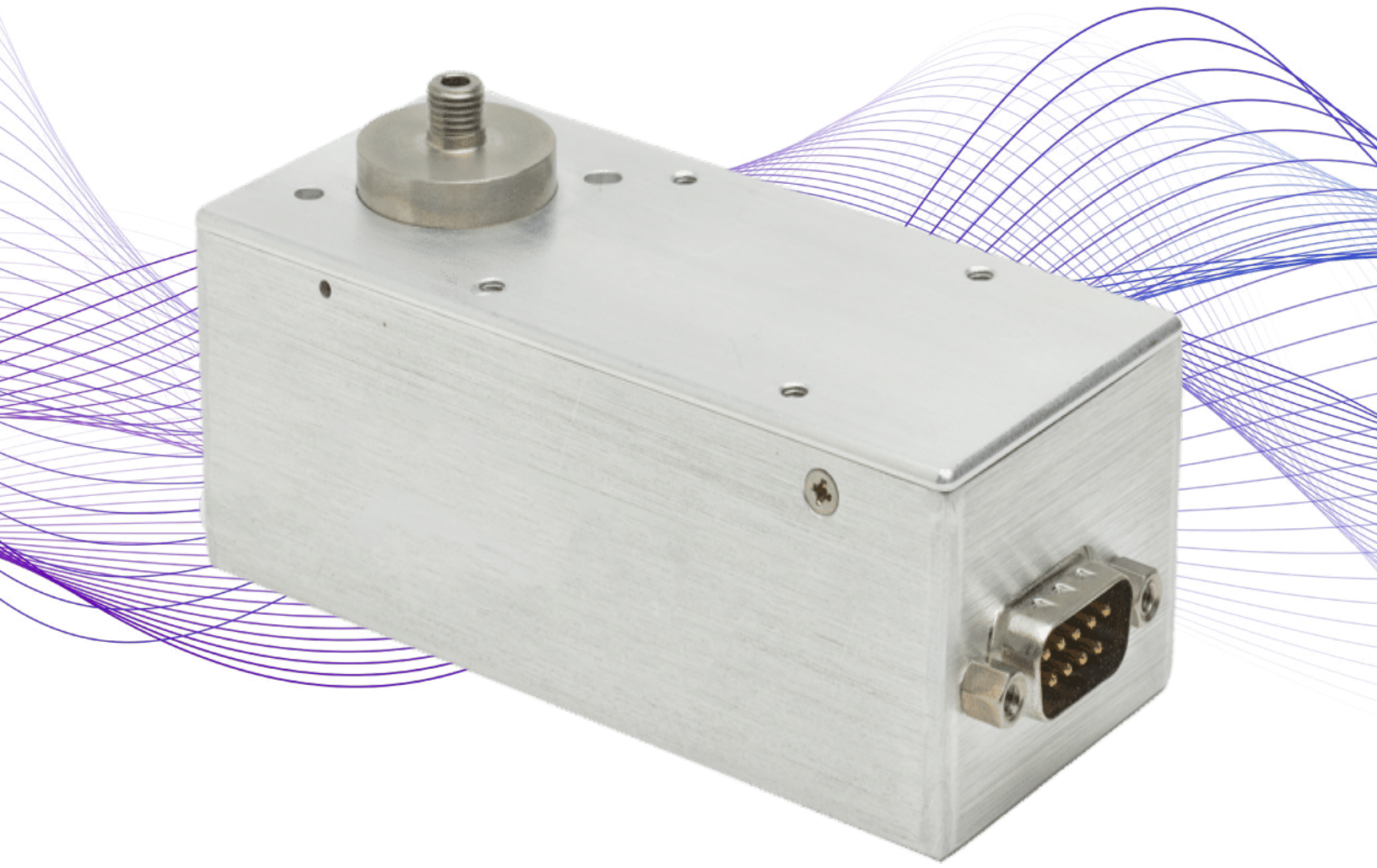
AVANTES USA
MEMBER OF THE NYNOMIC GROUP

SPECTRAL TIPS AND TECHNIQUES:
OPTIMIZING THE AVALIGHT-XE-MINI FOR RELIABLE UV–VIS MEASUREMENTS



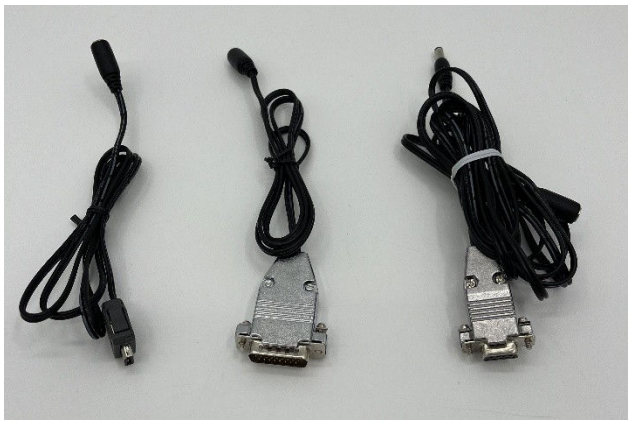
INTRODUCTION AND GUIDE

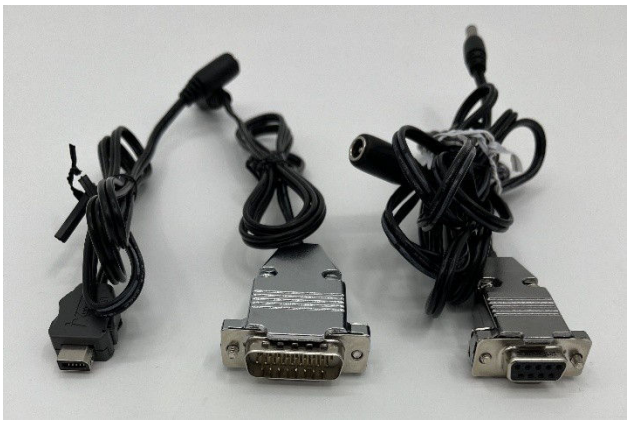
For applications that require pulsed illumination, Avantes offers specialized light sources designed for precise, high-intensity output. The AvaLight-Xe-Mini is a pulsed xenon lamp that delivers 2 W of power with a broad usable wavelength range of 200–1100 nm, making it well-suited for fast, time-resolved, and high-sensitivity measurements. The AvaLight-Xe-Mini is a compact, long-lasting light source, making it ideal for OEM integration or for any setups where a small footprint is required. Besides the standard model, two other versions are available: a high-power model that can run up to 6W and a deep UV model that broadens the spectral output down to 160nm. While the AvaLight-Xe-Mini is our most compact light source, it can also be one that is not as straightforward to connect and use in our software. As such, below is a short guide covering the setup and functionality of the AvaLight-Xe-Mini and how to control it within AvaSoft.

The first step in using the AvaLight-Xe-Mini is to properly connect it to a power source and to one of our spectrometers. The lamp has a 9-pin D-Sub connector that both providwes power to the lamp and allows control of the pulse rate via a connection to a spectrometer. A special 2-part interface cable is utilized for this function, as shown below along with an AvaLight-Xe-Mini and NEXOS™ spectrometer:

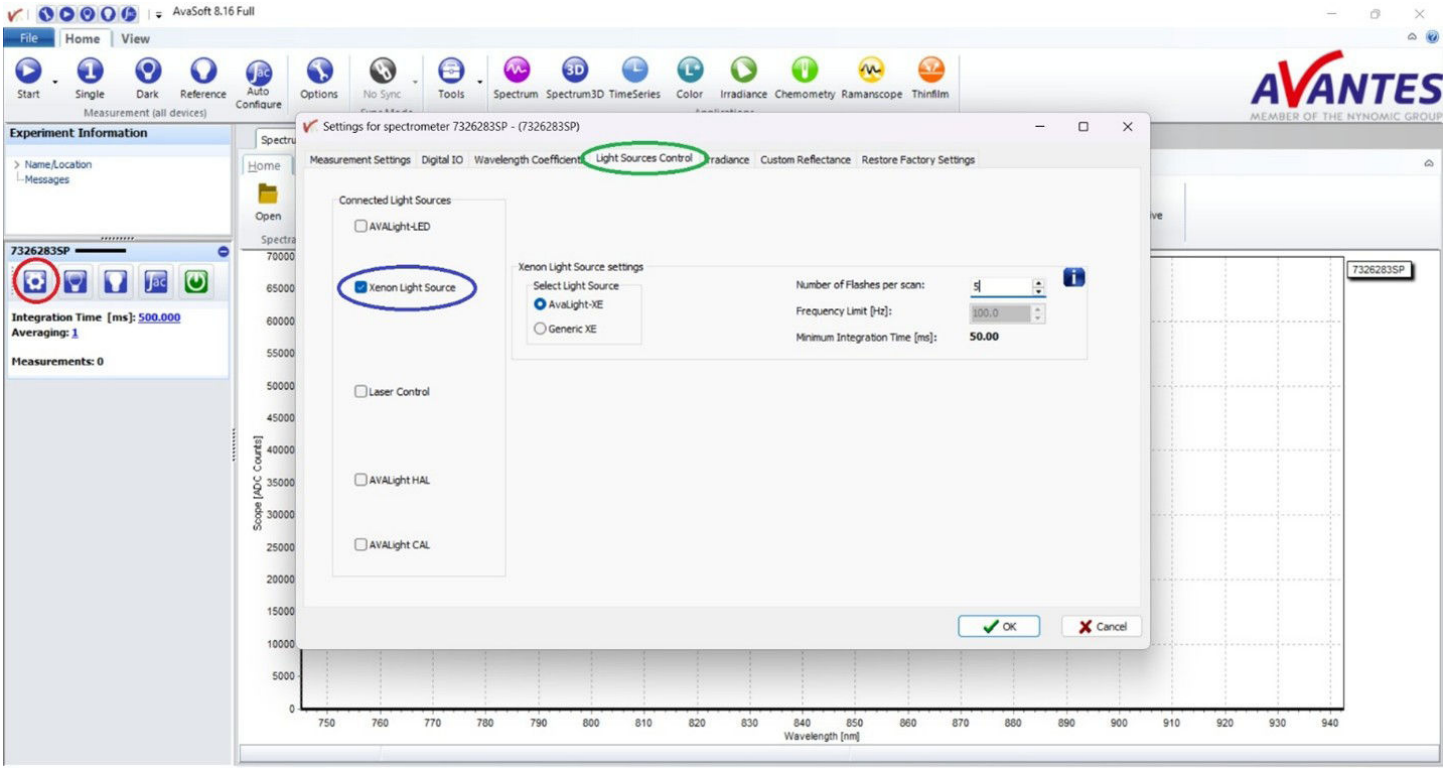
One portion of the interface cable has a 9-pin connector that attaches to the Xe-Mini. This connector also has both male and female barrel connector ends. The male barrel connector end connects to the female barrel connector end of the other portion of the interface cable, which also connects to the spectrometer. The female barrel connector end of the first portion connects to a 12V power supply. When fully connected, the setup should look as below:

It is worth noting that depending on the spectrometer being used, a different interface cable end may be required, as the Nexos pictured above uses a compact, 10-pin connector, whereas a majority of our spectrometers (ULS and Varius models with the EVO suffix in the model name) utilize a larger 26-pin connector. The two different connectors are shown below alongside the 9-pin connector for the light source:

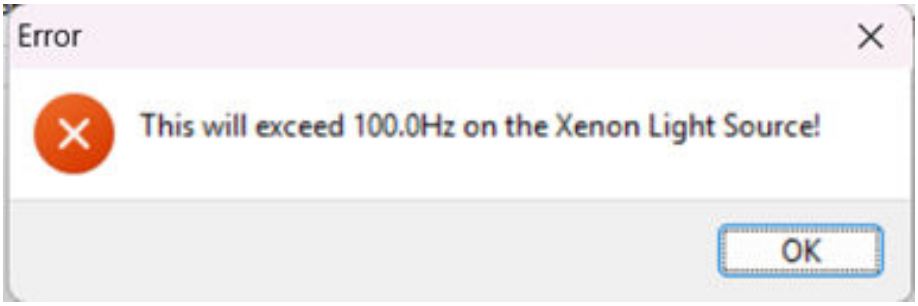




Once connected, the light source can be controlled within AvaSoft by enabling the Xenon Light Source option. This can be accessed by clicking on the Spectrometer settings (circled in red below), navigating to the Light Sources Control tab (circled in green below), and checking the Xenon Light Source box (circled in blue below).

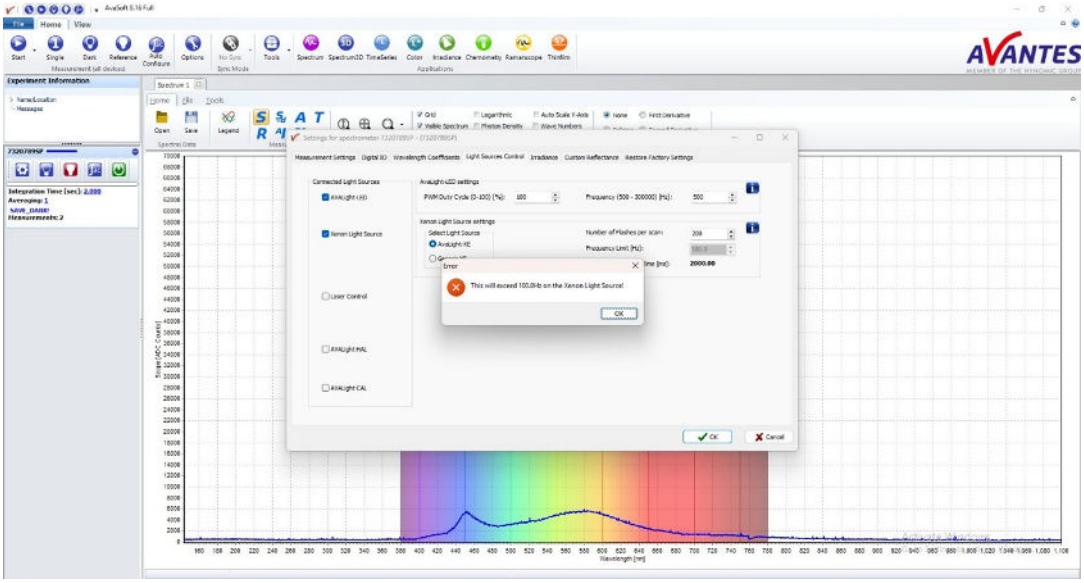


Notice that after checking this box, there are options available for AvaLight-XE or Generic XE. The Generic XE option allows users to adjust the frequency limit. While some xenon sources do have flexibility in this limit, it is strongly recommended that this setting is not changed and only the AvaLight-Xe setting is used with any AvaLight-Xe-Mini lamps. To the right of this is a Number of Flashes per scan setting. As named, this will set the number of times the xenon lamp flashes per integration time. Due to the 100Hz frequency limit, any single adjustment to this value corresponds to a 10ms difference in the Minimum Integration Time value. Because of this relation, it is recommended to use an integration time that is divisible by 10ms (i.e., 20ms, 50ms, 130ms, etc.). This also allows the maximum number of flashes for the respective integration time. For example, if a 100ms integration time is used, the number of flashes can be set to 10 to fully utilize the integration time. If the number of flashes is set such that the minimum integration time exceeds the set integration time, the following error will appear, and the number of flashes will be reset to 0:



With this in mind, if the number of flashes per scan is being increased, always change the integration time first, then the flashes per scan value. If the integration time needs to be decreased, the number of flashes per scan must be decreased first, otherwise the integration time will not update after clicking "Set".

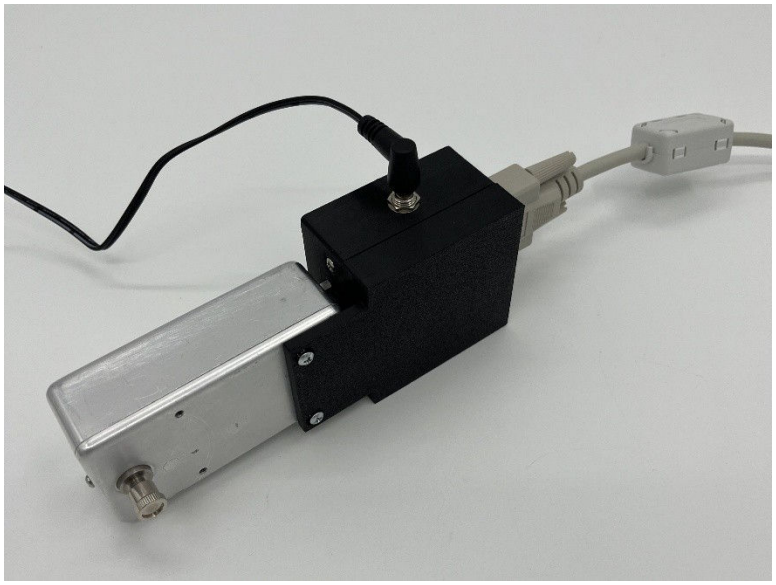
Since many numbers in AvaSoft are floating numbers, sometimes very miniscule rounding errors can create errors where it shouldn't appear to be the case. Depending on the spectrometer and light source, AvaSoft may throw the above error in cases where it may not be apparently a problem, as shown below:



In cases such as this, it is recommended to set the integration time slightly above the target value (in this case, setting the integration time to 2.001s when the target is 2.000s), adjust the number of flashes per scan to 200, and then reset the integration time to 2.000s so that the value hits its floor without being below the minimum integration time.

The nature of the Xenon spectra with its many gaussian peaks can result in saturation of the spectrometer being used particularly in the visible range (380-780 nm). The red saturation warning will appear on the screen. Avoiding saturation may mean that the A/D counts in scope mode are not fully optimized at 80% of the maximum 65,536 counts across the entire wavelength range. Using some trial and error it is possible to find an optimum level of scope counts without saturation. In some rare cases, the Avalight-XE-Mini and all other pulsed xenon sources from Avantes can fully saturate the spectrometer even at the minimum possible integration time usable with this source (10 ms). If this occurs, an attenuator may be required to block out part of the light output to prevent saturation. Avantes offers the ATT-INL inline attenuator, ATT-DA direct attached attenuator or the CC-VIS/NIR-SMA inline cosine diffuser as options for attenuation. Please contact a sales engineer for more information about attenuator options.

One limitation of the Xe-Mini is its lack of an internal shutter. Because of this, if a dark measurement must be saved in AvaSoft, the only method for blocking the xenon light is to physically unplug it, typically where the interface cable connects to the spectrometer, the light source, or the power supply. If the DLL is being used, some extra lines of code can be added such that whenever a dark measurement is taken, the number of flashes can be temporarily set to 0, but this functionality is unfortunately not available in AvaSoft. Alternatively, a hardware solution can be implemented. Below is an example developed at Avantes Inc. that utilizes a simple relay and the TTL shutter function within AvaSoft to cut power to the Xe-Mini anytime a dark measurement is taken:



While this prototype is not something we offer as a product, it shows that this functionality can be implemented by either software or hardware means with just a few steps.

With these steps complete, the AvaLight-Xe-Mini can be utilized for a variety of measurements and fully controlled through AvaSoft. Please reach out to our support team at support@avantes.com for further explanation or troubleshooting options.

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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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