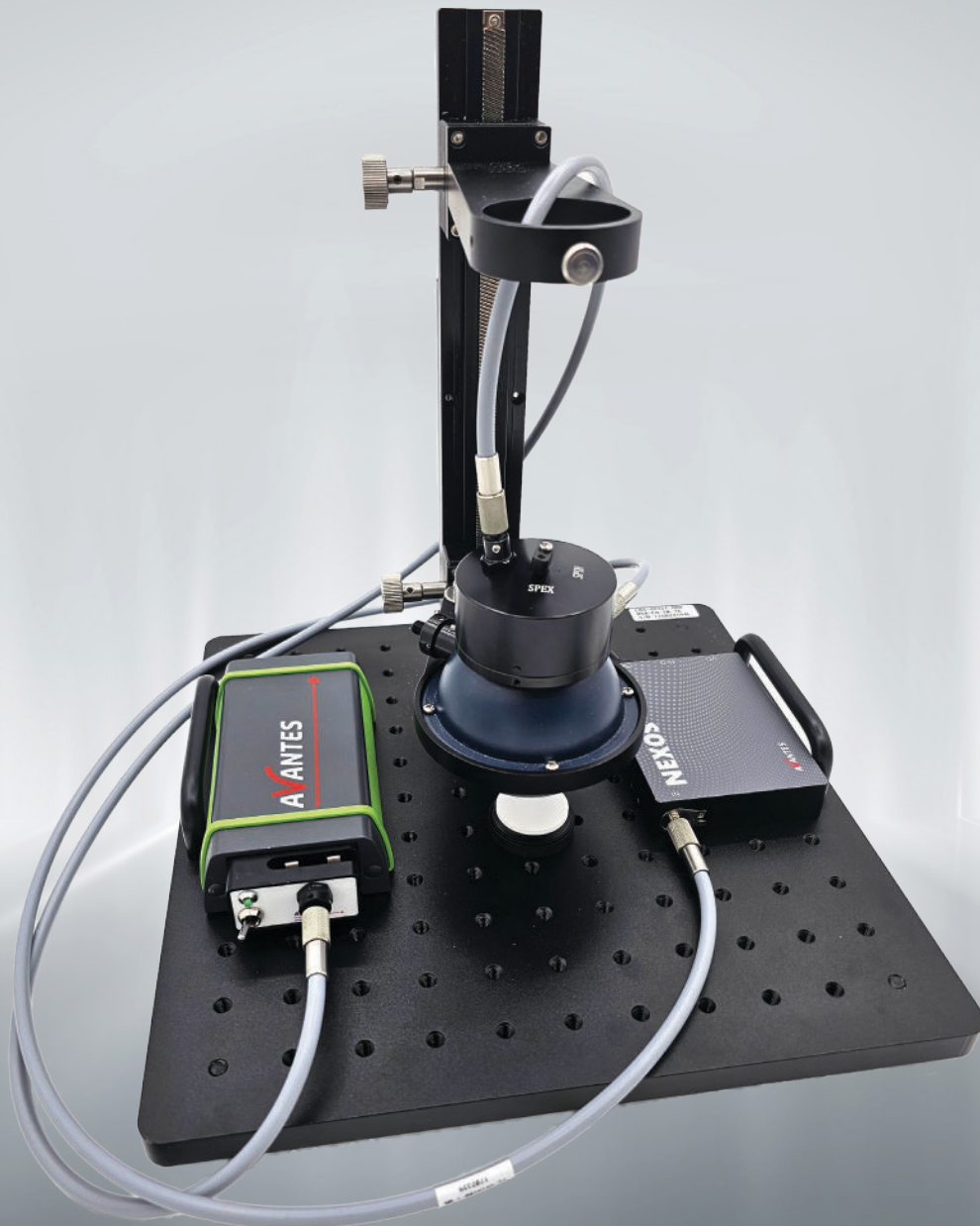
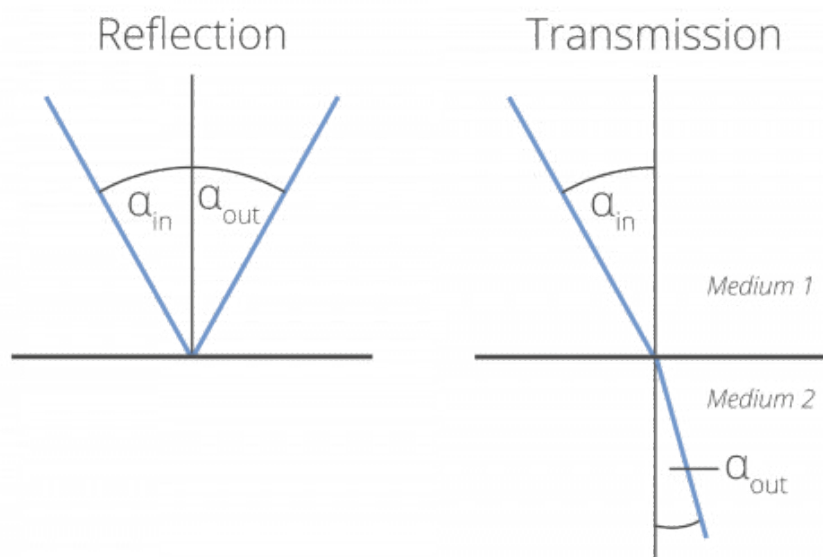


SPECTROSCOPY CONFIGURATIONS FOR TRANSMISSION AND REFLECTION APPLICATIONS



APPLICATIONS FOR TRANSMISSION & REFLECTION SPECTROSCOPY

Reflection or reflectance spectroscopy, is used to non-invasively characterize materials projecting incident light on a sample and measuring the corresponding reflected light. In specular reflection the angle of reflected light equals the angle of incident light (example mirrored surfaces). In diffuse reflection conversely the reflected light from a surface is scattered in many angles. Both types of reflection can be used on a variety of sample types from metals, glass and plastics to biologicals and powders. Transmission spectroscopy involves passing light through a sample and measuring the received light. Both specular and diffuse transmission measurements are possible much like reflection. Often samples of the same type can be characterized using either transmission or reflection.



The following configurations represent some of the more common use cases for reflection and transmission that are possible with Avantes instruments, light sources and sample interface accessories. These configurations offer the following advantages.

Size/portability – These configurations are optimized for size and with portability/transportability in mind

Repeatability – Often measurements with fiber optic instruments can result in non-repeatable measurements so these fixed configurations ensure greater sample to sample repeatability.

Value – These configurations are affordable to accommodate different budgets

Use of use – These configurations are designed to make transmission and reflection measurements easier for different sample types.

These configurations represent examples of Avantes capabilities, but certainly more unique configurations are possible based on each application. Please contact a sales engineer to discuss your requirements.

REFLECTION STAGE SETUP

Reflection/Transmission Stage

[TR-Stage-US](#): Reflection (shown) and/or transmission stage configurations with vertical orientation; integrated transmission and reflection stage

Light Source Options

Avalight-HAL-S-Mini2 tungsten halogen source 360-2500 nm (shown); Avalight DhC - Deuterium halogen source 200-2500 nm for specular samples, Avalight-DH-S High Powered Deuterium halogen source 200-2500 nm

Reference Tile

Reference tiles for specular (RS-2) or diffuse (WS-2) samples. Both of these tiles are also available with NIST traceable calibrations.

Spectrometer

[AvaSpec-NEXOS™ 2048 CL](#)

AvaSpec-Varius2048CL (200-1100 nm or any subset) with slit-size dependent resolution; optional interface cable for automated shuttering. NIR spectrometer options (950-2500 nm) are available and can complement or replace UV/VIS instruments.

Fiber Optics

Any Avantes reflection probe can be utilized; however, the most commonly used configuration features the FCR-7UVIR200-2-ME/BX probe, which incorporates a 6-around-1 fiber arrangement."



APPLICATIONS

The reflection set up shown above is ideal for **measuring plastics, thin film coatings, metal, biological** or any **other sample type which has reflection properties of interest** over the range from 200-2500 nm. The stage is fully adjustable for larger or smaller samples. Collimating optics can be adjusted to control spot size projecting onto samples. Any of Avantes AvaSpec spectrometers can be configured with this set up. If a broadband configuration is required, Avantes instruments can be coupled together to cover a broader range. For example to cover 200-2500 nm, Avantes AvaSpec-Varius 2048CL-EVO is ideal and this can be coupled with our AvaSpec-NIR256-2.5-HSC EVO to extend from 1100 nm to 2500 nm.

TRANSMISSION STAGE SETUP

Reflection/Transmission Stage

TR-Stage-US: Transmission Stage (shown) and/or reflection stage configurations with vertical orientation

Light Source

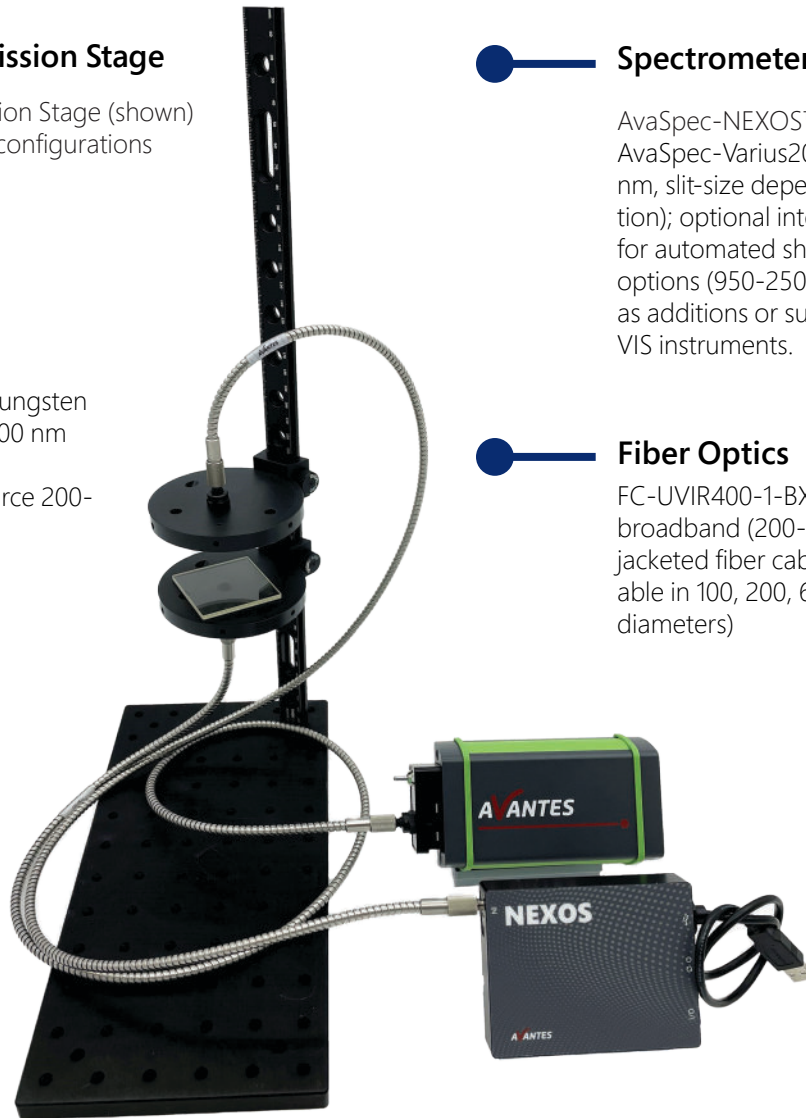
AvaLight-Hal-S-Mini2: tungsten halogen source 360-2500 nm (shown); AVALIGHT Dhc - Deuterium halogen source 200-2500 nm

Spectrometer

AvaSpec-NEXOS™ 2048 CL; AvaSpec-VariS2048CL (200-1100 nm, slit-size dependent resolution); optional interface cable for automated shuttering. NIR options (950-2500 nm) available as additions or substitutes for UV/VIS instruments.

Fiber Optics

FC-UVIR400-1-BX - 400: micron broadband (200-2500 nm) BX jacketed fiber cables (also available in 100, 200, 600 micron core diameters)



APPLICATIONS

This transmission set up is optimized for **measuring specular transmission** from 200-2500 nm in which collimated light is projected into a sample and remains collimated as it passes into the receiving optics. With the addition of a unique receiving plate and an integrating sphere, it can be reconfigured for diffuse transmission. The stage is suitable for glass and other optical materials, plastics and film characterization. The stage is fully adjustable for larger or smaller samples. Collimating optics can be adjusted to control spot size projecting onto samples. Any of Avantes AvaSpec spectrometers can be configured with this set up. If a broadband configuration is required, Avantes instruments can be coupled together to cover a broader range. For example to cover 200-2500 nm, Avantes AvaSpec-VariS 2048CL-EVO is ideal and this can be coupled with our AvaSpec-NIR256-2.5-HSC EVO to extend from 1100 nm to 2500 nm.

TRANSMISSION STAGE WITH SPHERE

(For Measuring Diffuse Transmission Samples)

Reflection/Transmission Stage

TR-Stage-US: Transmission (shown) and/or reflection stage configurations with vertical orientation.

Integrating Sphere

The AvaSphere-50-IRRAD acts as the collector for this configuration which is ideal for measuring samples with scattering properties

Light Source Options

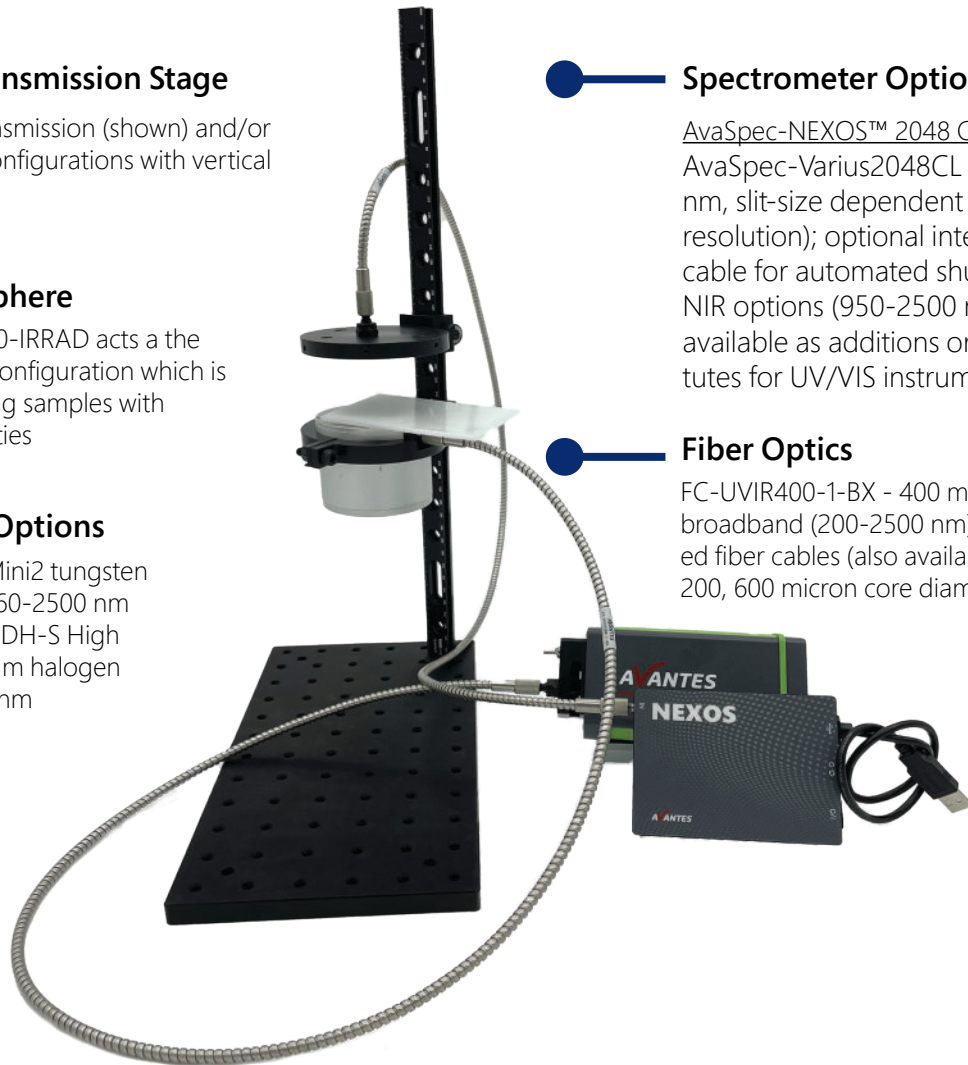
Avalight-HAL-S-Mini2 tungsten halogen source 360-2500 nm (shown); Avalight-DH-S High Powered Deuterium halogen source 200-2500 nm

Spectrometer Options

AvaSpec-NEXOS™ 2048 CL;
AvaSpec-Varius2048CL (200-1100 nm, slit-size dependent resolution); optional interface cable for automated shuttering. NIR options (950-2500 nm) available as additions or substitutes for UV/VIS instruments.

Fiber Optics

FC-UVIR400-1-BX - 400 micron broadband (200-2500 nm) BX jacketed fiber cables (also available in 100, 200, 600 micron core diameters)



APPLICATIONS

This transmission set up is ideal for **measuring diffusing samples** where collimated light entering a sample exits diffused thus requiring a sphere to collect the output signal. It can be used on plastics and diffusing optics set up shown above is ideal for measuring plastics, or any other sample type which has transmission properties of interest over the range from 200-2500 nm. The stage is fully adjustable for larger or smaller samples. Collimating optics can be adjusted to control spot size projecting onto samples. Any of Avantes AvaSpec spectrometers can be configured with this set up. If a broadband configuration is required, Avantes instruments can be coupled together to cover a broader range. For example to cover 200-2500 nm, Avantes AvaSpec-Varius 2048CL-EVO is ideal and this can be coupled with our AvaSpec-NIR256-2.5-HSC EVO to extend from 1100 nm to 2500 nm.

VARIABLE COLLIMATING LENS CONFIGURATION

Transmission Stage

CLH-UV/VIS-VAR - Fully adjustable transmission (shown) stage configuration with horizontal orientation

Fiber Optics

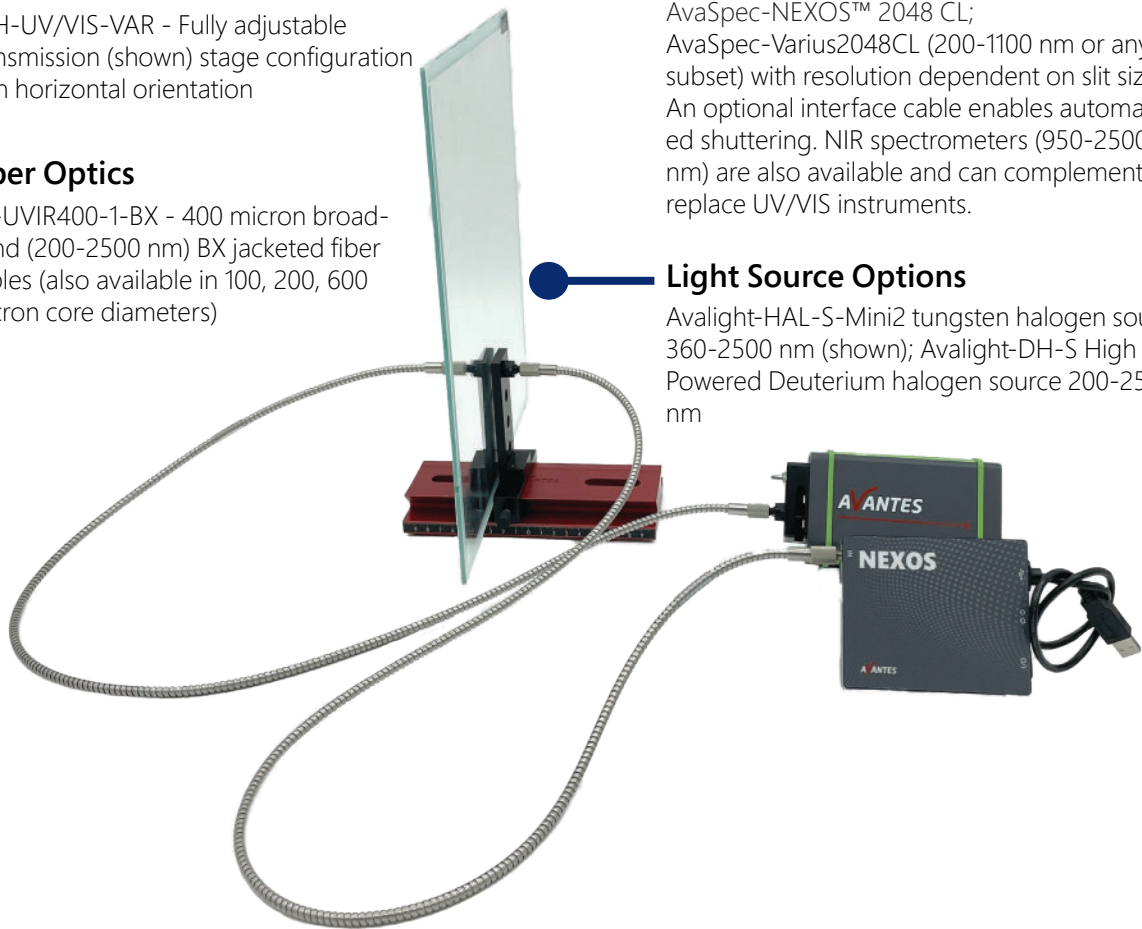
FC-UVIR400-1-BX - 400 micron broadband (200-2500 nm) BX jacketed fiber cables (also available in 100, 200, 600 micron core diameters)

Spectrometer Options

AvaSpec-NEXOS™ 2048 CL;
AvaSpec-Varius2048CL (200-1100 nm or any subset) with resolution dependent on slit size. An optional interface cable enables automated shuttering. NIR spectrometers (950-2500 nm) are also available and can complement or replace UV/VIS instruments.

Light Source Options

Avalight-HAL-S-Mini2 tungsten halogen source 360-2500 nm (shown); Avalight-DH-S High Powered Deuterium halogen source 200-2500 nm



APPLICATIONS

This transmission set up is ideal for **measuring optically transmissive samples** where a **horizontal orientation is problematic**. For example **large glass panes** or **plastic laminates**. It can be used on plastics, glass or any other sample type which has transmission properties of interest over the range from 200-2500 nm. The stage is fully adjustable for larger or smaller samples. Collimating optics can be adjusted to control spot size projecting onto samples. Any of Avantes AvaSpec spectrometers can be configured with this set up. If a broadband configuration is required, Avantes instruments can be coupled together to cover a broader range. For example to cover 200-2500 nm, Avantes AvaSpec-Varius 2048CL-EVO is ideal and this can be coupled with our AvaSpec-NIR256-2.5-HSC EVO to extend from 1100 nm to 2500 nm.

TRANSMISSION/REFLECTION SYSTEM



- **Reflection/Transmission Stage** TRAN/REFL STAGE: Integrated transmission and reflection stage with adjustable vertical arm for positioning integrating sphere and samples.
- **Spectrometer Options** AvaSpec-Nexos 2048CL and AvaSpec-Varius2048CL (200-1100 nm, slit size-dependent resolution) with optional automated shuttering. NIR options (950-2500 nm) are also available and can complement or replace UV/VIS instruments.
- **Light Source Options:** For UV measurements, the Avaspec-XE-Mini-HP is recommended (interface cable and power supplies sold separately).
- **Integrating Sphere** 76 mm Spectralon Integrating sphere for reflection or transmission; including two SMA ports, port reducer and reflectance port plug
- **Reference Tile:** W-2 white diffuse PTFE based reference tile
- **Fiber Optics:** FC-UVIR400-1-MS: Two 400 micron core broadband fibers

APPLICATIONS

The TR System is ideal for all types of transmission and reflection measurements on **glass, plastic, powder and biological samples**. For reflection measurements both specular reflection included (SPIN) and specular reflection excluded (SPEX) are possible. For transmission measurements the sphere becomes the collector allowing for both specular and diffuse samples to be measured reliably. The system can also facilitate photoluminescence measurements on solid and powder samples.

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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