

SPECTRAL TIPS AND TECHNIQUES: PERFORMING A WAVELENGTH CALIBRATION IN AVASOFT 8

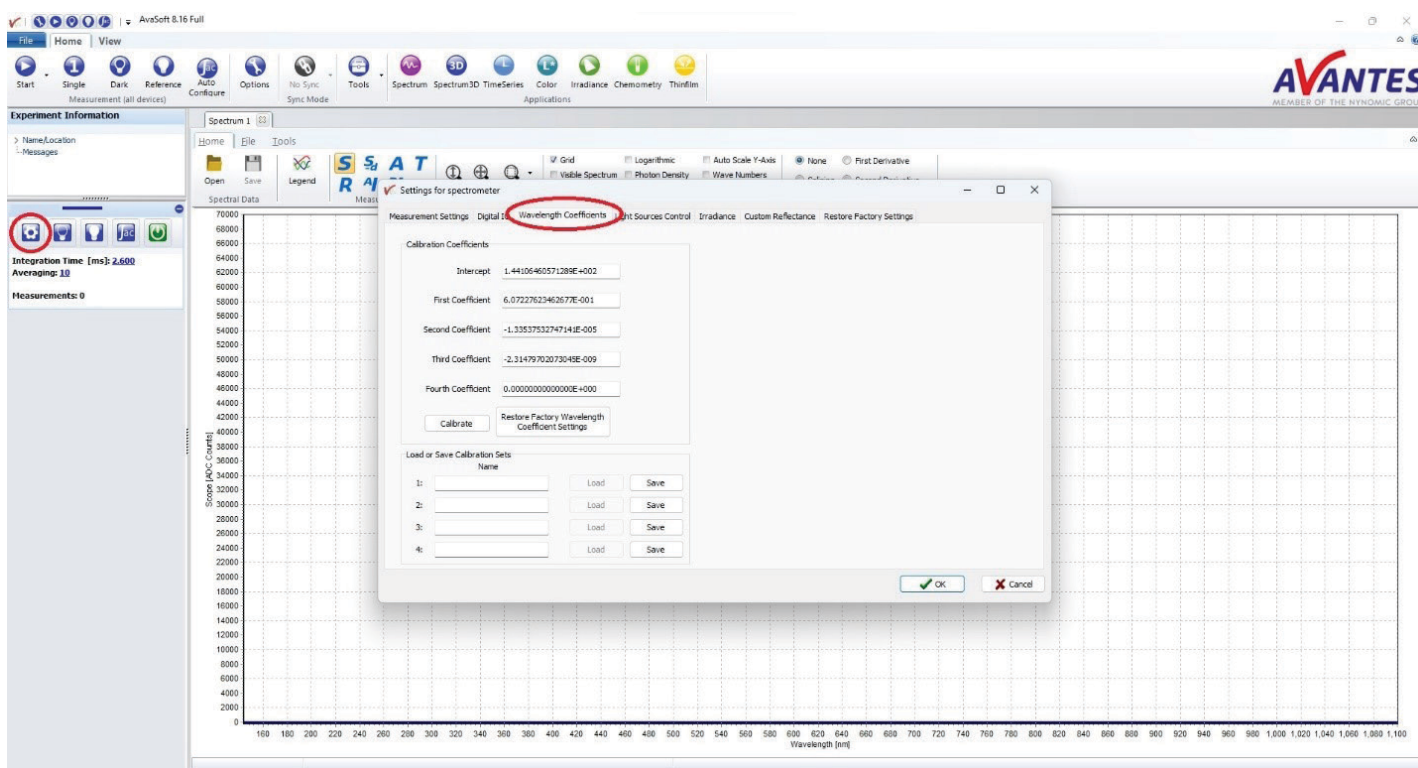


INTRODUCTION

With any measurement tool, accuracy is one of the key metrics in determining the quality of the device. For spectrometers, this can be determined through wavelength accuracy, which is certified through a wavelength calibration. Though all Avantes spectrometers undergo an initial wavelength calibration during the production process, over time this accuracy can slowly drift, whether it be from temperature changes, frequent transportation of the instrument, or changing device hardware such as the slit. To avoid inaccurate measurements from being introduced, routine wavelength calibrations are recommended, either with one of our calibrated light sources, or our in-house calibration services. Below is a short guide on performing a wavelength calibration utilizing one of our calibrated light sources.

WAVELENGTH COEFFICIENTS ADJUSTMENTS

To wavelength calibrate a spectrometer, the wavelength coefficients must be adjusted. This can be done by accessing the spectrometer settings (the cog wheel icon on the left of the window, shown here circled in red) and navigating to the Wavelength Coefficients tab (also circled in red).

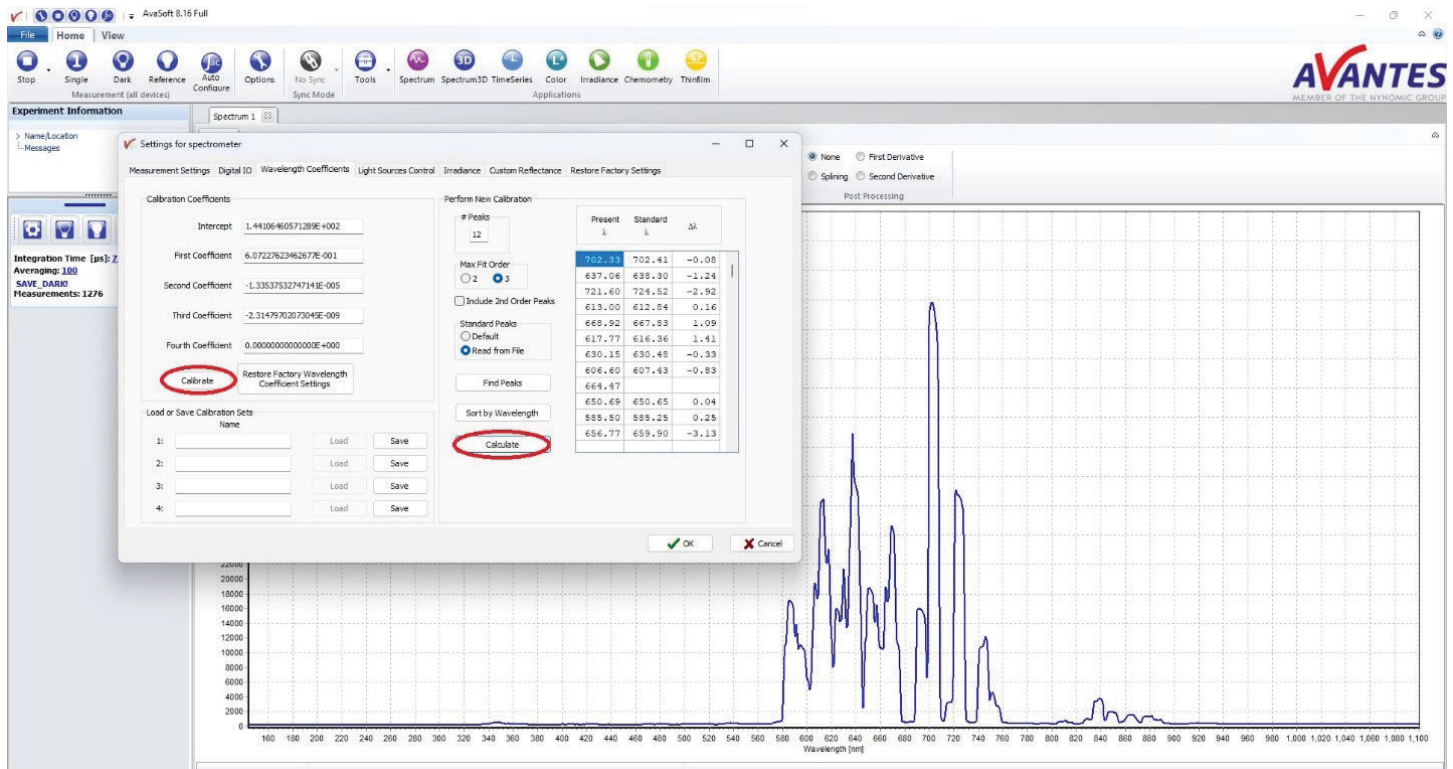


In this tab, start the calibration by clicking the "Calibrate" button (circled in red in the next figure). This will populate the right-side of this window with a "Perform New Calibration" section with some calibration options and three columns indicating the peaks measured by the spectrometer, the closest standard peak associated with the selected light source, and the difference between these peaks. The first setting value sets the number of peaks to be used for comparison. These are automatically selected based on peak magnitude, with larger peaks being selected first. This minimizes the chance for a noise peak to be interpreted as a light source peak. 10-30 peaks are recommended for calibration, as both too little and too many peaks can cause the fitting algorithm to generate poorly fitting coefficients for the whole range of the spectrometer. The second setting determines if a second- or third-order function is used to fit the measured peaks to the standard peaks.

A third-order fit is almost always recommended for a better fit. The next option is to include second-order peaks for calibration. This is typically not used unless the light source used only has standard peak values below the current measured range. Even in this case, it is recommended to use a different calibration light source rather than this option for a better fit. The last option determines the standard peaks to use for the peak comparison. The default selection uses the peaks of our AvaLight-Cal Mercury-Argon light source. If using a different light source, a .lit file should be included with the light source that contains the appropriate standard peaks. If this file is lost, contact the Avantes support team at support@avantes.com and a replacement file can be provided.

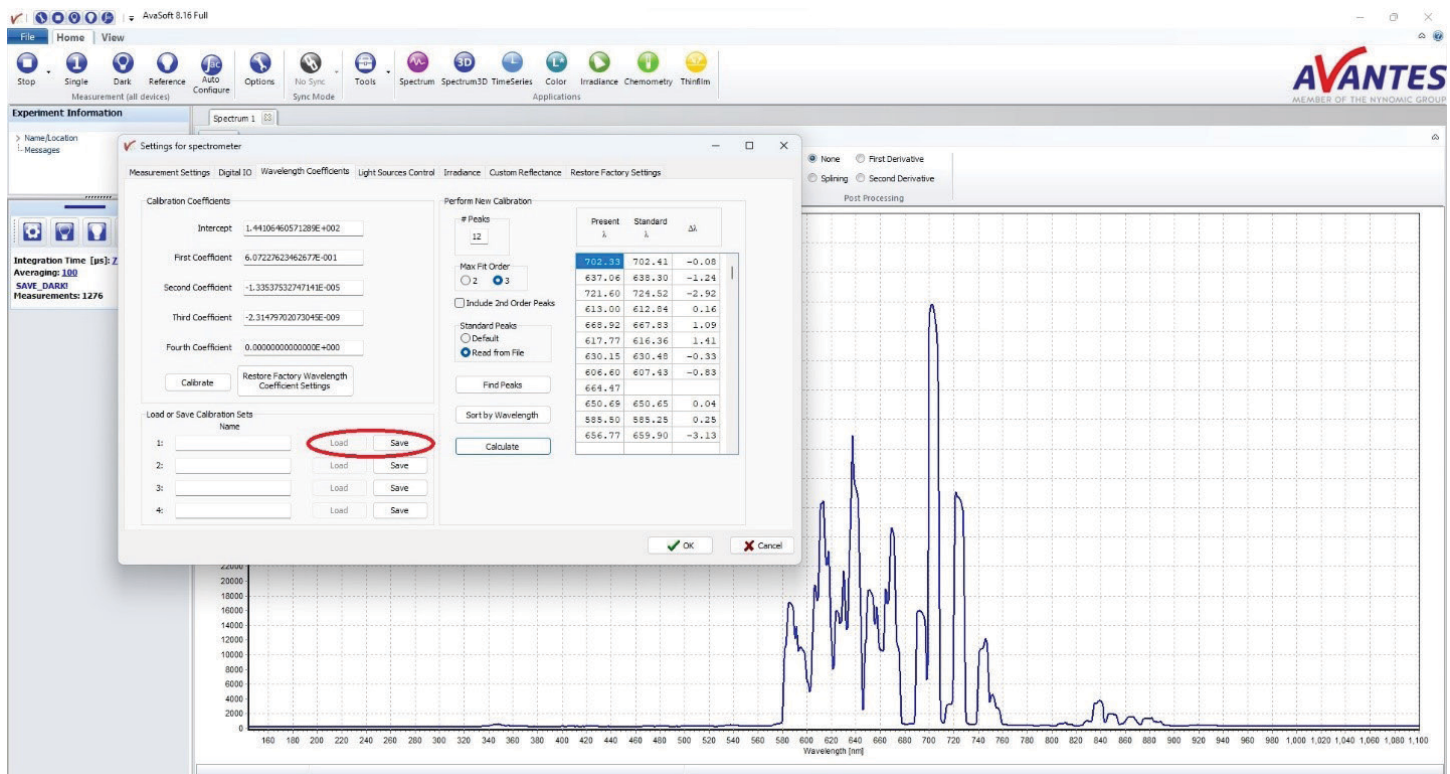
MATCHING PRESENT PEAKS TO STANDARD PEAKS

With the settings adjusted and the correct peak file selected, click the "Find Peaks" button to match the present peaks to the standard peaks. Then click the "Calculate" button (also circled in red in the next figure) to run the fitting algorithm and generate new wavelength coefficients. The present peaks will be adjusted based on the new coefficients and are automatically be sorted by peak magnitude with the largest first. They can be reorganized by wavelength by clicking the "Sort by Wavelength" button. Ideally, the present peaks should cover a large portion of the spectrometer's range to have a good general fit and not just a good localized fit. Additionally, the difference between peaks should be no more than +/- 0.05 nm for UV/VIS spectrometers, and no more than +/- 1.00 nm for NIR spectrometers. Depending on the application and available pixels of the spectrometer, these criteria may be loosened or more strict. If the fit is still not accurate enough, the number of peaks can be adjusted and the coefficients can be recalculated to achieve the best possible coefficient fit.

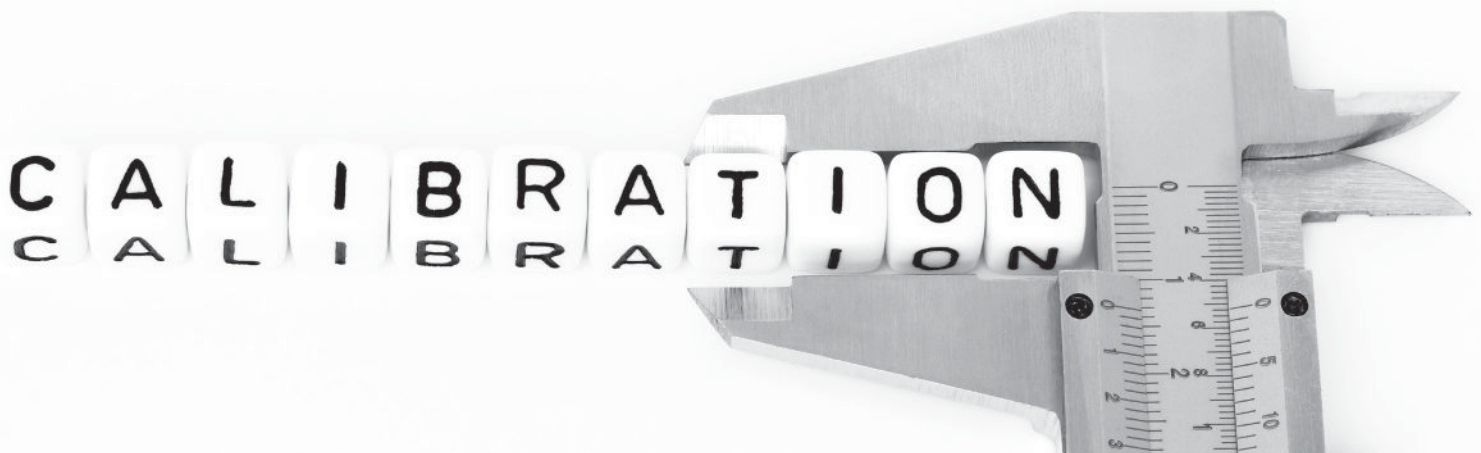


SAVING CALIBRATION TO COMPUTER

Once the fit is sufficiently accurate, the coefficients can be saved to the computer by clicking the "Save" button in the Load or Save Calibration Sets portion of the window (circled in red in the figure below). The calibration set can be named to the left of this button with details such as the date of the calibration, the light source used, and the number of peaks. Up to four calibration coefficient sets can be saved and can be easily switched by clicking the "Load" button next to the desired calibration set. While these updated coefficients are saved in the software based on the spectrometer serial number, they are not saved directly on the spectrometer device settings. To use these new coefficients on a different computer, they must be edited on the spectrometer EEPROM settings using our Delphi program. Contact our support team at support@avantes.com for instruction on this procedure.



With these steps complete, the spectrometer has been successfully wavelength calibrated. If these steps do not result in a sufficiently accurate wavelength calibration or other issues arise, please reach out to our support team at support@avantes.com for further explanation or troubleshooting options.



SUPPORT & ADVICE

Providing high-quality equipment is only part of what we do. The other equally important factor is the high level of service we deliver. Our organization includes various services to provide you with the best support and advice:

Feasibility studies

Our sales engineers perform free feasibility studies to find your most ideal measurement setup.

Support team

Our support team never sleeps and provides you with the best possible service.

Demo program

Our demo program allows you to try our products for free to ensure that you find the perfect solution.

MyAvantes

Personal platform including AvaSoft software and other helpful material for you to download.

Online support

Helpful documents and tutorial videos on demand regarding to your products.



ABOUT AVANTES

We are Avantes, a leading player in the compact spectrometer industry. We operate in various industries, including (bio)medical, agriculture, semiconductor, and consumer electronics. Our instruments are found in world-class research laboratories, embedded in devices, or playing a crucial role in quality control during production.

With a long history of consulting with clients across various industries, Avantes is an **experienced partner** equipped to guide customers who want a solution tailored to their application and research needs.

Through our headquarters in the Netherlands and offices in the USA and China, our sales engineers work closely with our customers to find the most ideal measurement solution. In addition to our direct offices, Avantes has a **worldwide network** of distributors in over 35 countries ready to assist you. All of our products are made in our own production facility in the Netherlands.



Let our solutions empower your application

Scan the QR-code and discover how our solutions will empower your application. We are happy to help!

CONTACT

WE'RE HAPPY TO HELP

Curious how spectroscopy can help you reveal answers by measuring all kind of materials, in-line, at your production facility, in a lab or even in the field? Please visit our website or contact one of our technical experts, we're happy to help you.

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