AvaRaman Bundles

Raman Spectroscopy allows obtaining individual spectral 'fingerprints'of materials. Commonly used in chemistry, pharmaceutical and medical fields,to provide information by which molecules can be identified.

To offer our customers optimal performance for a reasonable price, Avantes joint forces with 2 partners to offer you a Raman Bundle consisting of a great spectrometer (3 different models), a unique Laser-Probe combination (785nm) supplying enhanced signals and an outstanding Software package to analyze the Raman spectra. These 3 Bundles have in common:

For Excitation:
AvaLaser785 (incl.: 785 nm laser safety goggles). It has an ultra-high throughput integrated Raman probe. This novel device includes an integrated wavelength stabilized laser source with Raman filter packs, beam shaping optics and high efficiency Raman spectra collection optics.

Type of Measurements:
Raman techniques are used for many different materials. The Avantes bundles are very good for the use of powders and liquids.
If very weak signals possibly together with fluorescence background the AvaRaman-D (Highsense Bundle) using our new AvaSpec-HERO is recommended (Higher quantum efficiency in NIR and better signal to noise performance). When weak Raman signals occur (Integration time longer than 5 seconds) the thermo-electric-cooled (TEC) spectrometer is recommended. This is added in the AvaRaman-E (Performance Bundle). When strong signals are available (aromatic compounds, alcohol based liquids) in general AvaRaman-F (Basic Bundle) is very suitable to perform the measurement.

For Analysis:
Panorama-Light: Panorama Light is a modular, high-end software platform for spectroscopic data evaluation. The application meets all requirements for a comprehensive spectroscopy working environment, offering:

- Measurement with an instrument
- 2D & 3D data visualization
- Searching in libraries
- Archiving in spectral libraries, including additional information

For Detection:
We offer state of the art spectrometers based on the Avantes Star- and SensLine spectrometers, tailored for optimal performance in the Raman range of interest.

Ordering information

Ava-Raman-D (Highsense Bundle) For the most challenging applications. This bundle uses the AvaSpec-Hero for detection. The High end cooled back-thinned detector, low-noise electronics and optical bench with high Numerical Aperture, results in excellent Signal to Noise and Dynamic Range.	• Range : 100 cm-1 - 3000 cm-1 • Resolution: 10 cm-1 • Spectrometer: AvaSpec-HS1024x58TEC-EVO set for (788-1020nm), slit-25 (replaceable slit), FC-PC connector • Also including: AvaLaser785 (integrated in probe), Raman software: Panorama Light
Ava-Raman-E (Performance Bundle) For demanding applications. Based on the cooled version of the spectrometer offered in the bundle Ava-Raman-A. Cooling enables you to work with longer inte-gration times, yet keeping the thermal noise limited.	• Range : 150 cm-1 - 3600 cm-1 • Resolution: 6 cm-1 • Spectrometer: AvaSpec-ULS2048x64TEC-EVO set for (788-1100nm), slit-25 (replaceable slit), DCL-UV/VIS200, FC-PC connector • Also including: AvaLaser785 (integrated in probe), Raman software: Panorama Light
Ava-Raman-F (Basic Bundle) For basic applications. Based on an uncooled spectrometer this is the entry bundle for reasonable strong signals.	• Range : 150 cm-1 - 3600 cm-1 • Resolution: 6 cm-1 • Spectrometer: AvaSpec-ULS2048CL-EVO set for (788-1100nm), slit-25 (replaceable slit), DCL-UV/VIS200, FC-PC connector • Also including: AvaLaser785 (integrated in probe), Raman software: Panorama Light

Options

AvaRaman-SH-785 Bundle	Bundle Light tight cuvette holder for Use with Raman probe of AvaLaser785 used with the AvaRaman D/E/F bundles. Incl. adjustable gold coated mirror for signal collection.
AvaRaman-XYZ-785 Bundle	Ava-Raman-XYZ-785 Bundle Manually Adjustable X-Y-Z Stage for use with Raman probe of AvaLaser785 used with the Ava-Raman D/E/F bundles.

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AvaRaman Fiber-optic Raman System

AvaRaman

Raman spectroscopy is especially useful for reaction monitoring, product identification, remote sensing and the characterization of highly scattering particulate matter in aqueous solutions. Based on the principle discovered by Prof. Chandrasekhara Venkata Raman, it measures the result of the inelastic scattering of photons.

Avantes uses the high-sensitivity AvaSpec spectrometers in combination with a 532 nm or 785 nm laser to give you the best result for your Raman measurements. The spectrometers are appropriately configured according to the wavelength of the laser.

Now the AvaSpec-HERO is integrated in a Raman system as well.
Because of the lower dark noise (only 2 counts) you'll have a much better performance. The superior Signal to Noise ratio (800:1) is important when you're dealing with small signals, which is typically the case in raman,. Also when small process changes need to be monitored in time, the HERO is superior as the small change process will lead to a small change in signal which can be clearly discriminated by the excellent SN ratio. The higher NA optical bench results in a better sensitivity (Twice as high as the ULS2048L). This will lead to more photons impinging on the detector. Temperature control is very important in raman measurements to create stable results in time. Cooling to -10 °C for lowest noise performance and very stable cooling control (+-0.1 °C accuracy) is delivering accurate and reproducible results.
This all together provides you with a combination that is suitable for the more demanding applications (low light, better signal to noise, low noise ratio).

All AvaRaman systems are equipped with cooling systems. Cooling the detector down to -35°C cooling versus ambient, reduces the noise figures by a factor 2-3, enabling the usage of longer integration times to enhance the detection of small signals. All AvaRaman systems are delivered with special AvaSoft-Raman software. Complementary Panorama-Pro software is available for Raman interpretation and functional group assignment.

A selection of different probes is available to select the right one for your application. For more information on our software solutions including AvaSoft-FULL/Raman and Panorama-Pro, please check the software pages on the website.

Technical Data

	AvaRaman-532TEC	AvaRaman-532HERO-EVO	AvaRaman-785TEC
	Cooled	Cooled	Cooled
Signal to noise Ratio	200:1 for Benzene	800:1 for Benzene	300:1 for Benzene
Resolution*	10 cm^{-1}	10 cm^{-1}	7 cm^{-1}
Spectrometer	AvaSpec-ULS2048L-TEC with grating NC (535-752 nm), slit-25, DCL-UV/VIS TE-cooled	AvaSpec-HERO with HSC1200-0.75 (535-660nm), slit-25-FCPC, TE-cooled, Standard: replaceable slit	AvaSpec-ULS2048L-TEC with grating SI (785-1080 nm), slit-25, DCL-UV/VIS-200 TE-cooled
Raman Shift	100-5400 cm^{-1}	100-3650 cm^{-1}	100-3500 cm^{-1}
Laser output	532 nm, 50 mW	532 nm, 50 mW	785 nm, 500 mW, Class 3b
Laser Wavelength	532 nm	532 nm	785 nm
Laser Bandwidth	< 0.1 nm	< 0.1 nm	< 0.2 nm

** typical resolution: higher resolution possible on request*

Pre-configured spectrometers can be shipped within 24 hours

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AvaRaman Probes

AvaRaman-PRB-XXX
3/8" SS low-cost focusing probe with a 200 µm excitation fiber and 400 µm read fiber. Multiple focal lengths available (5 mm, 7.5 mm (standard), 10 mm). It can withstand 80ºC. Manual shutter included, 1.5 m fibers.
Specify XXX=excitation wavelength, laser and spectrometer connection type.

AvaRaman-PRB-FP-XXX
1/2" SS focusing probe with a 200 µm excitation fiber and 400 µm read fiber. Multiple focal lengths available (5 mm (standard), 7.5 mm, 10 mm). It can withstand 80ºC.
Specify XXX=excitation wavelength, laser and spectrometer connection type.

AvaRaman-PRB-FIP-XXX
5/8" SS immersible focusing probe for in-situ measurements with a 200 µm excitation fiber and 400 µm read fiber. It can withstand 200ºC.
Specify XXX=excitation wavelength, laser and spectrometer connection type.

AvaRaman-PRB-FC-XXX
3/8" SS immersible process probe for in-situ measurements with a 200 µm excitation fiber and 400 µm read fiber. It can withstand 500ºC and 3000psi.
Specify XXX=excitation wavelength, laser and spectrometer connection type.

Ordering Information

AvaRaman-532TEC-USB2	Consisting of following elements: • Solid state 50 mW laser 532 nm, FWHM 0.1 nm, FC/PC connector • TE-cooled AvaSpec-ULS2048L-TEC-USB2 Spectrometer with 1200 lines/mm grating set 535-752 nm, 25 µm slit (SMA), DCL-UV/VIS-200 • AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-532 laser safety goggles
AvaRaman-532HERO-EVO	Consisting of following elements: • Solid state 50 mW laser 532 nm, FWHM 0.1 nm, FC/PC Connector • TE-cooled AvaSpec-HERO Spectrometer with 1200 lines/mm grating set for 535-660 nm, 25 µm slit (FC/PC) (replaceable) • AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-532 laser safety goggles
AvaRaman-785TEC-USB2	Consisting of following elements: • Solid state 500 mW laser 785 nm, FWHM 0.2 nm, FC/PC connector • TE-cooled AvaSpec-ULS2048L-TEC-USB2 Spectrometer with 830 lines/mm grating set 785-1080 nm, 25 µm slit (SMA), DCL-UV/VIS-200 • AvaSoft-Raman software for the AvaRaman system, AvaRaman-GL-785 laser safety goggles

Other Accessories

AvaRaman-SH-3/8"	• Rugged cuvette holder for secure positioning of 3/8" Raman probes
AvaRaman-SH-1/2"	• Rugged cuvette holder for secure positioning of ½" Raman probes
AvaRaman-Calibrationtile	• PTFE White tile in holder for 3/8" Raman probe