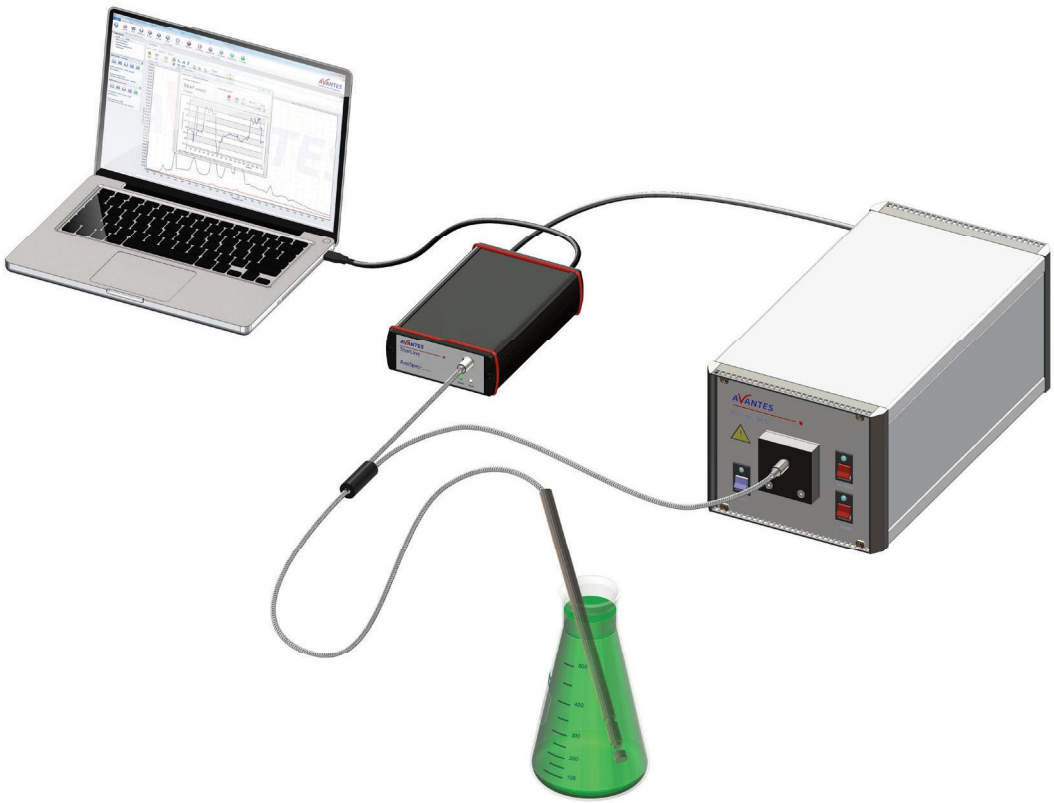
UV/VIS absorbance measurements

The absorbance (also called optical density) of a material is a logarithmic ratio of the radiation falling upon a material, to the radiation transmitted through a material. UV/VIS absorbance measurements encompass a wide variety of chemical and biochemical applications which involve many areas of research and industrial end uses. UV/VIS absorbance can be applied qualitatively and quantitatively in spectroscopic measurement applications ranging from blood parameters to chemical concentrations in process and reaction monitoring. Fiber-optic spectrometers offer a tremendous value proposition for UV/VIS measurements because of their relatively low cost, small size and ability to be introduced in harsh environments through the fiber interface. Combined with a fiber-optic transmission dip probe, inline flow cells or the more traditional cuvette cell, a fiber-optic spectrometer can accurately and repeatably measure over the range from 200-1100 nm.

Small Instruments Come of Age

Scientists who are largely familiar with more traditional bench top spectrophotometers may have the perception that fiber-optic instruments cannot provide the resolution or stray-light rejection required for more demanding applications. In fact, fiber-optic spectrometer technology has come a long way and Avantes' instruments are on the leading edge for this technology. Our instruments are capable of measuring at resolutions as high as 0.05 nm in the UV. In terms of stray-light rejection, Avantes has developed a special optical bench called the ultra-low stray-light (ULS) optical bench to provide optimal performance for our customers. AvaSpec ULS spectrometers have stray-light levels as low as 0.04%.

Typically UV/VIS absorbance systems consist of a spectrometer, stabilized light source and fiber-optics, which are connected to some form of sampling accessory (probe or cuvette cell). Single fiber-optic spectrometers can be configured for broadband measurements (200-1100 nm) or narrow band (any range from 200-1100 nm) depending upon the desired wavelength range and resolution. Avantes UV/VIS instruments are also fully compatible with our AvaSpec NIRLine spectrometers, which enable spectroscopic measurements out to 2500 nm.



Common System Configurations

Avantes modular platform enables users to configure systems in a variety of ways and also allows the flexibility of changing the system configuration later to provide additional functionality. The typical UV/VIS absorbance system consists of an AvaSpec spectrometer, AvaLight fiber-optic light source, fiber cables and a cuvette cell holder. To the left this system configuration is shown with a cuvette cell holder above with a dip probe configuration below.

Our affordable AvaSpec-ULS2048-USB2 and AvaSpec-ULS2048L-USB2 provide excellent resolution (1.0 nm FWHM) over the entire range from 200-1100 nm, or higher resolution for a shorter-range configuration. For higher resolution (0.6 nm FWHM from 200-1100 nm) the AvaSpec-ULS3648-USB2 is recommended. Customers that demand higher signal-to-noise performance and higher sensitivity in the UV or NIR should consider Avantes SensLine instruments.

The AvaSpec-ULS2048XL has a high-performance back-thinned CCD detector and the AvaSpec-HS1024X58/122-TEC is Avantes highest sensitivity spectrometer with a thermo-electrically cooled CCD detector and a high numerical aperture optical bench. Any of Avantes' instruments can be combined with our AvaLight-DHS-BAL deuterium halogen source and a CUV-UV/VIS cuvette cell holder. The CUV-DA-DHS is a nice alternative, which enables directly coupling of the cuvette cell holder to the front plate of the light source to minimize the use of fiber-optics. This same system configuration can be integrated into a single housing (AVS-Desktop) to provide an integrated spectrophotometer module with a common power supply for the light source and spectro-meter.

Fiber-optics

One of the key value propositions to fiber-optic instruments is the ease with which measurements can be made inline or in-process using a fiber-optic probe or accessory. Avantes offers a variety of sizes and configurations of fiber-optic transmission dip probes, which include special configurations for measurements in high temperatures (up to 500 °C), high pressure or vacuum. Also available are fiber-optic flow cells for standard and micro-fluidic applications.

Instrument Control Software

Avantes proprietary AvaSoft software is a Windows-based 32- and 64-bit compatible software package which enables full instrument control and includes a basic chemo-
metry add-on module (AvaSoft-Chem). For customers requiring more sophisticated analytical software, which enables model development and multi-variate analysis, Avantes instruments are fully compatible with Panorama-Pro software from LabCognition.

UV/VIS/NIR Absorbance

Designed for broadband measurements, this UV/VIS absorbance bundle features a high power deuterium halogen light source with integrated shutter and a variable dip probe. A versatile bundle to measure absorbance in most situations.

Typical applications:

- Colorization of fluids
- In-line measurements
- Color of liquids in test tubes and flasks

... and many more

Order information: Ava-Absorbance

Spectrometer	AvaSpec-ULS2048-USB2	Grating UA (200-1100nm) 25 µm slit, DUV, DCL-UV/VIS OSC-UA Order Sorting Filter AvaSoft-Full
Light source	AvaLight-DH-S	
Fiber optics	FDP-7UV200-VAR Dip Probe	

The AvaAbsorb system was designed for those situations in which you would like to do consecutive sample and reference measurements in a controlled environment.

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