

RAMAN SPECTROGRAPHS

530 – 630 nm & 770 – 980 nm

Raman is a very low light level technique, and even small improvements in the optical system can significantly expand detection capabilities. +Raman scatter is a faint radiation detected close to the illuminating laser line, on the long wavelength side of the laser wavelengths. The Raman spectrographs have high performance necessary for optimum Raman spectroscopy applications that require high throughput, high spectral resolution, and the best possible imaging performance. Spectrographs are available for system integration as either imaging or multichannel devices, providing easy integration with different types of CCD and CMOS cameras as well as microscopes.



There are two Raman spectrographs to choose from, depending on application requirements. Mechanically, these spectrographs differ slightly because they are optically designed for two distinct spectral ranges. The R6E covers the shorter wavelengths with a smaller range, while the R10E covers the longer wavelengths with a larger range. The R10E uses a larger spectral dispersion to achieve a larger spectral range. As an example, the pictures and mechanical drawings shown here depict the R6E spectrograph.

The current optical design of the Raman spectrographs is matched to Andor iStar 734 or Ixon 888, and Princeton instruments PI-MAX3-1024i or PI-MAX1K cameras with a 1024 x 1024 pixel sensor with 13 μm pixel size.

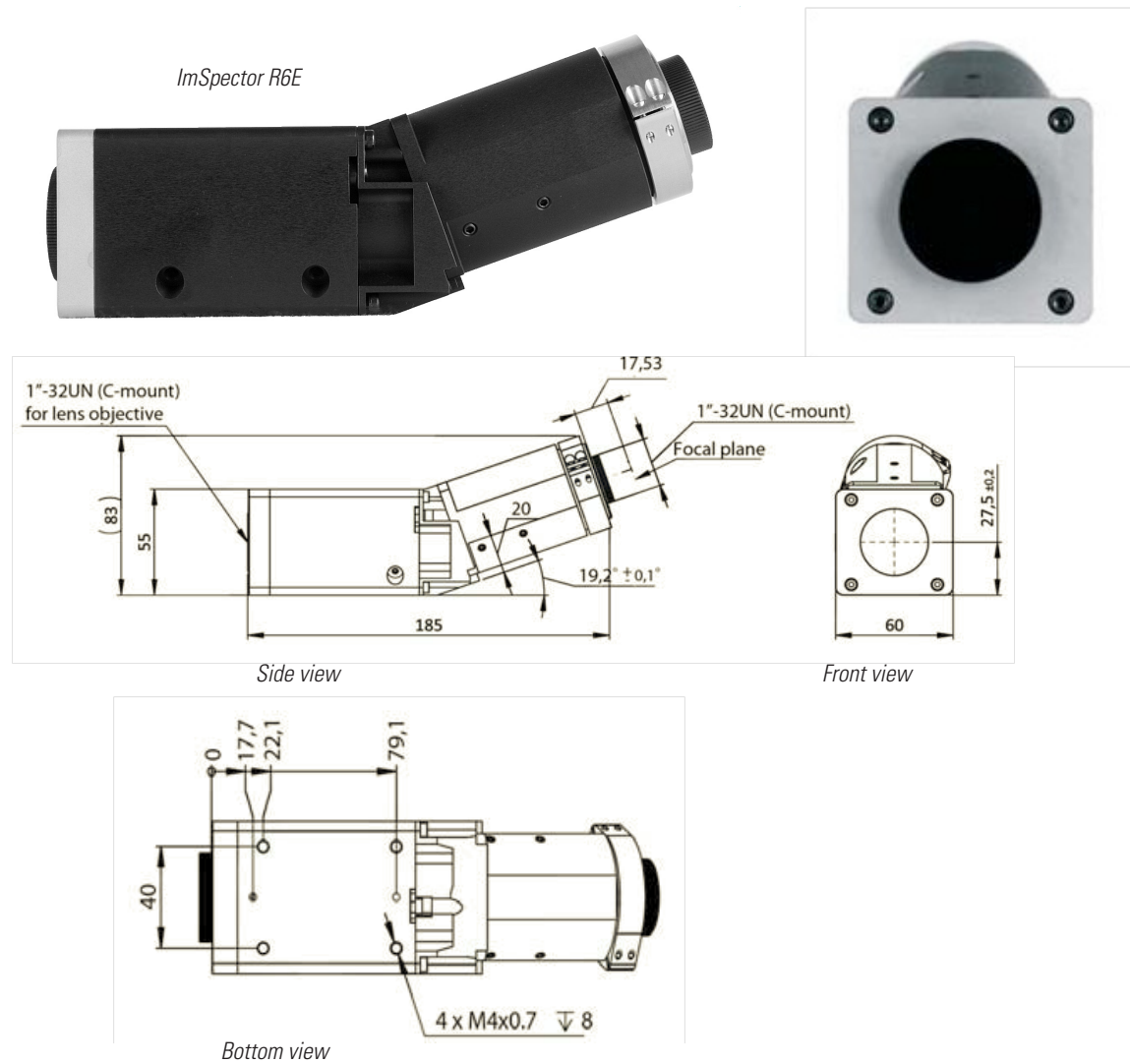
Raman Spectrograph Specifications

Optical Characteristics	R6E	R10E
Spectral Range	530 - 630 nm (18900 - 15900 cm^{-1})	770 - 980 nm (13000 - 10200 cm^{-1})
Spectral Dispersion	7.7 nm/mm	16.15 nm/mm
Spectral Resolution	0.3 nm ($\approx 10 \text{ cm}^{-1}$)	0.3 nm ($\approx 10 \text{ cm}^{-1}$)
Image Size (Spectral x Spatial)	13 x 13 mm	13 x 13 mm
Numerical Aperture	0.21 (F/2.4)	0.21 (F/2.4)
Optical Input	Telecentric	Telecentric
Average Diffraction Efficiency	> 65%	> 65%
Stray Light	< 0.5% (halogen lamp, 633 nm long-pass filter)	< 0.5% (halogen lamp, 633 nm long-pass filter)
Slit Width, default	30 μm (13, 18, 50, and 80 μm available on request)	30 μm (13, 18, 50, and 80 μm available on request)
Slit Length	14.3 mm	14.3 mm
Magnification	1:1	1:1
Aberrations		
Bending of Spectral Lines Across Spatial Axis	Smile < 3 μm (0.025%)	Smile < 3 μm (0.025%)
Bending of Spatial Lines Across Spectral Axis	Keystone < 3 μm (0.025%)	Keystone < 3 μm (0.025%)
Astigmatism	None	None
Mechanical Characteristics		
Body	Anodized Aluminum Tube	Anodized Aluminum Tube
Size (W x H x L)	60 x 83 x 187 mm	60 x 83 x 187 mm
Weight	1100 g	1100 g
Lens Mount	Standard C-mount Adapter (removable)	Standard C-mount Adapter (removable)
Camera Mount	Standard C-mount Adapter (removable)	Standard C-mount Adapter (removable)
User Adjustments	Image axis rotation relative to detector rows, back focal length adjustable ± 1 mm (for both)	
Environmental Characteristics		
Storage Temperature, non-condensing	-20 $^{\circ}\text{C}$... + 85 $^{\circ}\text{C}$	-20 $^{\circ}\text{C}$... + 85 $^{\circ}\text{C}$
Operating Temperature, non-condensing	+ 5 $^{\circ}\text{C}$... + 40 $^{\circ}\text{C}$	+ 5 $^{\circ}\text{C}$... + 40 $^{\circ}\text{C}$

A complete Raman measurement system consists of:

- Excitation laser
- Block filter for illumination
- Front optics – multichannel fiber or imaging lens
- Raman spectrograph
- Sensitive CCD or CMOS detector

The ImSpector Raman spectrograph should be used as a part of the measurement system, where all the remaining components are also optimized for the measurement setup. The ImSpector Raman spectrograph can also be used as high resolution spectrograph for standard spectral imaging or multichannel measurements.



Raman Spectrographs Ordering Information		
Part Number	Description	Product Name
MRC-318-001-01	ImSpector - Enhanced Raman Spectrograph R6E, 30 μ m slit* (default)	ImSpector R6E
MRC-318-001-02	ImSpector - Enhanced Raman Spectrograph R10E, 30 μ m slit* (default)	ImSpector R10E

* When ordering please specify if different slit width is needed.