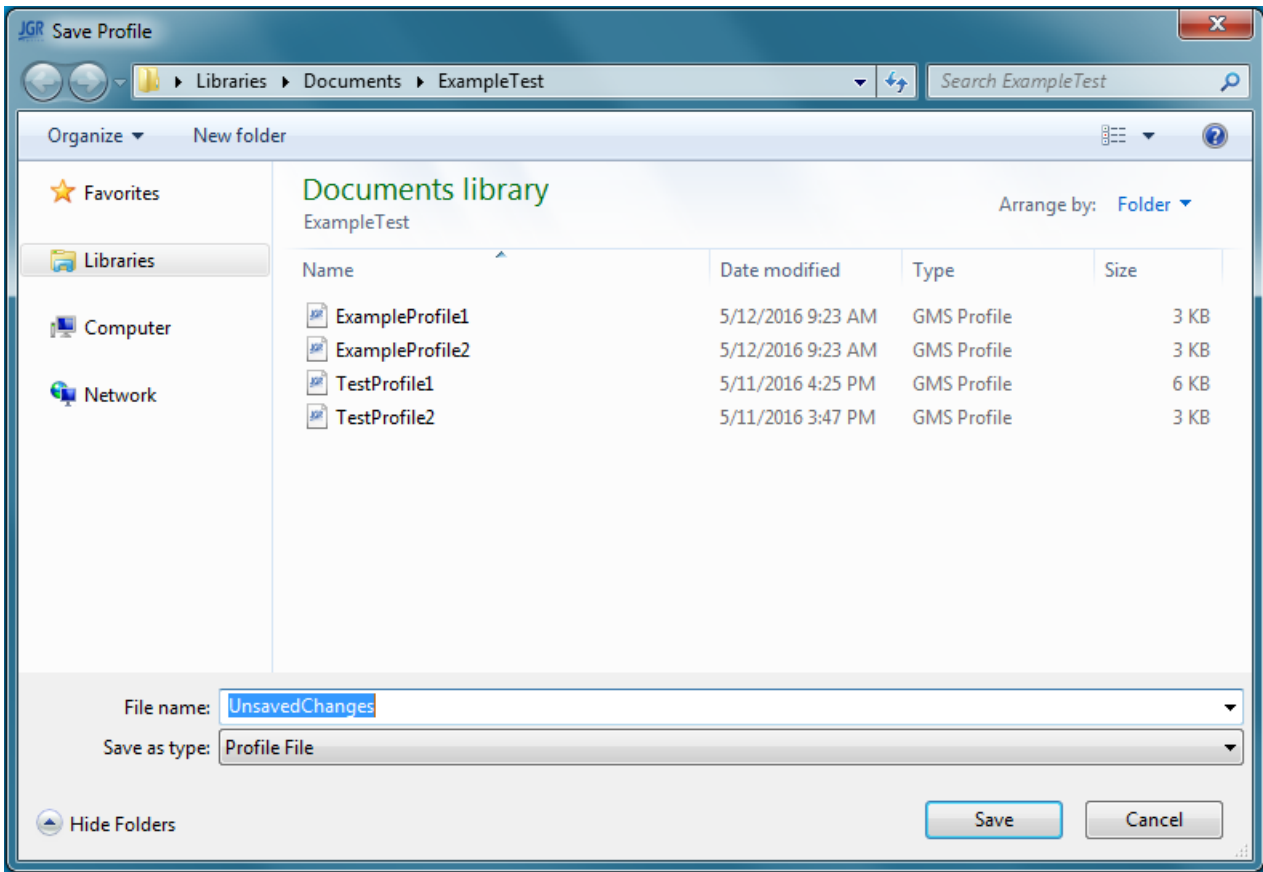


Figure 5.2: Save dialog for a test profile.

Instrument Type:

- Every Test Profile includes at least one test instrument but can include several different instruments (BR5, MBR5, etc.).
- You can switch between the different registered instruments at any time by using the drop-down menu above the Test List.
- You should ensure that the instrument settings are properly configured before beginning any test sequences (see [Configuring Instruments](#) for more information on configuring the instrument settings).

Configuring Header Labels

Using Header Labels:

- The header labels allow you to specify additional information about the instrument or about the test sequence.
- Examples of these fields include “Serial Number”, “Part Number”, “Connector Side”, and “Test Number”.
- Each user-input field consists of a field name, saved as part of the test profile, and the field’s contents, specified by you at some point prior to saving the test results.
- Both the field’s name and its contents are saved with the test results.

Editing Header Labels:

- The Header Labels can be modified by pressing the Format Labels button on the main screen.
- The Description Table Format window (see Fig. 5.3) contains a text box for specifying the number of Header Text Rows, up to a maximum of 9. Enter in the desired value.
- Below this the Row Headers will update to reflect the new number. They can be edited directly by entering the desired header name.
- If the Row Header names are numerical the Auto Increment on Save option can be enabled, which will automatically increment the header by 1 after each save.

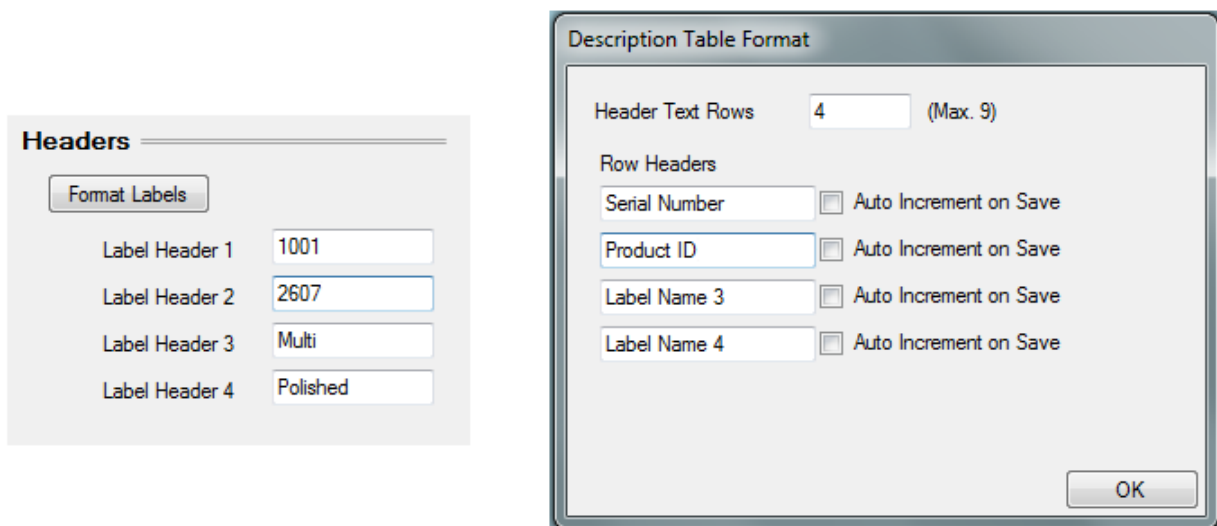


Figure 5.3: The label headers as they appear on the main screen (left) and the Description Table Format window used to edit them (right).

Alarms

Alarms allow you to be immediately notified when a measured value does not fall within specifications. To configure the alarms, click on the Alarm button to bring up the alarm configuration dialog (see Fig. 5.4).

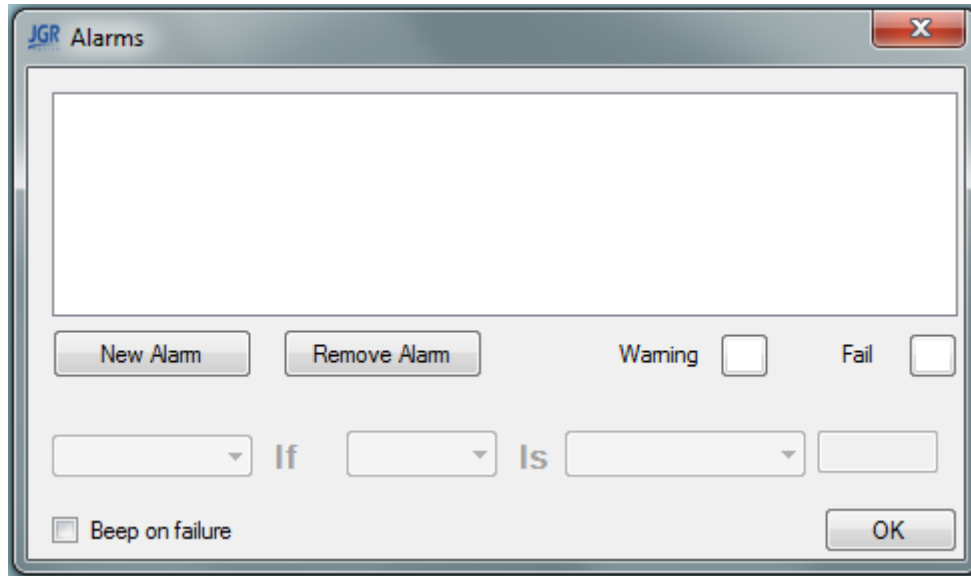


Figure 5.4: The alarms window.

Setting Up and Managing Alarms

Creating and Editing Alarms:

- To add a new alarm to the alarm list, click the New Alarm button. The alarm will be added to the list and selected for editing.
- Once an alarm has been added to the list, its parameters may be defined. You must select a warning type, test type and alarm criteria from the three drop-down lists as well as specify a threshold value using the parameter specification (see Fig. 5.5).
- If a test result triggers both a warning and a failure the failure will take priority when highlighting the result.
- An alarm may be edited by clicking on the alarm in the alarm list. The selected alarm will be highlighted and its parameters will appear in the parameter specification inputs.

Saving and Deleting Alarms:

- To delete an alarm from the alarm list, select the alarm by clicking on it in the list. The alarm should now be highlighted. Once the alarm is selected, it may be deleted by clicking the Remove Alarm button.
- To save changes to the alarm dialog the OK button must be pressed before exiting.
- Changes will not save if any alarm is not of the correct format, i.e. "<alarm #>. <alarm type> if <test type> is <alarm criteria> <threshold value> <\"dB\" or \"dBm\">".

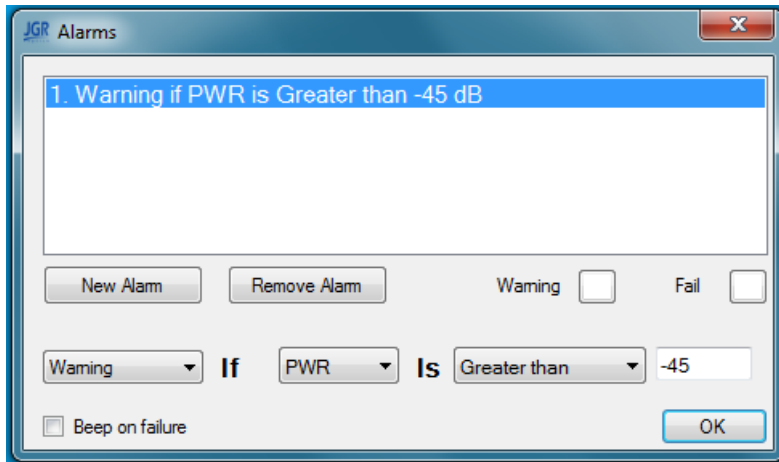
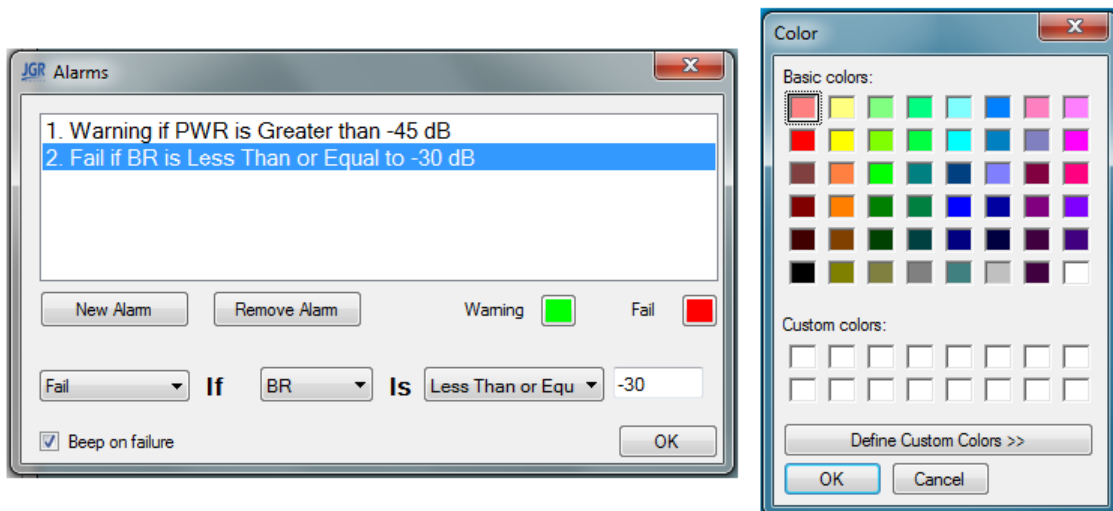


Figure 5.5: Creating a warning to trigger if the power is greater than -45dB.

Further Alarm Customization

- Warnings and failures can be assigned colours so that when they are triggered they are immediately recognizable in the Sequence View.
- This can be set by clicking on the colour squares next to the Warning and Fail labels and choosing from the colour menu window (see Fig. 5.6).
- Failures can be further identified by enabling the Beep on Failure check-box in the bottom left corner of the window.



	Instrument	Wave	Test	Reading:	Pause	Pause Message	Description
▶ 1	1- BR5	1310	IL	10.88	<input type="checkbox"/>		
2	1- BR5	1310	BR	-80.00	<input type="checkbox"/>		
3	1- BR5	1490	IL	11.42	<input type="checkbox"/>		
4	1- BR5	1490	BR	-61.70	<input type="checkbox"/>		
5	1- BR5	1550	IL	11.40	<input type="checkbox"/>		
6	1- BR5	1550	BR	-61.60	<input type="checkbox"/>		
7	1- BR5	1310	PWR	-40.00	<input type="checkbox"/>		
*					<input type="checkbox"/>		

Figure 5.6: The warnings are set to appear as green and the failures as red. The bottom half of the figures shows how they would appear in the Sequence View.

Saving and Loading Test Profiles

Saving a Test Profile

- A new test profile may be saved by selecting “Save Profile as...” from the “File” menu or using the keyboard shortcut Ctrl+S.
- This will open a “Save as” dialog where the profile name and save location may be specified.
- When saving changes to a named profile (previously saved) you may also choose the “Save” option from the “File” menu.
- For named test profiles, the keyboard shortcut for the “Save” option is Ctrl+S. The option “Save Profile as...” is still available to let you save the test profile under a new name but the keyboard shortcut is changed to Ctrl+Shift+S.

Loading a Test Profile

- To load an existing profile, select “Load Profile” from the “File” menu or use the keyboard shortcut Ctrl+O.
- If any changes have been made to the currently opened test profile or there is no currently loaded profile, a dialog will appear asking if you wish to save the profile changes.
- Choosing to save the changes will bring up a “Save as” dialog if the profile has not been previously saved and named. Choosing to “Cancel” will abort the load profile process and will keep the existing profile open.
- This dialog will only appear if you have made changes to the current test profile. If not, the Open File dialog will appear. Find the desired profile and click ‘Open’.

The Test Profile List

The test profile list provides you with a method by which to quickly load commonly used test profiles (see Fig. 5.7).

- When the program is started, the test profile list is loaded. Each profile is checked to ensure it still exists.
- If a profile does not exist or its system location has changed, the profile is automatically removed from the test profile list.
- To add a profile to the list, click the “Add” button in the Main Window.
- An open file dialog will be presented. Use the dialog to navigate to the location of the desired profile and select the profile. Select “Open” to add the profile to the list or “Cancel” to cancel the process.
- To remove a profile from the test profile list, select the profile to be deleted by clicking on it in the list and clicking the “Remove” button.
- To load a profile from the test profile list, double-click on the profile.
- As with loading a test profile via the “Load Profile” option, if any changes have been made to the current profile, you will be asked if he/she wishes to save the changes.

Note that changes to the test profile list are saved when the program is closed regularly. Any changes made will not be saved if the program crashes or is exited by any means other than the “Quit” option under the “File” menu or the close button located at the upper right of the program.

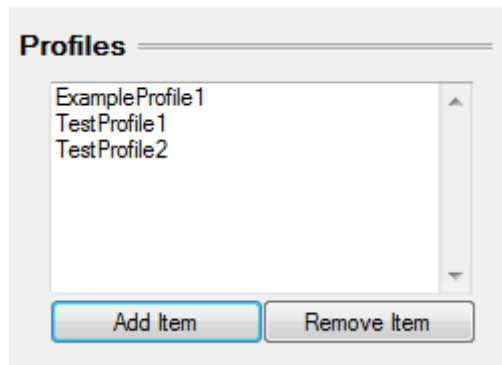


Figure 5.7: The list of test profiles on the main screen.

Configuring, Running and Saving a Test

The Sequence View

The Sequence View is the area on the main screen where the test information is created and stored. The column order seen in the Sequence View can be altered depending on preference (see [Configuring Test Settings](#)). The Reading column contains the measurements taken from the instrument. The Sequence View is saved with the current Test Profile and will be loaded alongside the Test Profile.

Adding/Removing a Test

There are two methods by which to add a test to the sequence, with the Insert button or by editing the last row (see Fig. 6.1). Selecting the row number of a test (highlighting it) and pressing the Delete key will remove the test from the list.

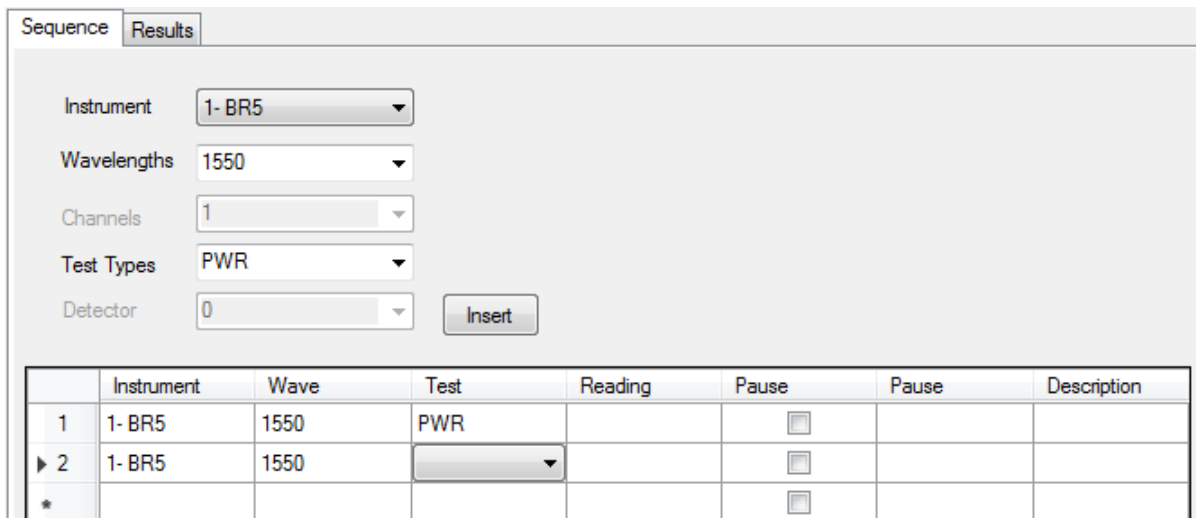


Figure 6.1: Two methods of adding the same test to the sequence, with the Insert button or by editing the last row.

Adding Tests via Insert Button:

By selecting the test parameters in the menus above and pressing the Insert button, the parameters are added to the sequence all at once. The Insert button will be enabled only when a full set of test parameters has been selected.

Adding Tests by Editing the Last Row:

Alternatively test parameters can be selected by clicking in each parameter field of the last row of the sequence. This will add the parameters one by one, and a full set of test parameters must be chosen before running the test.

Adding Multiple Tests at Once

- The Test Parameters method allows you to insert multiple tests into the sequence at once by entering multiple values, separated by commas, into the parameter input boxes (see Fig. 6.2).
- To enter in a range of values, such as for channel or detector parameters, use a "-" symbol in between the start and end of a range of values.

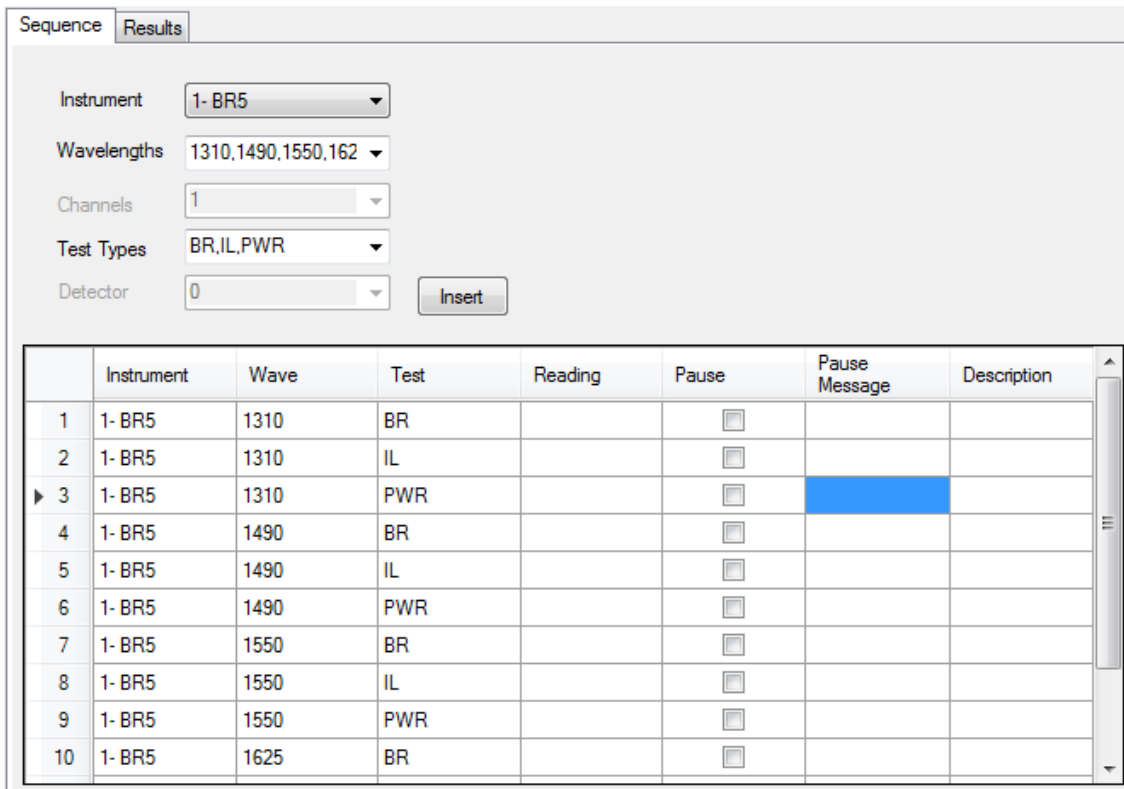


Figure 6.2: 12 tests were created using the parameter list method. Note that all test types selected are added for each selected wavelength in sequential order.

Adding Tests to the Middle of the Sequence

You may insert tests into the middle of the sequence by using the Insert button (Fig. 6.3 and Fig. 6.4).

- To insert a test into the middle of the sequence, you must select the row of the list where the new test is to be inserted.
- You may select the test in the sequence by clicking on row header (containing the row number).
- Clicking on the "Insert" button will cause the new test to be inserted into the sequence *before* the selected test.
- Multiple tests can be selected by either dragging the cursor and highlighting a number of rows or by holding the Ctrl key and selecting rows one by one.
- When multiple tests are selected from the sequence, the new test will be inserted into the list before *each* selected test.

The figure shows two screenshots of the GMS software interface. Both screenshots have tabs for 'Sequence' and 'Results'. The left screenshot shows the configuration for a test at 1625 nm for PWR. The 'Instrument' is set to '1- BR5', 'Wavelengths' to '1625', 'Channels' to '1', and 'Test Types' to 'PWR'. The 'Detector' is set to '0'. Below the configuration is a table with 6 rows. Row 5 is highlighted in blue, indicating the test is being added. The right screenshot shows the same configuration, but the test at 1625 nm for PWR is now added to the sequence at position 5. The table now has 7 rows, with row 5 highlighted in blue.

	Instrument	Wave	Test
1	1- BR5	1310	BR
2	1- BR5	1310	IL
3	1- BR5	1310	PWR
4	1- BR5	1490	BR
▶ 5	1- BR5	1490	IL
6	1- BR5	1490	PWR
*			

	Instrument	Wave	Test
1	1- BR5	1310	BR
2	1- BR5	1310	IL
3	1- BR5	1310	PWR
4	1- BR5	1490	BR
▶ 5	1- BR5	1625	PWR
▶ 6	1- BR5	1490	IL
7	1- BR5	1490	PWR
*			

Figure 6.3: (Left) Before a test at 1625 for PWR was added. (Right) After the test was added.

The figure shows two screenshots of the GMS software interface. Both screenshots have tabs for 'Sequence' and 'Results'. The left screenshot shows the configuration for tests at 1550 nm for BR. The 'Instrument' is set to '1- BR5', 'Wavelengths' to '1550', 'Channels' to '1', and 'Test Types' to 'BR'. The 'Detector' is set to '0'. Below the configuration is a table with 7 rows. Row 7 is highlighted in blue, indicating the test is being added. The right screenshot shows the same configuration, but the tests at 1550 nm for BR are now added to the sequence at positions 2, 3, 4, 6, 7, 8, 9, and 10. The table now has 11 rows, with row 11 highlighted in blue.

	Instrument	Wave	Test
1	1- BR5	1310	BR
2	1- BR5	1310	IL
3	1- BR5	1310	PWR
4	1- BR5	1490	BR
5	1- BR5	1625	PWR
6	1- BR5	1490	IL
▶ 7	1- BR5	1490	PWR
*			

	Instrument	Wave	Test
1	1- BR5	1310	BR
2	1- BR5	1550	BR
3	1- BR5	1310	IL
4	1- BR5	1550	BR
5	1- BR5	1310	PWR
6	1- BR5	1550	BR
7	1- BR5	1490	BR
8	1- BR5	1625	PWR
9	1- BR5	1490	IL
10	1- BR5	1550	BR
▶ 11	1- BR5	1490	PWR
*			

Figure 6.4: (Left) Before tests at 1550 for BR were added. (Right) After the tests were added.

	Instrument	Wave	Test	Reading	Pause	Pause	Description
1	1- BR5	1310	BR		<input checked="" type="checkbox"/>	Hold on	
2	1- BR5	1550	BR		<input type="checkbox"/>		
3	1- BR5	1310	IL		<input checked="" type="checkbox"/>	Wait	
4	1- BR5	1550	BR		<input type="checkbox"/>		
5	1- BR5	1310	PWR		<input checked="" type="checkbox"/>	Break	
6	1- BR5	1550	BR		<input type="checkbox"/>		
7	1- BR5	1490	BR		<input type="checkbox"/>		
8	1- BR5	1625	PWR		<input checked="" type="checkbox"/>	Rest	
9	1- BR5	1490	IL		<input type="checkbox"/>		
10	1- BR5	1550	BR		<input checked="" type="checkbox"/>	Time Out	
11	1- BR5	1490	PWR		<input type="checkbox"/>		
▶*					<input type="checkbox"/>		

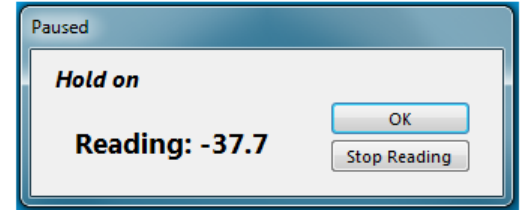


Figure 6.5: A sample sequence with pause messages enabled.

Adding Pauses

- Pauses can be added to a series of tests. Simply check the box under the Pause column where a pause is desired (see Fig. 6.5).
- Pause messages and descriptions can be entered into the respective text boxes to provide additional information.
- A dialog will appear when a pause is reached containing a live reading of the current test type and the pause message.

Running and Saving a Test

Once all the configuration is done it is recommended to save the current test profile.

- If a reference has not been taken, ensure the Acquisition value is set to Reference and not Measurement.
- Pressing the Start button in the top left corner of the main screen will run through all the tests once to reference the instrument. For extended instructions on referencing see [Taking a Reference](#).
- Press the Start button in the top left of the main screen to begin the testing. Use the Pause and Stop buttons during the testing to pause and stop the test if needed.
- Switch to the Results tab to see the results organized in rows. Use the drop-down menu above to switch between the results for each instrument (see Fig. 6.6).
- Use the Save Results button to save an Excel file if the test was not configured to do so automatically.

Sequence		Results							
1- BR5									
Ch#	IL (dB) @1310	IL (dB) @1490	IL (dB) @1550	IL (dB) @1625	BR (dB) @1310	BR (dB) @1490	BR (dB) @1550	BR (dB) @1625	
▶ 1	-5.82	-9.5	-9.89	-10.14	-18.4	-18	-17.7	-17.6	
*									

Figure 6.6: A sample set of test results organized by instrument.

Graphing Data

If performing a long-term test the data measurements can be graphed in real time and analyzed after the test has finished.

Plotting the Data

Creating and Viewing a Plot:

- Begin by setting up a long-term test (see [Configuring Test Settings](#)) and running it. While the test is running press the View Graph button on the main screen.
- If a test is not running a window (Fig. 6.7) should appear. There will be tabs at the top to switch between Insertion Loss, Backreflection, Power, IL Average and Polarization Dependent Loss.
- The y-axis is in units of either dB or dBm depending on the quantity being measured, and the x-axis is expressed as both a date and time.
- If a test is running the corresponding graph tabs will update automatically as data is collected.
- Hold Shift and scroll with the mouse to zoom in and out.
- Hold Ctrl and drag the mouse to move the area of focus.

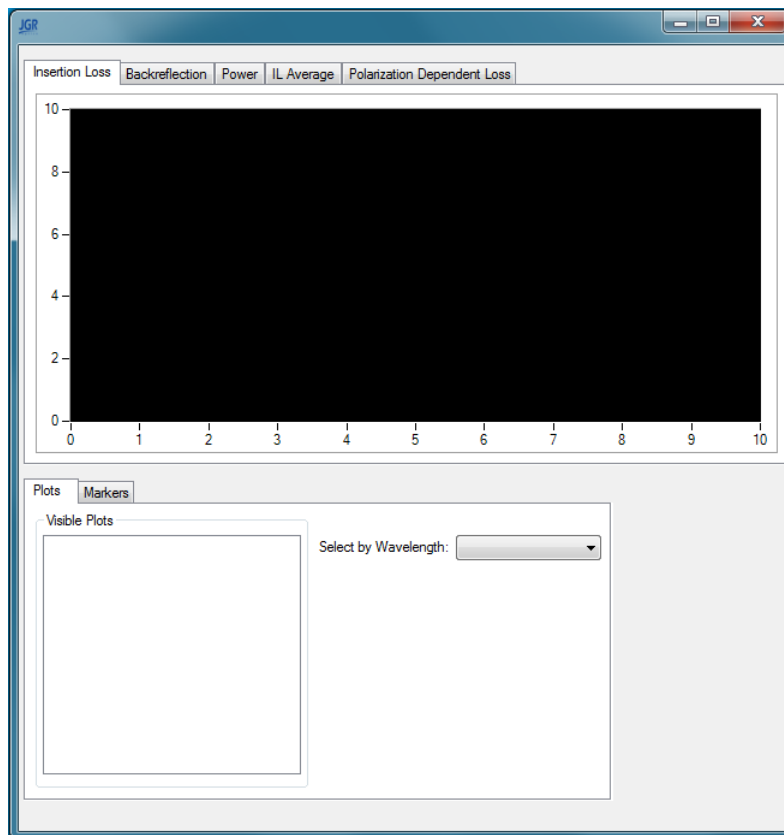


Figure 6.7: The graph screen when no test has been initiated.

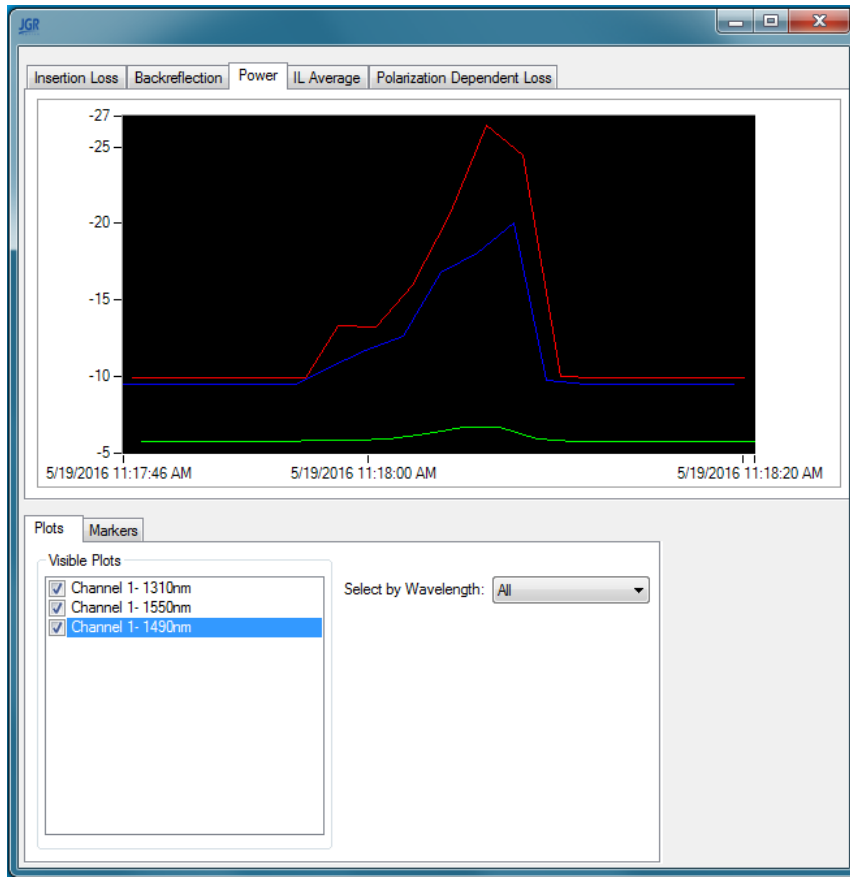


Figure 6.8: A sample plot of power vs time for three wavelengths (Green: 1310, Blue: 1490, Red: 1550).

Filtering Plots:

- Underneath the graph space are two tabs labeled Plots and Markers. On the Plots tab are options for selecting which plots are visible based on values such as wavelength, channel, etc.
- Use the check-boxes to select plots one by one or via the drop-down lists.

Utilizing Markers

Adding and Moving Markers:

- Data markers can be used to identify specific values on the completed graphs.
- Data markers can be added whilst a test is running but it is recommended to wait until a test has concluded before doing so.
- Select the Markers tab in the graphing window to view the marker options (Fig. 6.9).
- Two markers are available for every wavelength value and can be enabled individually by using the Enabled check-boxes under Cursor 1 and Cursor 2.
- The markers will appear on the bottom left corner of the graph area, and can be moved by clicking and dragging either the horizontal bar (vertical movement only), the vertical bar (horizontal movement only) or the center reticle (any movement allowed).
- The right half of each cursor's field are two boxes listing the X and Y positions of the marker's center reticle. Entering a specific value into these boxes will move the reticle to the specified value.

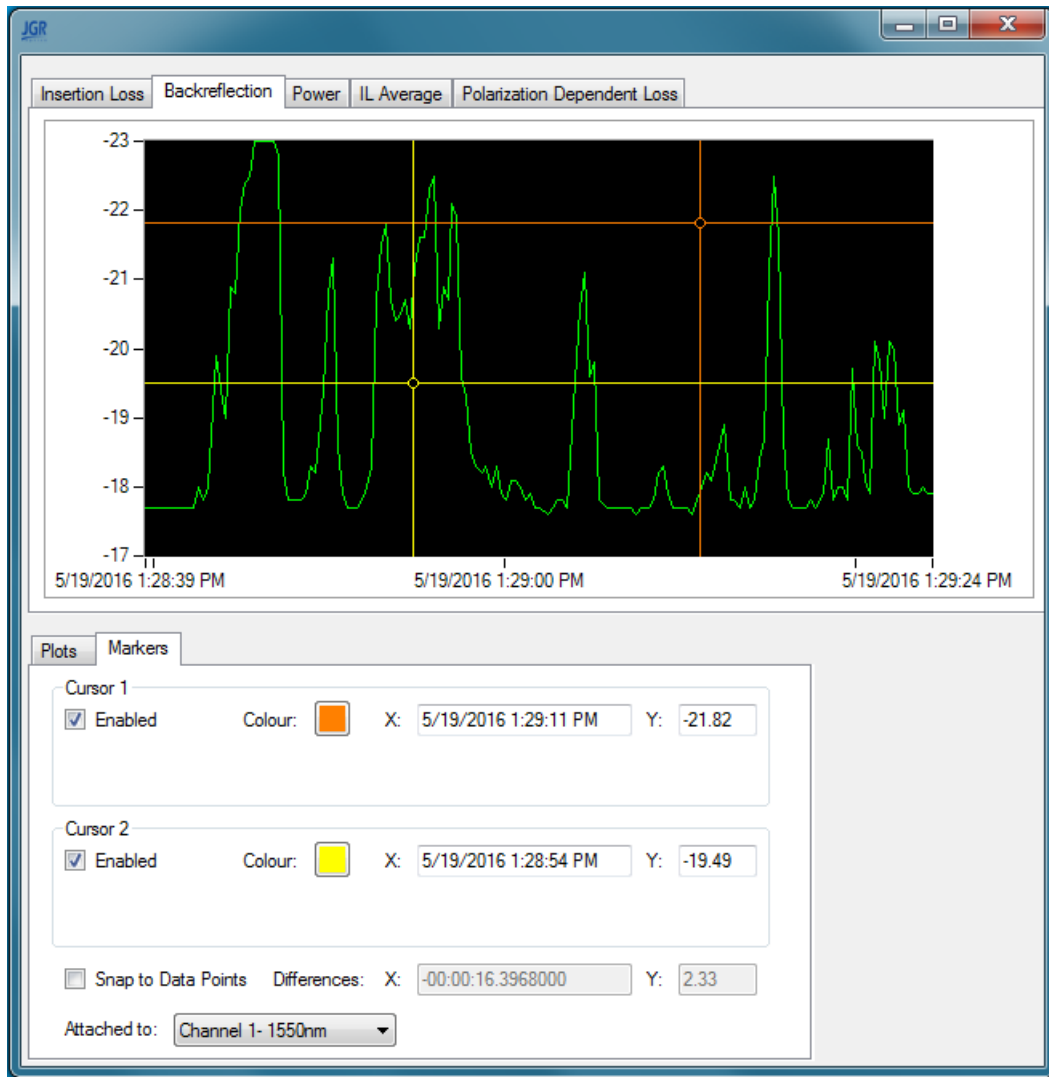


Figure 6.9: A sample Backreflection graph with two data markers enabled.

Additional Marker Options:

- The colour of each marker can be customized by entering the colour menu accessed via the square next to the Colour label.
- Enabling the Snap to Data Points check-box will restrict the movement of the reticle to the data points taken by the instrument as opposed to being able to move freely.
- Use the drop-down list at the bottom of the tab to switch between markers for separate wavelengths.

Taking a Reference

The GMS allows you to take IL references and BR references through the software. To do so, click the Settings menu then select Take Reference. The window in Fig. 7.1 should appear.

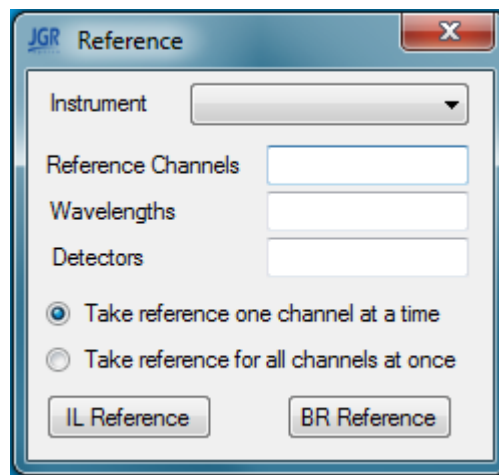


Figure 7.1: The main reference window.

- Begin by selecting the instrument you wish to reference from the drop-down list.
- In the textboxes, enter the channels, wavelengths and detectors you would like to take the reference for.
- If you have all the channels connected to the detector already, select the second radio button: "Take reference for all channels at once". The software will automatically run through the specified channels and take the reference.
- If you would like to connect and take the reference one channel at a time, select the first radio button: "Take reference one channel at a time". The software will prompt you one channel at time through the channels.

Referencing One Channel at a Time

For this example and section 7.2, this manual will only look at IL referencing. The software will function identically for taking a BR reference. Example in Fig. 7.2.

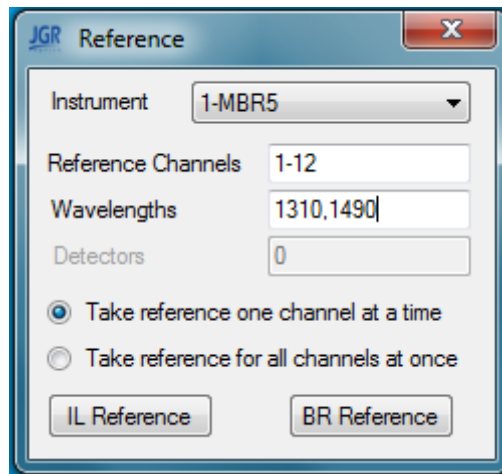


Figure 7.2: Referencing one channel at a time for an MBR5.

Upon clicking the “IL Reference” button, the window in Fig. 7.3 should pop up:

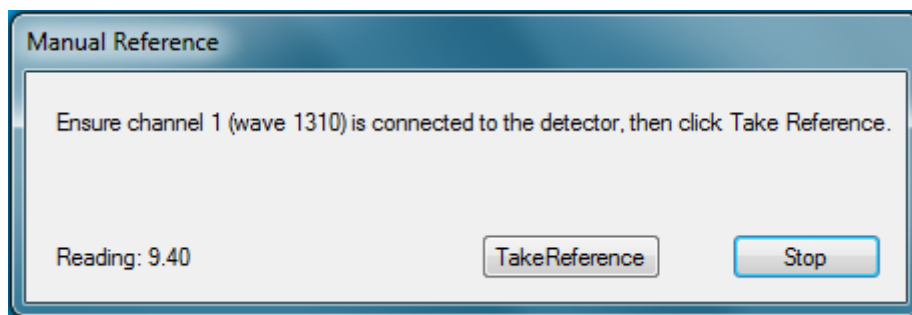


Figure 7.3: The window prompt for the first channel reference.

- The label shows the information about the reference. The software will prompt you through all the channels (in this case, all 1-12) and wavelengths (1310 and 1490).
- The Reading label shows a real time reading that the meter is receiving (if taking IL Reference, the meter will be in Relative Power Mode. If taking BR Reference, the meter will be in Backreflection Mode).
- To take the reference for the specified channel, click Take Reference. The software will proceed to switch to the next channel/wavelength and you can now connect the next channel to the detector, by selecting Take Reference.
- Repeat until all channels have been referenced. To stop taking the reference, click Stop. The previous channels referenced will remain referenced.

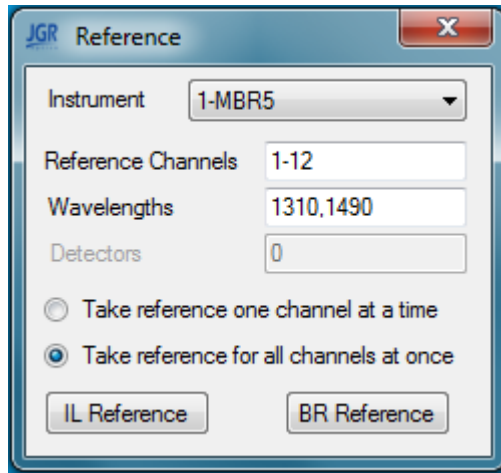


Figure 7.4: Referencing all channels at once for an MBR5.

Referencing All Channels at Once

- If all the channels being referenced are already connected to the detector, then you may choose to have the software take the reference for all channels automatically without having to specify one channel at a time.
- Upon clicking the IL Reference button with Take Reference for all Channels at Once selected, the window in Fig. 7.5 should pop up.

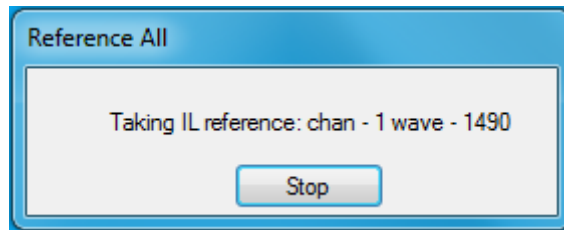


Figure 7.5: The auto-updating window for referencing all channels.

- This window merely shows the process of the software taking the reference. To stop taking the reference, click the "Stop" button (the channels already referenced will still be referenced).