

## SPECTRAL PRODUCTS

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SMB32Pro for  
SMB301  
Ver 2.9

# Table of Contents

Warranty and Liability	1
Quick Start Installation Guide	2
System Requirements	3
<i>Requirements for the Hardware</i>	3
<i>Requirements for the Software</i>	3
<i>Check System Package Contents</i>	3
Introduction	4
Software Installation	4
<i>Before You Start:</i>	4
<i>Software CD Installation:</i>	4
Main Screen:	7
Menu Bar:	7
Command Button Bar:	10
Command Buttons and Dialog Boxes	10
Graph Control Buttons:	18
Information Display Area:	19
Status Display Bar:	19
Quick Access Controls:	20
Graph Sliding Bar Controls:	20

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## Warranty and Liability

This SM product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Spectral Products will, without charge, repair or replace, at its discretion, the defective product or component parts.

For warranty service or repair, this product must be returned to a service facility designated by Spectral Products (SP). For products returned under warranty, the Buyer shall prepay shipping charges (including shipping charges, duties, and taxes for products returned to SP from another country), and SP will pay for shipping charges to return the product to the Buyer.

This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations, modifications or repairs, if the serial number is altered, defaced or removed, the improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, or improper site preparation or maintenance. No other warranty is expressed or implied. SP shall not be liable for any consequential damages, including without limitation, damages resulting from loss of use, as permitted by law.

## Quick Start Installation Guide

This quick start guide will instruct you through the installation of the SM32Pro software package. Please follow the instructions closely to complete the installation. Before beginning, read through this entire guide.

1. Insert the SM installation CD into the appropriate CD-Rom drive. (The installation should begin automatically. If not, open the cd through windows explorer and click on the “**setup.exe**” file to begin the installation manually.)
  - In USB applications, it is recommended to leave the unit disconnected from the computer until the software has been installed and the system has been rebooted.
2. The first screen displayed requires you to input the user name, company name, and serial number. The full serial number is found on the unit or on the calibration certificate included in the data package provided by SP.
3. Accept all the defaults of the next three screens by simply pressing next through each.
  - After these steps are completed, the installer will begin copying the files into the designated folders on the system.
4. The installation is now complete. Click finish and manually restart the computer to finish installation of the software.

# System Requirements

Check that your computer meets the minimum requirements for the SM32Pro system.

## *Requirements for the Hardware*

Ø One free slot or port of appropriate type to insert board or connection to the spectrometer

## *Requirements for the Software*

- Ø Any IBM compatible computer with a 486 processor or higher (Pentium 100 or higher is strongly recommended)
- Ø A hard drive with at least 50 MB free space
- Ø A 3 ½ inch high density floppy drive (1.44 MB)
- Ø A CD-ROM
- Ø A VGA or compatible display
- Ø 16 MB RAM (32 MB recommended)
- Ø A mouse or other pointing device
- Ø Microsoft Windows® 98, 98SE, ME, NT, 2000, or XP

## *Check System Package Contents*

Check that your SM system package contains all of the required components.

### **Common system packages contain the following:**

- Spectrometer
- Power supply
- Any accessories ordered

***\*Note: Package contents may vary from unit to unit and order to order. If you have any questions about the contents of your package, please contact the support team referred to in the back of this manual.***

## Introduction

SM32Pro for SM301 is a Windows based operating software program designed for use with SP SM301 and SM301-EX spectrometers. SM32Pro is a true 32-bit application and optimized for SM spectrometer operation control, data acquisition, data manipulation, graphic display, and other features. This user manual will cover the software installation and the various function controls and features.

The SM32PRO.INI file, which is provided together with the SM32Pro, contains instrument specific model information as well as wavelength calibration information. Substitution of the file by inappropriate format may result in a failure in operation. Please contact Tech Support if such a file is in question.

## Software Installation

### *Before You Start:*

It is recommended that the user review the SM spectrometer hardware user manual first to get familiar with the hardware involved. All customers are advised to pay extra attention to the voltage and other electrical ratings associated with the SM spectrometer products to avoid any unnecessary equipment damage.

The following section will describe the SM32Pro software installation procedures. It is recommended that the operating software be installed prior to the hardware installation.

### *Software CD Installation:*

1. Insert the SM32Pro installation CD into the computer CD ROM.
2. When prompted, enter your name, your company name, and the instrument serial number as written on the SM spectrometer. The serial number has to end with “-EU”.

**Customer Information**  
Please enter your information.

Please enter your name, the name of the company for which you work and the product serial number.

User Name:

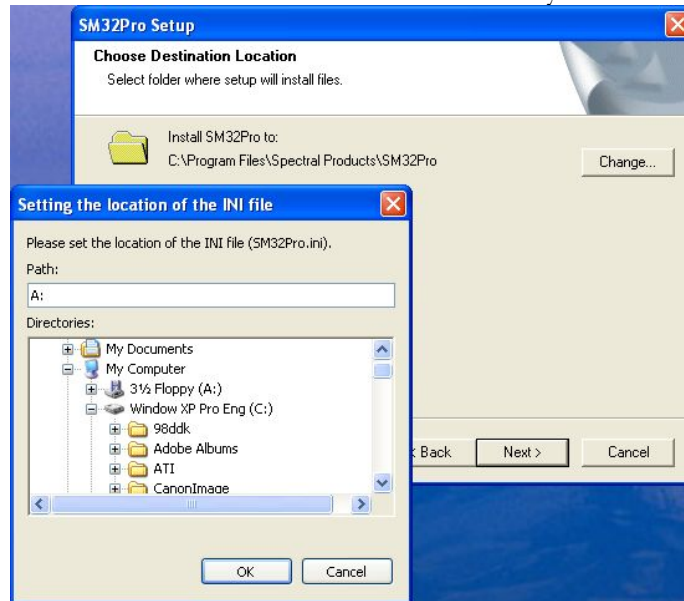
Company Name:

Serial Number:

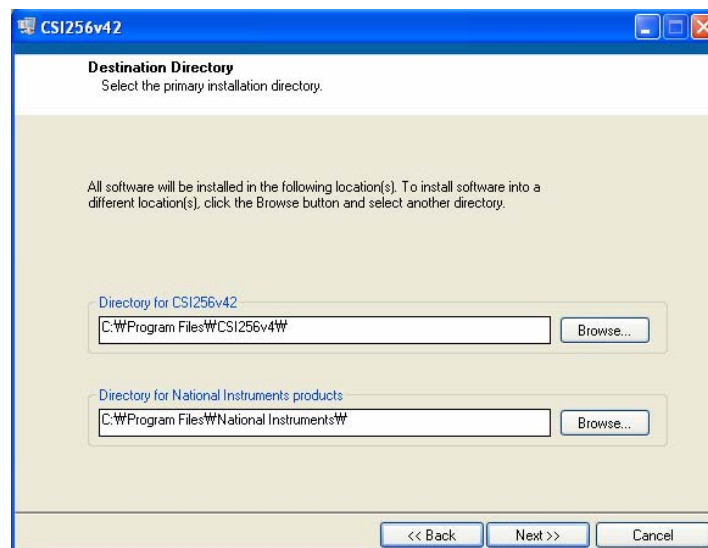
InstallShield

< Back    Next >    Cancel

3. Choose the destination location to install the program. When clicking the Next button after setting the destination directory, a window will pop up for setting the location of the INI file (SM32Pro.ini) of the unit. Sometimes the ini file could be included in the installation CD and this step will be skipped. SP provides the INI file included in a floppy diskette (A:\, generally). If you have kept the provided INI file on a directory in the local hard disc drive and would like to use this INI file when installing the software, then please set the folder which contains the “SM32Pro.ini” file correctly.



4. At the end of the installation, the Cal Sensors’ software and hardware driver installation will begin automatically. If the setup program isn’t launched automatically, please browse the installation CD and run \Calsensors Software\CSI256 Application Setup\setup.exe
5. Follow each installation step and



6. *If the setup program for SM32Pro wasn't launched automatically*, you can launch it by running the "Setup.exe" from the appropriate device driver folder on the SM installation CD. (See quick setup installation guide, the 1<sup>st</sup> step)
7. Some PC or Windows may ask you to reboot the computer after the installation. In this case, rebooting is strongly recommended.
8. After the software installation is finished, power up the spectrometer, plug the USB cable into your computer and follow Windows hardware installation wizard to finish the hardware driver installation. The installation CD may need to be in the CD-Rom for some computers (especially AMD CPU computers).
9. If no problem happened during the hardware installation, you can run the SM32Pro.

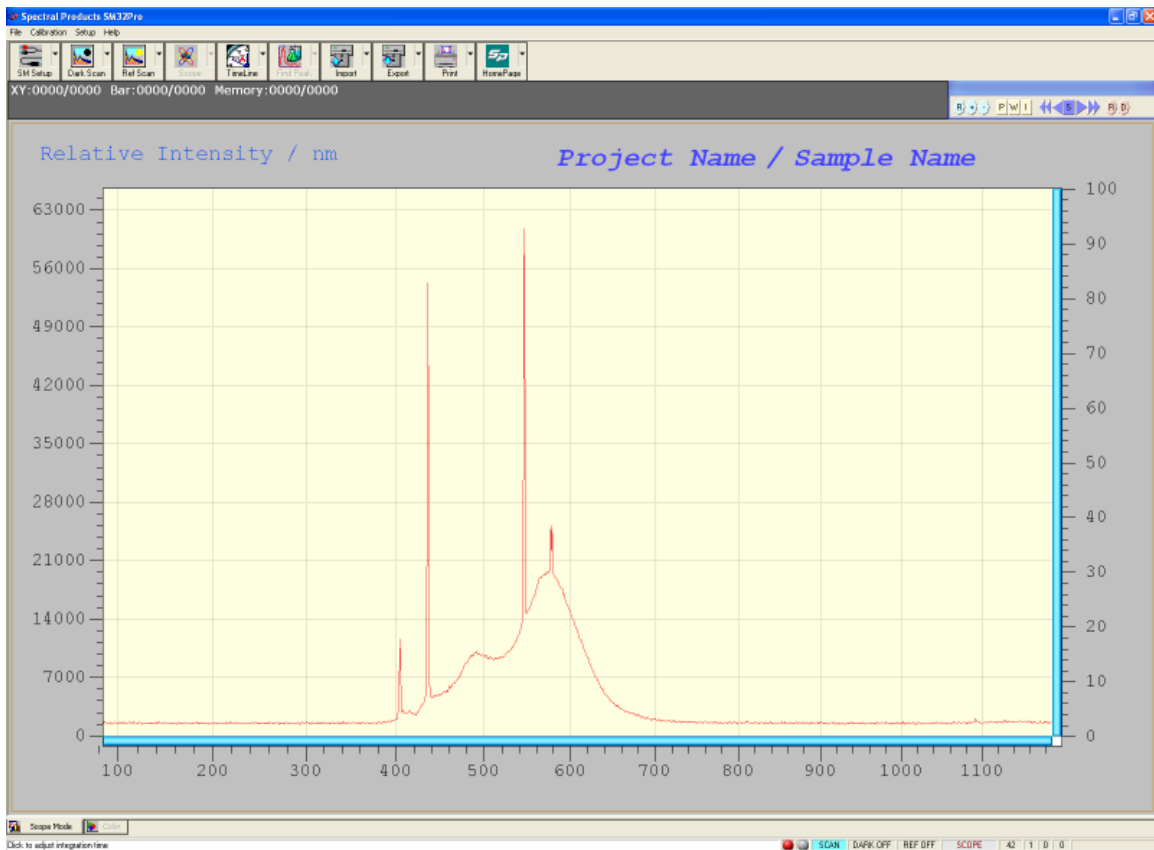


# Getting to Know SM32Pro

## Main Screen:

The main screen consists of a menu bar, command buttons bar, cursor value and timeline recording display area, graph control buttons bar, project and sample information area, status display area, quick access controls, and a graphic display area.

The graphic display chart consists of two Y scales as well as an X-axis. The Y-axis on the left displays a relative intensity scale in A/D counts in Scope mode while the right Y-axis is defaulted to percentage. The maximum counts shown on the left Y-axis for a 12-bit spectrometer is 4096 (PCI version) or for a 16-bit spectrometer is 65536 (USB version). When in Scope mode, the X-axis display is in pixel number or in wavelength number. The maximum pixel number is, for example 0 to 2048 for SM240, or it will display the desired wavelength range.



## Menu Bar:

### CALIBRATION - WAVELENGTH:

Custom wavelength calibration is supported by use of the Calibration tool in Calibration->Wavelength. This menu is activated only under the “pixel” mode.

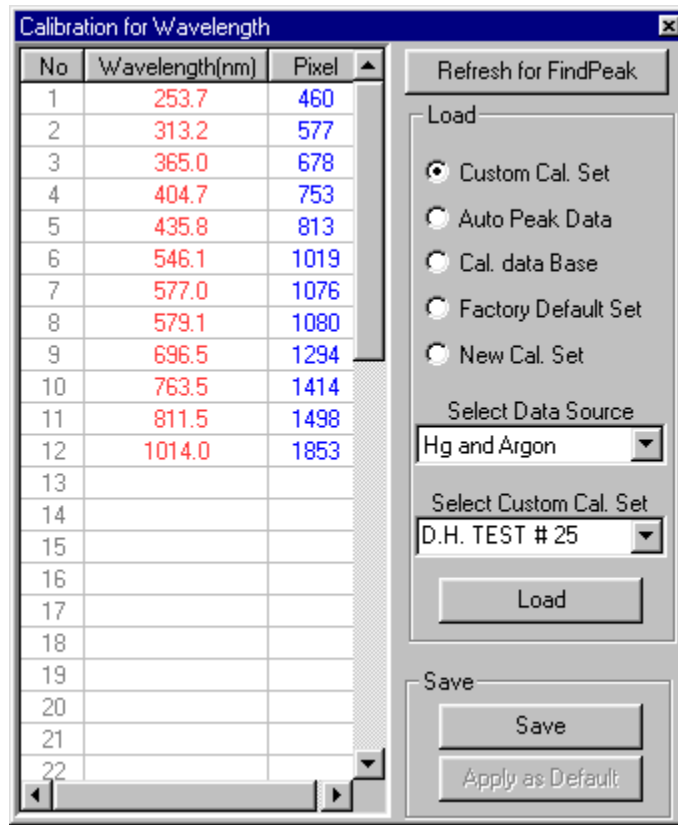
**NOTE:** Only the advanced users who have a calibration light source are recommended using this menu.

## CALIBRATION DIALOG BOX:

Custom wavelength calibration is achieved via the use of the Calibration dialog box. The dialog box consists of a text-editing table for wavelength and pixel value entries, and five different options for loading existing as well as future calibration sets or templates. In calibration mode, all other spectrometer control functions are still supported in the background.

### Refresh for Find Peak:

This command button allows the peak finder to update. This is useful when different calibration reference sources are involved in the procedure.



Load options:

### Custom Cal Set:

The wavelength calibration set that the SM32Pro utilizes for conversions between different X-axis units is labeled as Custom Cal Set. When the Custom Cal Set check box is selected, the display window lists the known wavelength values and corresponding pixel numbers in a tabular format.

Use the Select Custom Cal Set drop down list to highlight the desired wavelength calibration set and then click **Load** to bring the values into the table for adding or subtracting any custom pixel to wavelength reference lines.

**Auto Peak Data:**

Upon entering the Calibration mode, Peak Finder is automatically started. To use these peak values to generate a new calibration set, select the Auto Peak Data option and click on **Load**. The pixel values that correspond to the found peaks will be copied into the Pixel column for further editing.

The matching known wavelength values can be manually typed into the corresponding cell in the Wavelength column, or click on the Wavelength cell and use the drop down list to select wavelengths from the built-in wavelength database which is comprised of known lines for an HgAr lamp.

**Cal Data Base:**

This option allows the known wavelength database to be brought into the Wavelength column. Choose a desired wavelength from the Select Data Source drop down list and click on **Load** for the data to be imported.

**Factory Default Set:**

This option allows the import of the factory created calibration set into the calibration-editing table. Click on **Load** to make the imported data effective.

**New Cal Set:**

Selecting this option and then clicking **Load** clears the calibration editing table for use to create a new custom calibration set. Wavelengths can be either typed in manually or selected by use of the drop down list as described earlier.

After the creation of the new calibration set type in the desired name into the Select Custom Cal Set field and click on "Save" for the changes to be made. Click on **Apply as Default** to use this particular calibration set as a default.

**CALIBRATION - IRRADIANCE:**

Custom irradiance calibration is supported by use of the Calibration tool in Calibration->Irradiance. This menu is activated only under the "pixel" mode and after taking the dark scan.

**NOTE:** SP facilitates the irradiance calibration of the unit. Please contact SP to do the irradiance calibration.

**SETUP - CUSTOMIZE:**

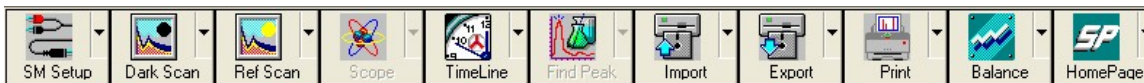
By using the Customize option in the Setup menu, one can customize the print report.

**CUSTOMIZE DIALOG BOX:**

The Organization name, Operator name and Sample name can be custom changed to be included on the print report.

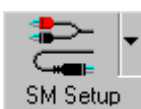
## Command Button Bar:

Most of the system operating functions can be realized by use of the command buttons. The command buttons are arranged as general control buttons with embedded pull down dialog boxes, which are opened by clicking on the little arrow on the right side of the button.



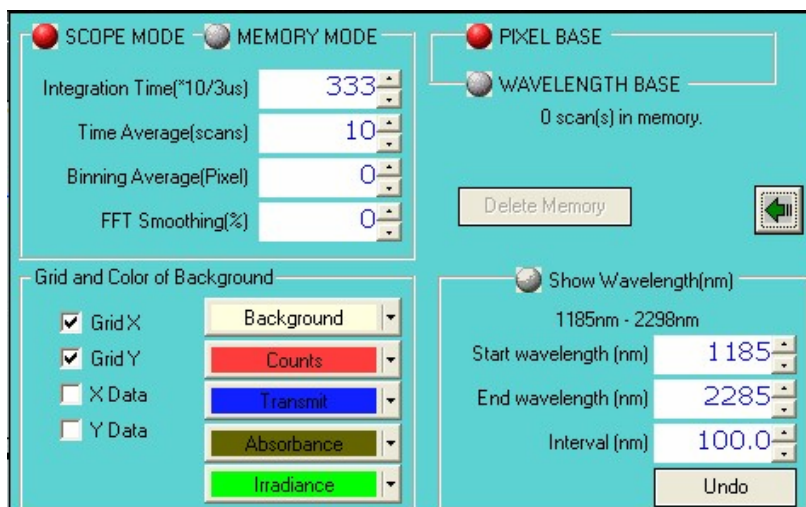
## Command Buttons and Dialog Boxes

**\*NOTE:** After working with any dialog boxes described in this or later sections, simply click outside of the dialog box for changes to be effective and to exit.



The SM Setup function allows you to change operating parameters for the spectrometers. Clicking the top right arrow can activate the pull down dialog boxes.

### SM SETUP DIALOG BOX:



**SCOPE MODE** is the default-operating mode, which enables the live updating of the measurements.

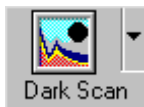
**MEMORY MODE** will be entered automatically when a play back operation is performed. The play back of recorded spectra can be achieved by using the **Import** command button. To exit the repeating play back of recorded spectra, the user needs to use this dialog box to change from **RECORD MODE** back to **SCOPE MODE**.

The **Integration Time** is to set the exposure time of the detector. The **Time Average** is to average the given number of scans. It helps to reduce the noise level. The **Binning Average** is also used to reduce the noise by averaging the given number of neighbor pixels' values so it also can cause some deformation of the real signal. The **FFT Smoothing** is to reduce the noise in the translated frequency domain and also can help to reduce the noise level.

When the **Pixel Base** display mode is selected, the wavelength display in X-axis will be supported in Scope Mode (*see also Graph Display Control Buttons* below) by clicking the “W” button on the Graph Display Control at the upper right corner of the main window. The **Pixel Base** displays the wavelengths on the X-axis according to the detector pixels corresponded in appropriate modes. The wavelength increment is the actual wavelength difference between two adjacent detector pixels.

When **Wavelength Base** is enabled, the customized wavelength range can be set up in the extended dialog box (by clicking the green arrow button). The **Show Wavelength(nm)** can be enabled in this base. The **start** wavelength, the **end** wavelength and the wavelength **interval** can be set up after activating the **Show Wavelength(nm)**. Those values have to be located within the real full wavelength range shown right under the **Show Wavelength(nm)** button.

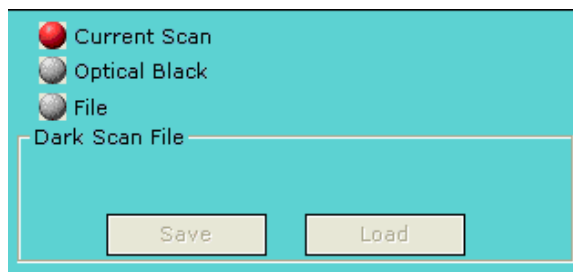
In the Grid and Color of Background pane, the color of each line and the graphic window background can be selected. The **Grid X** and/or the **Grid Y** are/is to present the scales on the coordinates. If the **X Data** and/or the **Y Data** are/is activated, the X and/or Y values will be displayed according to the mouse pointer position on the graphic window.



The Dark Scan function allows you to perform a dark scan.

*\*NOTE:* It is recommended that you take a dark scan after the spectrometer integration time is changed. To conduct a dark scan, first block all light from entering the spectrometer. Refer to hardware manual for more information.

#### **DARK SCAN DIALOG BOX:**

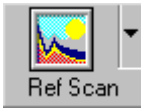


*\*NOTE:* **The dark scan is required for %T/R, absorbance, and irradiance measurements. Reference dark materials are essential for accurate measurement results to be obtained in different measurement modes and wavelength regions.**

**Current Scan:** The current scan option is provided to take a dark scan from the current data that is being collected. This dark data can be saved for future dark scanning purposes.

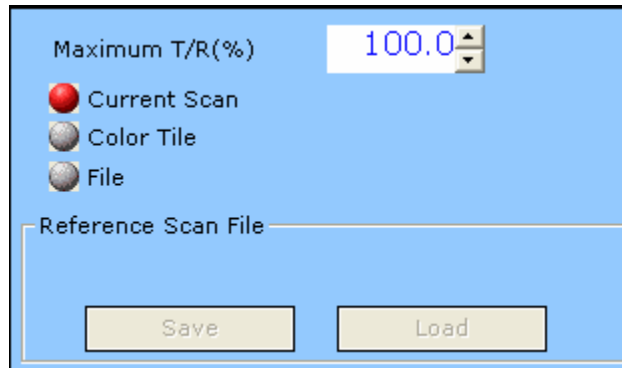
**Optical Blank:** The optical blank option allows you to use the power emissions from the 32 pixels not used in the collection of data, which only emit dark signal.

**File:** The file option allows you to load the previously saved dark data or save the current dark data.



This allows a reference scan to be taken, which is used in T/R% or absorbance measurement for normalization. The pull down dialog box supports several reference scan data sources, from current reference scan, or from a previously saved reference scan data file.

### REFERENCE SCAN DIALOG BOX:



**Maximum T/R (%):** When you wish to use the current reference scan as a custom T/R rather than the default setting of 100%, you can change this value between 0% and 100%.

**Current Scan:** The current scan option is provided to take a reference scan from the current data that is being collected. This reference data can be saved for future dark scanning purposes.

**Color Time:** If you chose the **Color Tile** option, the color tile options for **Set Calibration** and **Load Color Tile** will appear in this dialog box. To use the color tile reference scan, you first have to set the calibration of the specific color tile you wish to use as your reference. Once that is done, the text on the **Reference** button will read **Save Tile**, you will click on this to save the tile calibration as the name you have inputted into the box titled **Project Name**. When you wish to use the calibrated tile as a reference you will choose the calibration for the color tile you wish to use then click on the **Load Color Tile** option. It is now ready to be used. This function is used as a substitute for a white reference scan.

**File:** The file option allows you to load the previously saved reference data or save the current reference data.

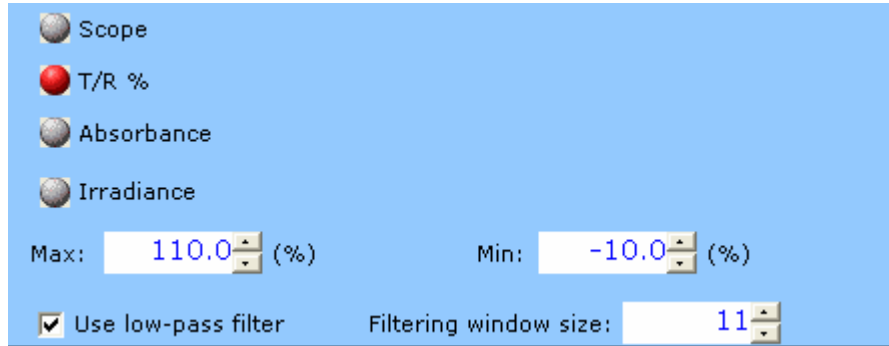
**\*NOTE:** *The reference scan is required for %T/R and absorbance measurements. Reference materials are essential for accurate measurement results to be obtained in different measurement modes and wavelength regions.*



mode, T/R%, absorbance

This indicates the current measurement/display being displayed. The button is enabled only after the dark and reference scans are taken. Click on the button when it is enabled to change between regular scope and irradiance modes.

### DISPLAY DIALOG BOX:



The “**Scope**” mode shows the signals read by each CCD pixel in 16-bit scale.

The “**T/R %**” mode shows the transmittance or reflectance of samples based on the “dark scan” which represents 0% T or R and the “reference scan” which represents 100% T or R.

The “**Absorbance**” mode shows the absorption converted from the transmittance, where  $A = 1/\log(1/T)$ .

The “**Irradiance**” will not appear if the unit wasn’t calibrated at SP and/or doesn’t have a proper calibration data file. If “**Irradiance**” is chosen, the irradiance options for absolute or relative measurements and the distance will appear to the right of the selections. There are two kinds of irradiance measurements. The **Absolute Irradiance** needs to be calibrated by using a calibrated light source which should be done at SP. **Distance**, is the distance from the light source to the unit, and **Relative Irradiance** needs the calibrations spectrum of the light source, and the color temperature of the light source.

The **Max/Min** setting is for scaling the y-axis in each mode.

For more detailed information about how to use the absolute irradiance in this software, please refer to the additional manual provided along with this main manual.

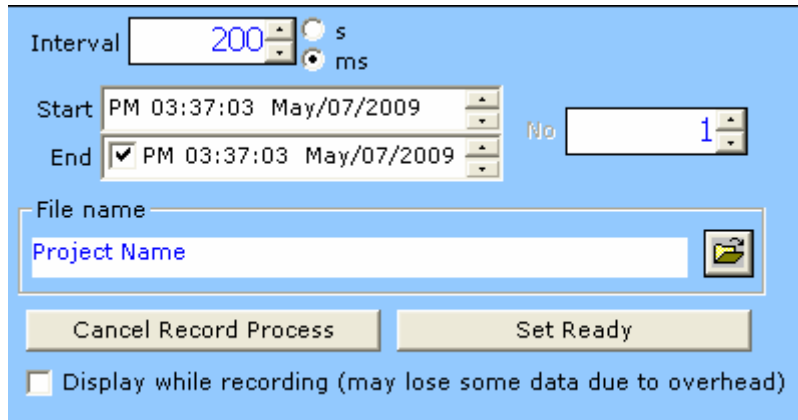
The “**Use low-pass filter**” is for smoothing data and the “**Filtering window size**” is for the total pixel number for applying the low-pass filter. Each pixel’s value will be replaced by the average of the neighbor pixels’ given by this window size in the low-pass filter.



This allows for configurations for automatic sequential spectrum recording at specified time intervals and to specified data files. The pull down dialog box allows for the entry of starting time, ending time, and recording time interval in milliseconds (ms) or seconds (s).

You can choose the duration you want to collect the data by using the time duration function, or by choosing the actual amount of scans you wish to acquire.

## TIMELINE DIALOG BOX:



The **Timeline** button will become **Ready** after all timeline recording parameters are set. Click on the “**Set Ready**” button to start the timed recording process to record spectra within the set duration as shown in the timeline dialog box. The “Cancel Record Process” will cancel the process.

After the start of the Timeline recording the **Ready** button will now be the **Stop** button. Click on the button during recording process to terminate the recording.

The “**interval**” is for the interval between each spectrum. It has to be larger than the integration time. Considering the overhead time for data process which varies depending on the computer performance like CPU/memory speed it needs to be large enough to obtain each spectrum at the same time interval.

The “**Start**” and the “**End**” time setting is for setting the recording period. Instead of giving the end time, you can give the total number of the spectra to be recorded by un-checking the “**End**” time and set the desired “**No**” (number) setting.

If you select the “**Display while recording**”, the spectrum will be displayed while recording. The overhead time for displaying spectrum data is usually much larger than the data transferring time from CCD to computer memory. So you have to set the “**interval**” time long enough (like >200msec) not to lose any spectrum and get the periodic spectra.

**\*NOTE:** The progress of the recording process is updated in the data display area just above the graph display area if the “**Display while recording**” is not selected.

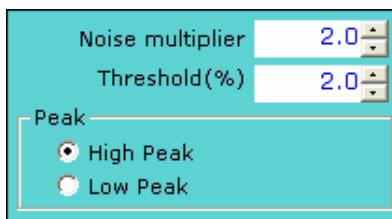


This allows for the spectral peaks and peak values to be found and displayed. After the peaks are identified, cross hair cursors will appear as you mouse over the peaks. The peak values will be displayed in the **Peak Data** display window.

There are two user configurable parameters in the Find Peak pull down dialog box, which are used by the auto peak finder for peak search. The Peak/Noise Ratio is a value between 0.0 and 10.0 at an increment of 0.1. The higher the ratio the less sensitive the peak finder will be. The Threshold (%) can be set between 0.0 and 100.0.



## FIND PEAK DIALOG BOX:

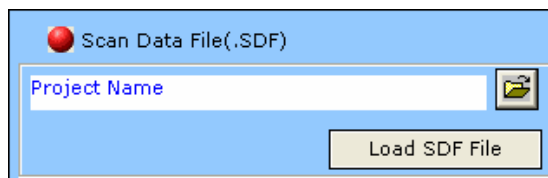


In addition to the peak find, a cursor bar tool is provided. Right click anywhere in the graphics display area and a cross cursor bar will appear with the cross point intercepted by the spectral curve. The cross point values will be displayed in the middle of the display area.

To change the cursor bar position simply place the mouse pointer to the vertical cursor until the pointer changes, which indicates that the cursor bar is now selected to be moved. Left click the mouse button and drag the cursor to where you desire it. You can also move the cursor bar by pressing the left or right arrow keys on the keyboard. Right click in the graphic display area to exit the cursor bar tool.

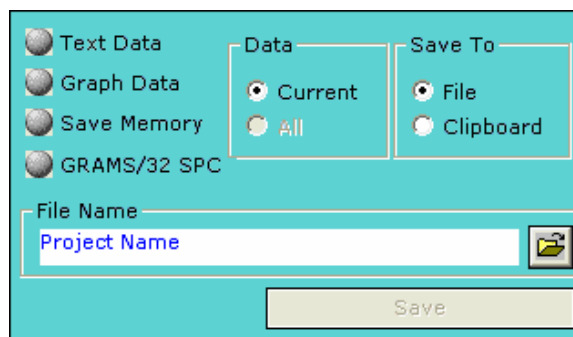


Allows for import of previously saved data to be displayed or processed in the current application. This uses a simple dialog box comprised of 2 sections, the **file box**, and the **load** button.



Allows export of spectral data to another program via OLE, to an excel file, binary data file, or to a text data file in an ASCII format. The pull down dialog box allows different file formats to be selected.

## EXPORT DIALOG BOX:



**Text Data:** When this option is chosen, use the File control button to bring up the file name dialog box for the entry of file name. The text data files will have the **.txt** extension. The data values in the file are separated by a space between any pair of data. Data pairs are separated by carriage returns. When the data is exported to an ASCII file, it is set up in a 3 column, tabular format for Pixel, Wavelength, and Intensity.

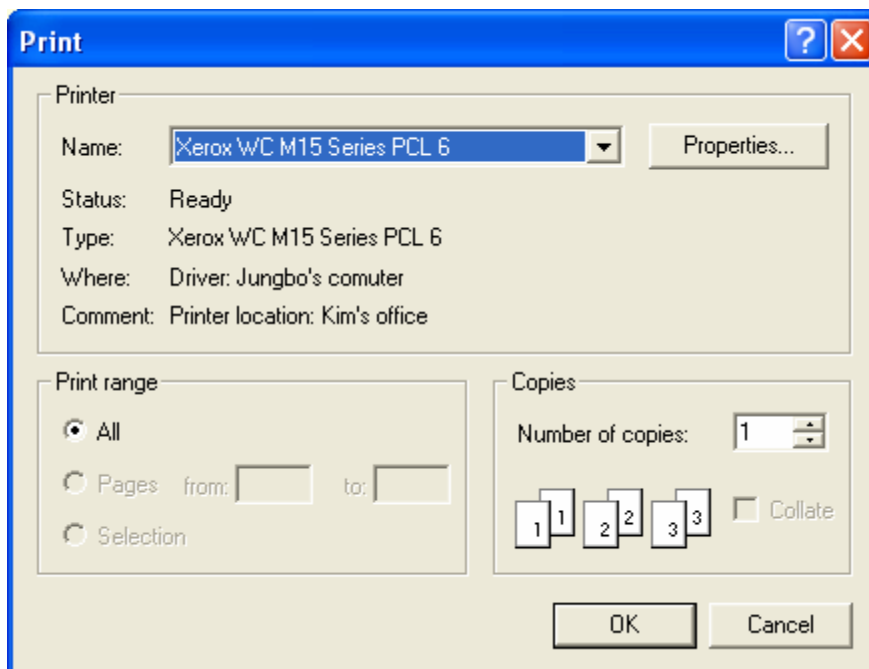
**Graph Data:** When this option is chosen, use the File control button to bring up the file name dialog box for the entry of file name. The graph data files will be saved in BMP format with the **.bmp** extension.

**Save Memory:** This option is available only when you save the scanned data using the “**R**” button for recoding on the “**Graph Control**” dialog located at the upper right corner of the main window. Please refer to the Graph Control Buttons section below. When this option is chosen, use the File control button to bring up the file name dialog box for the entry of the file name. The file name will be assigned an extension of **.sdf** for the binary data file format. And it can be reloaded by the “**Import**”.

**GRAMS/32 SPC:** When this option is chosen, use the File control button to bring up the file name dialog box for the entry of file name. The data will be saved in GRAMS/32 SPC file format with the **.spc** extension.



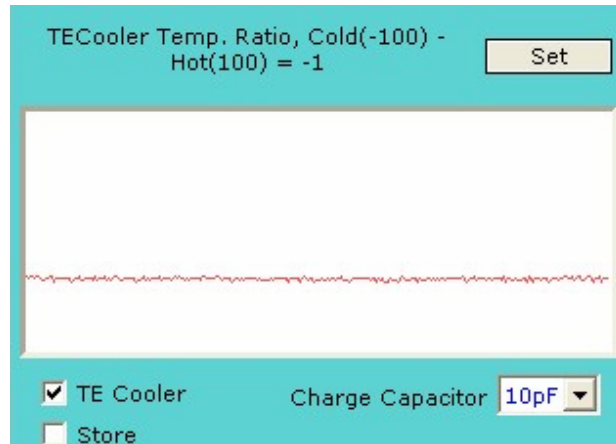
Allows for printing of the active spectrum. More specific data such as sample source, slit, name, and project name are included in the printout, as well as the peak values for the graph that was printed. These items can be set in the customize option in the program.





The detector should be balanced at least once before measuring the sample. It is also required to be done whenever the integration time has been changed. Balancing the detector is used for setting a stable base line. The input light should be turned off before using this. The pull down dialog box allows setting the TE Cooler On/Off option and the Charge of the Capacitor.

### EXPORT DIALOG BOX:



The TE Cooler can be turned on or off with selecting the **TE Cooler**. The capacitor charge value for balancing the detector can be set by choosing the value from the **Charge Capacitor** combo box. 1pF, 4pF, 7pF, 10pF, 11pF, 14pF, 17pF and 20pF are available (Old boards purchased before Oct. 2007 allow only up to 10pF). For noise purposes it would be desirable to make the sample capacitor larger, but that might result in an unacceptable loss of signal during the charge sharing. The default value is 10pF (4pF for old board) and is recommended for use. The **Store** button is for saving the setting values on the EEPROM of the electronic board.

After checking the options, wait until the TE cooler temperature ratio becomes 0 and then click the **Set** button to start balancing the detector. After the balance, the result signal level curve shown in the graphic panel in this pop-up window has to be close to FLAT. If there's some strange/large peak or valley in the result curve, this means that at some pixels the dark level conditions were over their tolerances. In this case, you have to redo the balance after changing the "charge capacitor" value and/or integration time until you get the result curve close to FALT.

**\*NOTE:** *Before measuring the real sample, this Balancing has to be executed at least once. The spectrum signal without the balancing is not the real signals. Also whenever the integration time changes, it has to be executed to balance the dark condition at each detector pixel again.*

## Graph Control Buttons:

The Graph Control Bar is a convenient utility that puts all of your necessary graph controls at your fingertips.



### ZOOMING CONTROLS:



The Zoom control buttons provide zoom Reset (**R**), stepped Zoom In (+), and stepped Zoom Out (-) controls. Flexible Zoom In can also be achieved by left clicking and holding the mouse button and dragging to draw a Zoom In view window inside the graphic display area around the interested portion. Clicking the R button does a Complete Zoom Out. After a graph is zoomed in, two sliding bars will appear for vertical and horizontal scroll control use. Move the mouse pointer to any of the sliding bars until the pointer changes to a double arrow. Click and hold down the left mouse button and slide to view desired spectral display area in the graph.

**\*NOTE:** In addition to the zoom buttons, simply using the mouse pointer can perform zoom in. To do so, left click, drag and draw a rectangular view window around the interested area in the graph.

### X AXIS UNIT CONTROLS:

The display control buttons allow for the selection of spectra to be displayed in pixel (**P**), wavelength in nm (**W**) or inverse centimeters (**I**).

The **W** and **I** display modes apply in T/R% and absorbance measurement modes only if the **Wavelength Base** is selected in SM Setup Dialog Box.

When **Pixel Base** is chosen in the SM Setup Dialog Box, the **W**, wavelength display mode will also be available in Scope measurement mode.

### PLAY BACK CONTROLS:



The play back control buttons provide functions when importing and playing back recorded spectra.




Allows for continuous frame-to-frame play back of imported (recorded) spectra in a reverse sequence.




Allows for play back of imported (recorded) spectra in a reverse sequence one frame at a time.




Allows for the termination of continuous play back operation.


 Allows for play back of imported (recorded) spectra in a sequence as recorded one frame at a time. In non-recording mode, this button allows a snap spectral shot to be taken each time when there is a click on it.

 Allows for continuous play back of imported (recorded) spectra in a sequence as recorded. In non-recording mode (Scope Mode) this button serves as a resume button for continuous acquisition operation.

## RECORDING CONTROL BUTTONS:

 The **R** control will save the current spectrum into memory. The maximum allowable number of spectra to be saved is dependent on the available memory size.

After the manual recording of desired spectra, the **Export** dialog box may be used to assign a file name for the recorded memory files. Thus, the files may be later imported for play back purposes.

 The **D** control allows the current displayed spectrum to be deleted from memory manually.

## *Information Display Area:*

XY:0000/0000 Bar:0000/0000 Memory:0000/0000

The display area is located on top of the graphic display and is used for display of mouse pointer positions on X and Y axes in the current spectrum (top left), cursor bar values (middle), timeline recording progress (bottom left), and memory usage (top right). Please also see Peak Finder and Timeline recording, for more information.

## *Status Display Bar:*



The status bar provides information regarding the performed and ongoing operations. These include dark scan status, reference scan status, color measurement status, etc. After you run the dark scan, if you click the **left mouse** button on the **DARK** pane, the dark scanned data will be displayed on the graphic window as black line. And if you click the **right mouse** button on this pane, the dark level will be subtracted from the original data. After you run the reference scan, if you click the **left mouse** button on the **REF** pane, the reference scanned data will be displayed on the graphic window as yellow line. If you click the same mouse button on each pane again, the displayed signal will be back to normal.

## *Quick Access Controls:*



The quick access controls are located on the bottom right of the status display and provide easy adjustments to (from left to right) integration time, time average, binning, and FFT filtering settings. Move the mouse pointer to the desired controls and right click to reduce the values or left click to increase the values.

## *Graph Sliding Bar Controls:*

There will be two sliding bar controls for vertical and horizontal scroll use when a zoom in tool is applied to the spectral display. Click on the sliding bar with the mouse pointer and hold down while sliding to view different parts of the spectrum.

# Technical Support

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To help us serve you most efficiently, please collect some information for us before you call:

1. A detailed description of your problem
2. The specific error or error message you received
3. Your system information;
  - a. Software version
  - b. Version of Windows (98, ME, 2000, NT, XP, etc.)
  - c. Unit Serial Number

Our technical staff can be most effective if you are sitting at the computer while consulting technical support.