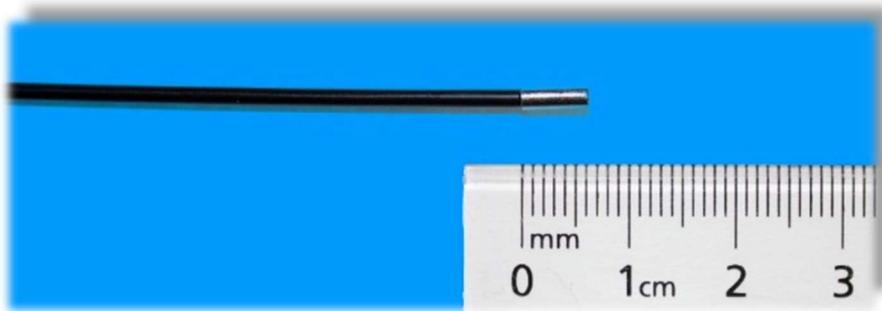


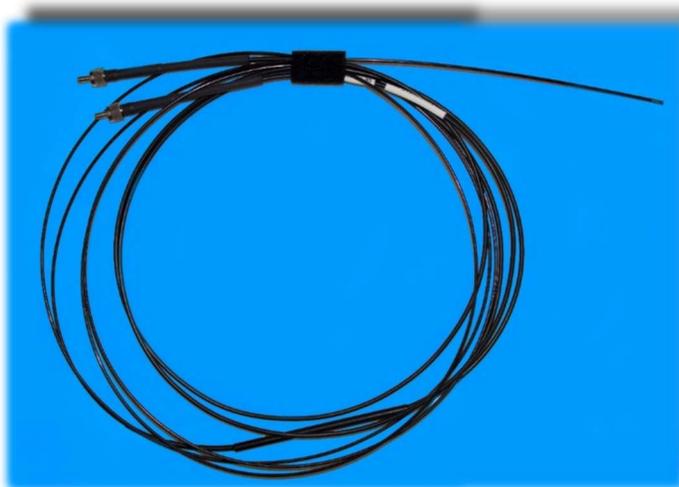
Raman Endoscopic Probe

Extremely Small Size, High Spatial Resolution, High Light Gathering Capabilities



Raman Endoscopic Probe Description

The EmVision Raman Endoscopic Probe enables efficient excitation and collection of Raman excited light from a 785 nm laser (note, other laser wavelengths available). This probe has a



small rigid tip, and is capable of insertion into and navigating the bend radius common in many flexible endoscopic designs. The finished probe tip diameter is 1.65 mm and the probe tip length is 5.0 mm. The approximate diameter of the surface of the region sample is 0.5 mm. The overall length of the probe is 3.0 meters. The laser connection can be FC-PC or SMA, and

the spectrometer connection can be EmVision's patented multi-fiber connector, SMA connector, or ferrule connector.

Raman Endoscopic Probe Design

The probe has a single 200 μm excitation fiber at its center and is surrounded by ten 200 μm collection fibers. All the fibers are low hydroxyl 0.22 NA fibers. The laser delivery fiber has a small band-pass filter positioned in front of it, and the collection fibers have a long-pass notched donut filter positioned at their ends. Beyond the filters is a two-component lens. The inner lens can be either sapphire or fused silica. The tips outer contact surface can be either fused silica or magnesium fluoride and all housed in a stainless steel needle tube. The fused silica allows for a scratch resistant easy to clean probe, while the magnesium fluoride allows for a Raman free outer contact component. The optical elements in this design are permanently fixed in alignment, with no possibility of movement due to normal use or vibrations; unlike other commercially available lensed fiber optic probes. The probe can be used for immersion and direct contact, and has been run endoscopically in humans (e.g. prostate and GI tract). The probe design is described in detail within US patent number 8,175,423 and US patent number 8,702,321.



Raman Endoscopic Probe Accessories

To address optimal integration and repeatable measurements, the probe can incorporate EmVision's patented keyed multi-fiber connector system. When coupled with EmVision's *HT or CS Raman Spectrometer*, optimal $f/2.2$ integration is achieved, high signal-to-noise ratios, short acquisition times and repeatable optical coupling is ensured. The keyed multi-fiber connector can only plug-in one-way and "snaps-in" to ensure consistent fiber positioning between the probe and spectrometer. This technology has been found to be very beneficial in applications requiring frequent probe removal, such as sterilization procedures.



Raman Endoscopic Probe Specifications:

Raman Endoscopic Probe Dimensions	Rigid 304 stainless steel tip: Outside diameter: 1.65 mm (0.065 in.) Note: < 1 mm OD probes are possible Length: 5.0 mm (0.197 in.) standard Overall length: 3.0 m (9.84 ft.) standard
Probe Tip Care	<p>Fully immersible in most powders and aqueous solutions</p> <p>Chemicals and solvents to avoid due to epoxy used in assembly of probe tip: methylene chloride, acids, bases, acetone, methanol, methyl ethyl ketone</p> <p>Window material: fused silica or MgF2</p> <p>Probe tip cleaning: Dampen delicate task wiper (Kimwipes) with water or isopropanol and wipe probe tip using finger to apply pressure to probe tip. Inspect with loop or microscope to ensure tip is clean.</p> <p>For use in temperatures up to 15° - 70° C (59° - 158° F)</p>
Spectral Range	350-3900 cm ⁻¹ (Stokes). Depending upon spectrograph (detector) limits
Excitation Wavelength / Power	785 nm, 830 nm; other wavelengths available Maximum power input to probe: 100 mW
Working Distance	Direct sample contact or close proximity (contact measurement is typical, longer working distance to several millimeters is possible)
Raman Endoscopic Probe Fiber Configuration	Collection: (10) 200 micron core fibers Excitation: (1) 200 micron core fiber Illumination spot size: 500 microns

Filter Specifications	Excitation path: band pass filter at probe tip Collection path: long pass filter at probe tip
Probe Connectors	Collection path: Keyed snap-in linear connector (patented), fibers in line (other probe interfaces such as SMA and ferrules are available) Excitation path: FC connector, SMA 905
Notes	<ol style="list-style-type: none"> 1. To ensure optimum performance, eliminate all light sources in testing area. 2. Inquire about custom designs.

Specifications are subject to change without notice