Important Safety Notices

The laser described here is safe to operate, provided the user pays attention to all safety warnings:

1. Post warnings in the area of the laser beam to alert those present.

2. Keep all unauthorized personnel out of the area where the laser is operated.

3. Whenever the laser is running and the beam is not in use, it is good operating practice to mechanically block the path.

4. Never look directly into the laser source or scattering laser light from any reflective surface. Never sight down the beam into the source.

5. Maintain experimental setup at low heights to prevent inadvertent beam-eye contact.

6. As a precaution against accidental exposures to the output beam or its reflection, operators should wear laser safety glasses attenuated to the wavelength being generated.

For additional information:

Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826
Toll Free: 1-800-345-2737
Tel: 1-407-380-1553
Fax: 1-407-380-5588
Laser Safety

**WARNING**

Use of controls or adjustments, or performance of procedures other than those described in this manual may result in hazardous laser radiation exposure.

This is a class IIIB laser device and up to 100 mW of 785nm (NIR) laser (for model IDR-RDR-785) or up to 50 mW of 532nm (NIR) laser (for model IDR-RDR-532) light may be emitted during data acquisition. Only personnel trained in laser safety protocols should be allowed to use this instrument.

The aperture warning label indicates where laser radiation may be emitted from the instrument. It is recommended that the cover always be in place on the sample holder during data acquisition. If not, the user is required to use the supplied laser safety goggles when using the instrument.

The case of the instrument is interlocked to prevent accidental exposure to laser radiation. Internal maintenance or repair must be performed at the factory or by authorized personnel only.
Remote Interlock

The remote interlock connector allows the laser power to be disabled by an external switch. This is a mono, 3.5 mm audio plug connector that should be shorted (barrel to tip) for normal operation.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About This Manual</td>
<td>iii</td>
</tr>
<tr>
<td>Document Purpose and Intended Audience</td>
<td>iii</td>
</tr>
<tr>
<td>Document Summary</td>
<td>iii</td>
</tr>
<tr>
<td>Product-Related Documentation</td>
<td>iii</td>
</tr>
<tr>
<td>Upgrades</td>
<td>iii</td>
</tr>
<tr>
<td>Warranty</td>
<td>iv</td>
</tr>
<tr>
<td><strong>Chapter 1: Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td>Overview</td>
<td>1</td>
</tr>
<tr>
<td>Features</td>
<td>1</td>
</tr>
<tr>
<td>About Raster Orbital Scanning (ROS)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Chapter 2: Set-up and Operation</strong></td>
<td>3</td>
</tr>
<tr>
<td>Overview</td>
<td>3</td>
</tr>
<tr>
<td>IDRaman reader Hardware</td>
<td>3</td>
</tr>
<tr>
<td>Three Way Sampling™</td>
<td>4</td>
</tr>
<tr>
<td>IDRaman reader Start-up with OceanView Software</td>
<td>6</td>
</tr>
<tr>
<td>Using OceanView</td>
<td>7</td>
</tr>
<tr>
<td>Acquiring a Spectrum</td>
<td>9</td>
</tr>
<tr>
<td>Saving Data</td>
<td>11</td>
</tr>
<tr>
<td><strong>Appendix A: IDRaman Software</strong></td>
<td>13</td>
</tr>
<tr>
<td>Overview</td>
<td>13</td>
</tr>
<tr>
<td>Software Overview</td>
<td>14</td>
</tr>
<tr>
<td>IDRaman reader Start-up</td>
<td>15</td>
</tr>
<tr>
<td>IDRaman reader Operation</td>
<td>16</td>
</tr>
<tr>
<td>Acquiring a Reference</td>
<td>16</td>
</tr>
<tr>
<td>Displaying a Reference</td>
<td>16</td>
</tr>
<tr>
<td>Focusing on the Sample</td>
<td>17</td>
</tr>
<tr>
<td>Acquiring a Spectrum</td>
<td>18</td>
</tr>
<tr>
<td>Acquiring an Average</td>
<td>19</td>
</tr>
<tr>
<td>Acquiring Spectra Over Time</td>
<td>20</td>
</tr>
<tr>
<td>Improving Your Spectrum</td>
<td>21</td>
</tr>
</tbody>
</table>
## Table of Contents

Display Options ................................................................. 22  
Saving Spectra ................................................................. 23  
Display Features ............................................................... 25  
  Graph Palette ................................................................. 25  
  Scale Palette ................................................................. 25  
  Cursor List ................................................................. 26  
Control Tab ......................................................................... 26  
Advanced Tab ................................................................... 27  
Analysis Tab .................................................................... 28  

Appendix B: Specifications ............................................ 29  
Index .................................................................................. 31
About This Manual

Document Purpose and Intended Audience

This document provides you with information to get your microscope set up and operating.

What’s New in this Document

This version of the IDRaman reader Installation and Operation Manual updates the cover and contact information.

Document Summary

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1: Introduction</td>
<td>Contains a list of product features.</td>
</tr>
<tr>
<td>Chapter 2: Set-up and Operation</td>
<td>Provides instructions for setting up and operating the IDRaman reader with OceanView software</td>
</tr>
<tr>
<td>Appendix A: IDRaman Software</td>
<td>Describes how to use IDRaman software.</td>
</tr>
<tr>
<td>Appendix B: Specifications</td>
<td>Provides a list of product specifications.</td>
</tr>
</tbody>
</table>

Product-Related Documentation

You can access documentation for Ocean Optics products by visiting our website at http://www.oceanoptics.com. Select Technical → Operating Instructions, then choose the appropriate document from the available drop-down lists. Or, use the Search by Model Number field at the bottom of the web page.

You can also access operating instructions for Ocean Optics products on the Software and Technical Resources CD included with the system.


Upgrades

Occasionally, you may find that you need Ocean Optics to make a change or an upgrade to your system. To facilitate these changes, you must first contact Customer Support and obtain a Return Merchandise Authorization (RMA) number. Please contact Ocean Optics for specific instructions when returning a product.
Warranty

Our 1-Year Warranty covers Ocean Optics IDRaman products – regardless of the application – from manufacturing defects.

The warranty covers parts and labor needed to repair manufacturing defects that occur during the warranty period. We also will cover the costs of shipping warranty-related repairs from our customers to Ocean Optics and from us to our customers.
Chapter 1

Introduction

Overview

The IDRaman reader is a fully integrated Raman spectrometer system featuring Raster Orbital Scanning technology (ROS). Scanning a tightly focused laser beam over the sample surface maximizes sensitivity and maintains high resolution for the most reliable Raman measurements. A convenient sampling system allows you to measure surfaces below the instrument, in cuvettes, or from the side and bottom of vials.

Features

- **Convenient Sampling** – The IDRaman reader features three convenient ways to sample. Point the source knob down and measure the area just below the IDRaman reader. Adjust the focus for maximum sensitivity. This configuration is ideal for process Raman measurements or reading SERS substrates. The adjustable focus sample chamber also allows you to sample vials two ways. The adjustable focus sample holder maintains laser safety while allowing you to measure from the bottom of the vial to get the best results from the smallest amount of sample. Traditional sampling from the side of a cuvette or vial is also available.

- **High-Resolution and Laser Line Options** – The IDRaman reader is available in a variety of different configurations with the choice of 532 or 785 nm laser excitation, each available with two resolution options.
  - The 8 cm\(^{-1}\) version covers the Raman spectrum from 200 to 3,200 cm\(^{-1}\) for samples requiring a wide measurement range like aliphatic hydrocarbons.
  - The high-resolution 4 cm\(^{-1}\) version covers from 200 to 2,000 cm\(^{-1}\); use this configuration to get the most detail near the laser line.
About Raster Orbital Scanning (ROS)

The Ocean Optics IDRaman reader uses ROS to rapidly scan a tightly focused beam in an orbital pattern, allowing lower average power to produce high-integrity data from a larger area of the sample without sample ignition or damage.

A tightly focused beam may result in noisy signals or missing the Raman active target completely, leading to false negative readings from unidentified samples.

Increasing the spot size of the laser dilutes the valuable information about the material, leading to inconclusive matches or false identification of samples.

ROS increases the effective size of a tightly focused beam. Information is obtained with complete integrity while sampling the large area needed for complex mixtures or irregularly shaped samples, leading to confident identification.
Chapter 2

Set-up and Operation

Overview

This section provides instructions for setting up and operating the IDRaman reader with OceanView software. Read all instructions and warnings carefully before attempting to install and operate your device.

IDRaman reader Hardware

Bottom View

Point and Shoot Port underneath the reader.

Laser Safety Warnings

Sample holder

Sample focus knob

Laser aperture warning label

Sample method selection

Bottom View
Three Way Sampling™

1. The vial goes in this position to analyze the sample through the side of the vial with the selector arrow pointed to the front of the system.
2. Insert the vial into the right-angle adapter. Insert the adapter into the sample holder to analyze the sample through the bottom of the vial.

3. Select the aperture illumination and the laser can be used for surfaces or well plates. Point and Shoot Port underneath the reader.
IDRaman reader Start-up with OceanView Software

► Procedure

1. Turn on the computer.

2. Ensure that OceanView software is installed.

3. Be sure that power is supplied to the instrument. Turn on the IDRaman reader.

4. Connect the reader to the computer via a USB cable.

5. When you first plug in your spectrometer, Windows 7 will attempt (unsuccessfully) to automatically install the driver for your spectrometer. You must manually install the new 64-bit driver for your spectrometer. Click close to close the warning message:

6. Click Change setting.

7. Select Yes, do this automatically.
The system installs the device driver software. A message informs you when the installation process has finished successfully.

8. Unplug the USB cable from the IDRaman reader.

9. Load OceanView software onto your computer.

10. Plug the USB cable back into the IDRaman reader.

11. Start the OceanView software. If OceanView does not find the IDRaman reader, go to Device Manager to connect to the device. For using OceanView, see the OceanView manual (*Product-Related Documentation*).

**Using OceanView**

OceanView software is available from Ocean Optics to acquire spectral measurement data from your IDRaman instrument. This section describes how to use the features available for your IDRaman micro. For more information on OceanView software see *Product-Related Documentation*. 
The Acquisition Group Window provides the following functions for the IDRaman micro:

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Play Button]</td>
<td>Take continuous acquisitions. See <a href="#">Acquiring a Spectrum</a>. This control is not recommended for systems such as the IDRaman micro that use a laser.</td>
</tr>
<tr>
<td>![Pause Button]</td>
<td>Take a single acquisition. Every time this control is activated, the laser fires and a measurement is captured.</td>
</tr>
<tr>
<td>![Integration Time]</td>
<td>Select the desired integration time and units (µm, ms, or seconds).</td>
</tr>
<tr>
<td>![Scans to Average]</td>
<td>Enter the number of scans to average. Click ![Stop] to stop averaging. See <a href="#">Acquiring an Average</a>.</td>
</tr>
<tr>
<td>![X-Axis]</td>
<td>Select the units for the x-axis, Ramanshifts or Pixels Pixels on the detector (useful for calibration only).</td>
</tr>
<tr>
<td>![Reference Spectrum Enable]</td>
<td>Check the box to enable a reference spectrum. See <a href="#">Acquiring a Reference</a>.</td>
</tr>
<tr>
<td>![Clean Peaks Enable]</td>
<td>Check the box to enable the Clean Peaks function. See <a href="#">Peak Cleaning</a>.</td>
</tr>
</tbody>
</table>
Acquiring a Spectrum

Set your integration time to the desired rate, choose your x-axis units, select the laser power, and then click to acquire a single spectrum. Spectra can be adjusted by averaging scans, enabling reference spectra, and using the Clean Peaks function. Save spectra using OceanView functions (see Product-Related Documentation).

Acquiring a Reference

OceanView allows you to take a reference measurement for a set integration time. The reference spectrum takes a measurement with the laser off, and then turns laser on and takes the Raman measurement. This lets you exclude ambient light and other environmental background as well as any fixed pattern noise from the CCD.

Acquiring an Average

Averaging is used when your sample has a high background. Often samples will produce some or even large amounts of fluorescence. The quality of a spectrum is determined by the signal-to-noise ratio. The noise is determined by “shot noise” which is equal to the square root of signal. This means that samples with large backgrounds will inherently have poor signal-to-noise ratios. Increasing the integration time will improve the signal-to-noise ratio, but with high background samples this may be impossible due to the detector's limited dynamic range.

Averaging allows you to take multiple short acquisitions and average them to improve signal to noise. Until the detector becomes dark noise limited, the signal to noise ratio will improve by the square root of the number of averages.

Select the number of scans to average using OceanView.

Peak Cleaning

Clean Peaks is a beta correction algorithm that takes the measured Raman spectra and removes the baseline, removing the effect of fluorescence. This method is not appropriate for every sample, but when spectral backgrounds are a problem it can provide background free spectra.
Raw spectra and cleaned spectra can be displayed on the same graph using the Schematic View (Advanced Math → Filtering → Clean Peaks).

**Note**

Checking the **Clean Peaks Enable** checkbox produces a single signal on the graph view showing just the clean peak processed spectra. Using this function in the schematic view allows you to view both the original AND the cleaned spectra.
## Saving Data

Use following OceanView controls to save your data to an ASCII text or .spc file:

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Image" alt="Image" /></td>
<td>Save graph to file. Saves your data as an ASCII text file unless you configure a different format using the Configure Graph Saving button described below.</td>
</tr>
<tr>
<td><img src="Image" alt="Image" /></td>
<td>Save content over time to one or multiple files (depending on how it is configured). OceanView provides the capability of saving and exporting processed data for each graph view to an ASCII file. When combined with external triggering, this feature can be used to automatically save full spectra timed to one or more external events. After this is selected once, press the spacebar for additional saves. Refer to the OceanView Installation and Operation Manual for more information (see Product-Related Documentation).</td>
</tr>
</tbody>
</table>

---

*OceanView Installation and Operation Manual*
Appendix A

IDRaman Software

Overview

IDRaman Software is a versatile data acquisition package with built-in baseline and smoothing features for the most difficult samples. This section describes how to use all of the features available and how they can be used to acquire the optimal spectrum for your application.

The software provides data storage in the universal ASCII format for spreadsheets or other third-party analysis and display. Also provided is the popular .spc format used with Thermo Scientific’s GRAMS spectroscopy software.
Software Overview

**Acquisition Type** — sets the display of the data, calibrated, raw pixel data, baseline corrected

- **View Multi-Spectra** — displays the selected spectrum of a multi-acquire
- **Display Options** — displays last acquisition, reference, or average
- **Integration time** — sets the spectral acquisition time
- **# of Multi-Acquisitions** — Sets the # of acquisitions in a multi-acquire
- **Delay Time** — Sets the time between acquisitions in a multi-acquire

**Acquire** — acquires the spectrum using the set methods defined by the user

**Continuous** — acquires spectra continuously

**Multi-Acquire** — acquires a series of spectra using the set method defined by the user

**Abort** — Aborts the current method

Cursor commands and Plot — sets the plot options, cursor, reads the location, and zooms the window
IDRaman reader Start-up

► Procedure

1. Turn on the computer.
2. Turn on the IDRaman reader.
3. Connect the IDRaman reader to the computer using the USB cable.
4. Double-click the IDRaman software link on the desktop. The software automatically connects to the reader and displays its name, serial number and firmware version. If the software does not connect automatically, do the following:
   a. Click Choose to select the reader.
   b. Select the reader in the drop-down menu and click Confirm. The reader serial number and COM port are displayed.
c. Click **Done**. You are ready to take spectra.

### IDRaman reader Operation

#### Acquiring a Reference

Spectra can be acquired several different ways depending on your application or the sample’s composition.

### Reference Type

This menu allows you to choose how and when a reference is taken for a set **integration time**. Normally the shutter closes during this period and the reference spectrum is subtracted from the acquisition. This removes any environmental background and it eliminates any fixed pattern noise due to the CCD detector.

- **No Reference** -- takes an acquisition without a reference.
- **Reference Once** -- takes a reference only once before an acquisition or series of acquisitions in a multi-acquire.
- **Reference Every Acquisition** -- takes a reference after each acquisition in a multi-acquire.
- **Block Reference** -- takes a set number of references, equal to the number of acquisitions, at the beginning of a multi acquire. This is useful for photo-bleaching.

#### Displaying a Reference

Once an acquisition is taken use the drop down menu in the display options to select reference and then click on the Display button to display the last reference taken.
**Note**

It is essential to have the reference acquired for the same integration time as the acquisition. If there is a mismatch, a new reference will be automatically acquired at the new acquisition time.

---

**Focusing on the Sample**

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Continuous" /></td>
<td>Continually acquires a spectrum for the set integration time. A single reference will be acquired first (if selected) and then continual spectra.</td>
</tr>
<tr>
<td><img src="image" alt="Abort" /></td>
<td>Focus mode is deselected by clicking the Abort button. This feature is very useful to view the spectrum while the Focus adjustment is rotated. While working with solids, the focus is critical and needs to be adjusted to impinge near the surface of the sample. Liquids are less critical, but highly absorbing liquids again will be optimal when the focus is near the surface.</td>
</tr>
</tbody>
</table>

---

**Sample location**

- **Use front slot to sample vial side.**
- **Use adaptor and back slot for bottom illumination.**

**Sample method control**

- **Used to sample vial side and bottom illumination.**
- **Rotate down to point & shoot aperture.**
# Acquiring a Spectrum

![Image of software interface with buttons and settings]

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="acquire_button.png" alt="Acquire Button" /></td>
<td>Acquires a spectrum for the set parameters and integration time. The shutter opens for a period of time determined by the integration time. Select the <strong>Laser Power</strong>, the <strong>Referencing Type</strong> and the <strong>Acquisition Type</strong>, and then click on the <strong>Acquire</strong> button to begin the acquisition.</td>
</tr>
<tr>
<td><img src="integration_time.png" alt="Integration Time" /></td>
<td><img src="integration_time_image.png" alt="Image of integration time setting" /></td>
</tr>
<tr>
<td><img src="abort_button.png" alt="Abort Button" /></td>
<td>Stops the process and return to the main menu. Some delays exist to allow for the shutter movement; however, the exposure time is precisely set by the integration time selected.</td>
</tr>
</tbody>
</table>
Acquiring an Average

Averaging is used when your sample has a high background. Often samples will produce some or even large amounts of fluorescence. The quality of a spectrum is determined by the signal-to-noise ratio. The noise is determined by “shot noise” which is equal to the square root of signal. This means that samples with large backgrounds will inherently have poor signal-to-noise ratios. Increasing the integration time will improve the signal-to-noise ratio, but with high background samples this may be impossible due to the detector’s limited dynamic range.

Averaging allows you to take multiple short acquisitions and average them to improve signal to noise. Until the detector becomes dark noise limited, the signal to noise ratio will improve by the square root of the number of averages.
To average a set of spectra together,

1. Set the **# of Multi-Acquisitions** to a desired number of spectra to be averaged.
2. Set the **Referencing Type** to the way you want the reference performed (no reference, reference one or reference every acquisition).
3. Set the **Acquisition Type** to the type of data to be displayed (calibrated, Calibrated Cleaned, or pixel data).
4. Click on the **Multi-Acquire** button to start the acquisition. The Abort button stops the process and return to the main menu.

## Acquiring Spectra Over Time

The **Multi-Acquire** button acquires multiple spectra over a period of time at known intervals. Timed spectral acquisition is a useful method of data acquisition when performing reaction monitoring. For example, information on the kinetics of a reaction can be determined from the Raman spectra as a function of time.

**Procedure**

To use the Multi-Acquire function,

1. Set the **# of Multi-Acquisitions** to the desired number.
2. Set the delay between each start with the **Interval Time**.
3. Choose a **Referencing Type**, and then click on the **Multi-Acquire** button.

   The delay time is the delay between the start of each acquisition. For example, if the integration time is 10 seconds and the desired delay between each acquisitions is 2 seconds the delay input should be 12 seconds (10 integration-12 sec delay = 2 seconds between each acquisition start).
4. Once the acquisition is complete, click on the **File** drop down menu and select **Save Multi-Spectra**, name the file and click **Save**. Note the Multi-file created is an ASCII file.

## Improving Your Spectrum

Depress the **Laser Power** selector up or down to adjust the laser power. The system defaults to high power at start up. The factory set laser power is shown in the dialogue box next to the **Laser Power** selector. These values can change with time and should be verified with a calibrated power meter.

![Image of laser power control](image)

## Cleaning Peaks

**Peak Clean** is a beta correction algorithm to produce spectra that are baselined corrected with powerful de-trending algorithms. This method is not appropriate for every sample, but when spectral backgrounds are a problem it can provide background free spectra. **Peak Clean** can be particularly useful for library matching. Select **Calibrated Cleaned** under **Acquisition Type**.

![Image of acquisition type](image)
Display Options

After an acquisition there are different display options for viewing the data collected.

<table>
<thead>
<tr>
<th>Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>View the last reference taken that is associated with the current data set.</td>
</tr>
<tr>
<td>Average</td>
<td>If a multi-acquisition was performed you can view the averaged data.</td>
</tr>
<tr>
<td>Last Acquisition</td>
<td>View the last acquisition.</td>
</tr>
<tr>
<td>View Multi-Spectra</td>
<td>Choose an individual file in a multi-acquisition. The last multi-acquire performed is stored in the temp file until a new multifile is collected. This allows you the ability to take as many single acquisitions but still view the average and individual data sets from the multi-acquire.</td>
</tr>
</tbody>
</table>
Saving Spectra

You can choose to save spectra in one of these formats:

- **SPC** – saves the spectrum as displayed on the screen with baseline correction applied in the .spc format used with Thermo GRAMS. The comments will be stored in the metadata in the .spc format.

- **ASCII** – saves the spectrum as displayed on the screen in the .prn format, ASCII X-Y format. The ASCII format is a column of wavenumbers and a column of intensities.

### ASCII Format

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>11628.52</td>
</tr>
<tr>
<td>201</td>
<td>11370.72</td>
</tr>
<tr>
<td>202</td>
<td>11193.41</td>
</tr>
<tr>
<td>203</td>
<td>11093.1</td>
</tr>
<tr>
<td>204</td>
<td>11099.31</td>
</tr>
<tr>
<td>205</td>
<td>11001.35</td>
</tr>
<tr>
<td>206</td>
<td>10947.95</td>
</tr>
<tr>
<td>207</td>
<td>10846.98</td>
</tr>
<tr>
<td>208</td>
<td>10666.26</td>
</tr>
<tr>
<td>209</td>
<td>10388.24</td>
</tr>
<tr>
<td>210</td>
<td>10067.22</td>
</tr>
<tr>
<td>211</td>
<td>9779.365</td>
</tr>
<tr>
<td>212</td>
<td>9597.465</td>
</tr>
<tr>
<td>213</td>
<td>9523.194</td>
</tr>
<tr>
<td>214</td>
<td>9490.938</td>
</tr>
<tr>
<td>215</td>
<td>9432.464</td>
</tr>
<tr>
<td>216</td>
<td>9305.857</td>
</tr>
<tr>
<td>217</td>
<td>9144.968</td>
</tr>
<tr>
<td>218</td>
<td>8997.332</td>
</tr>
<tr>
<td>219</td>
<td>8905.549</td>
</tr>
<tr>
<td>220</td>
<td>8863.54</td>
</tr>
<tr>
<td>221</td>
<td>8836.536</td>
</tr>
</tbody>
</table>

- **LIB** – saves the file in an encrypted format that can be used on our hand-held devices.

**Procedure**

1. Select the File drop down menu and then Save Current Display. A dialogue box will open with 4 options: ASCII, SPC, and LIB. One or all of these selections can be selected.
2. After selecting a save option, click **Save** a second time. You will be asked to create a comment in the comment line. Click **OK** when finished. A windows file storage dialogue will open to save the spectrum.
Display Features

Graph Palette

The Graph Palette brings up a menu to expand spectral regions.

Scale Palette

The scale palette is used to lock or unlock the autoscale features.
Cursor List

Right click on the cross-hairs in the Cursor Palette to bring up the Cursor List. This allows you to bring the cursor to the center of the display, add or delete cursors, and set cursor attributes. The cursor position can be read from the Cursor Palette.

Control Tab

<table>
<thead>
<tr>
<th>Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raster ON/OFF (see Raster Scan)</td>
<td>Turns the raster on and off: ON: Laser beam rasters in a circular pattern (~ 2mm in diameter). OFF: Laser beam is ~ 25 microns.</td>
</tr>
<tr>
<td>Shutter OPEN/CLOSE</td>
<td>Allows the user to open the shutter during laser power testing. Caution: this turns the laser on. Use proper safety equipment and precautions.</td>
</tr>
</tbody>
</table>
Raster Scan

Sometimes your sample is not homogenous. In this case the tightly focused laser beam may miss the particles in the sample and produce false signals. Raster scan enlarges the sampled area and provides a more statistically significant signal for heterogeneous samples.

► Procedure

1. Select the Control drop down menu.

2. Select Raster ON/OFF. The raster emblem appears indicating the raster is on.

- Raster ON -- the laser beam will raster in a circular pattern that is ~ 2mm in diameter.
- Raster OFF -- the laser beam will be a ~ 25 micron beam.

Advanced Tab
### Analysis Tab

The Analysis tab allows you to select Savitzky-Golay or Denoise smoothing, that is, to increase the signal-to-noise ratio without greatly distorting the signal.

A Savitzky–Golay filter is a digital filter that can be applied to a set of digital data points for the purpose of smoothing the data. This is achieved, in a process known as convolution, by fitting successive sub-sets of adjacent data points with a low-degree polynomial by the method of linear least squares. When the data points are equally spaced an analytical solution to the least-squares equations can be found, in the form of a single set of "convolution coefficients" that can be applied to all data sub-sets, to give estimates of the smoothed signal, (or derivatives of the smoothed signal) at the central point of each sub-set.

The method, based on established mathematical procedures, was popularized by Abraham Savitzky and Marcel J. E. Golay who published tables of convolution coefficients for various polynomials and sub-set sizes in 1964. Some errors in the tables have been corrected. The method has been extended for the treatment of 2- and 3- dimensional data.

---

## Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Wavelengths</td>
<td>532 nm or 785 nm (standard and high resolution versions)</td>
</tr>
<tr>
<td>Laser Output Power:</td>
<td></td>
</tr>
<tr>
<td>785 nm</td>
<td>100 mW, 80 mW at the sample</td>
</tr>
<tr>
<td>532 nm</td>
<td>50 mW, 40 mW at the sample</td>
</tr>
<tr>
<td>Detector</td>
<td>2048 element back-thinned array, NIR enhanced, TEC cooling to -10°C</td>
</tr>
<tr>
<td>Sampling Options</td>
<td></td>
</tr>
<tr>
<td>Downward-looking free space</td>
<td></td>
</tr>
<tr>
<td>Vial (bottom or side measurements)</td>
<td></td>
</tr>
<tr>
<td>cuvette (side measurements)</td>
<td></td>
</tr>
<tr>
<td>Raster Orbital Scanning (ROS)</td>
<td>Scans tightly focused beam over large sample area while maintaining high resolution and sensitivity</td>
</tr>
<tr>
<td>function</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2.7 kg. (6 lb)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>30 x 20 x 8 cm (12 x 8 x 3 in.)</td>
</tr>
</tbody>
</table>
Index

A
acquiring
  average, 9, 19, 20
  reference, 9, 16
advanced tab, 26, 27
analysis tab, 28
average
  acquiring, 9, 19, 20

C
Clean Peaks, 9
Control tab, 26
cursor list, 26

D
display features, 25
display options, 22
displaying
  reference, 16
document
  audience, iii
  purpose, iii
  summary, iii

F
features, 1
focus, 17

G
graph palette, 25

H
hardware, 3

I
IDRaman software, 13
  overview, 14
  Peak Clean, 21
  improving
    spectrum, 21
  introduction, 1

L
laser safety, B

O
Oceanview, 7
OceanView
  acquiring average, 9
  acquiring reference, 9
  acquiring spectrum, 9
  Clean Peaks, 9
  save data, 11
  operation, 3, 16
  overview, 1

P
Peak Clean
  IDRaman Software, 21
  product-related documentation, iii

R
Raster Orbital Scanning (ROS), 2
raster scan, 27
reference
  acquiring, 9, 16
  displaying, 16
  remote interlock, C
Index

S

save data, 11
saving spectra, 23
scale palette, 25
set-up, 3
specifications, 29
spectrum improving, 21
saving, 23
start-up, 15
start-up with Oceanview, 6

T

tab advanced, 26, 27
analysis, 28
Control, 26
Three Way Sampling, 4

U

upgrades, iii

W

warranty, iv
what's new, iii