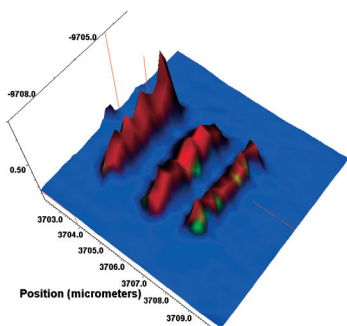
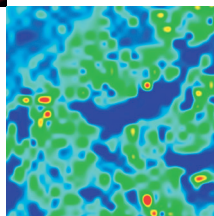
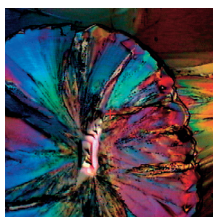


The Thermo Scientific DXR Raman microscope is designed to produce the results demanded by Raman experts with the ease required by busy analytical laboratories. SmartLock optical components and a patented autoalignment system make set-up easy, fast and precise. Automated calibration, focus and exposure ensure quality results with every measurement.

## Thermo Scientific DXR Raman Microscope

For sample microanalysis at or below the 1-micron level



The DXR Raman microscope delivers exceptional spatial resolution, together with the reliability, performance and reproducibility required in demanding analytical environments.

Designed for versatility, the DXR Raman microscope makes it as easy as possible to get high quality results.

- Class I laser-safe design for use in non-restricted environments
- Up to three excitation wavelengths for optimal results with demanding samples
- Patented autoalignment system for highest optimal performance

- Rapid, automated, multi-point calibration for confidence in sample identification
- Patented autoexposure and autofocus for true point and shoot Raman spectroscopy
- 1  $\mu\text{m}$  x, y spatial resolution and 2  $\mu\text{m}$  depth resolution
- Laser Power Regulator to assure reproducible laser power at sample
- True confocal design
- Superb visual quality
- Compatible with a full range of high-quality Olympus microscope components

## General System Features

Lasers	Single laser beam path	
	Multiple excitation lasers	Supported wavelengths 780 nm, 633 nm, 532 nm
	Laser safety	Class 1 standard. Class IIIb when fiber optic interface installed and on some specialized accessories.
	Laser Power Regulator	Active feedback system to control absolute laser power delivered to the sample. Facilitates laser-to-laser and system-to-system reproducibility.
Replaceable Components	Smart components	Components (lasers, filters, gratings, fiber port) store and report to OMNIC™ serial number, component identity, lifetime usage (lasers only) and parameters for calibration (gratings only)
	SmartLock components	Pre-aligned, user-exchangeable system components (lasers, filters, gratings, fiber port) lock into place and automatically optimize system alignment and calibration upon installation
Computer Interface		Through single USB 2.0 connector. Some accessories may require additional USB or serial ports.
Fiber Optic Port		Optional and user-installable

## System Performance – Spectral Range and Resolution

		Lasers			
		532 nm	633 nm	780 nm (high brightness)	780 nm <sup>3</sup> (high power)
Full-Range Grating	Spectral resolution <sup>1</sup>	5.0 cm <sup>-1</sup> FWHM	5.0 cm <sup>-1</sup> FWHM	5.0 cm <sup>-1</sup> FWHM	6.0 cm <sup>-1</sup> FWHM
	Upper cutoff (cm <sup>-1</sup> )	3500 cm <sup>-1</sup>	3500 cm <sup>-1</sup>	3300 cm <sup>-1</sup>	3300 cm <sup>-1</sup>
	Lower cutoff (cm <sup>-1</sup> ) <sup>2</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>
High-Resolution Grating	Spectral resolution	2 cm <sup>-1</sup> FWHM	2 cm <sup>-1</sup> FWHM	2 cm <sup>-1</sup> FWHM	
	Upper cutoff (cm <sup>-1</sup> )	1800 cm <sup>-1</sup>	1800 cm <sup>-1</sup>	1800 cm <sup>-1</sup>	
	Lower cutoff (cm <sup>-1</sup> ) <sup>2</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	
Extended-Range Grating	Spectral resolution	11 cm <sup>-1</sup> FWHM			
	Upper cutoff (cm <sup>-1</sup> )	6000 cm <sup>-1</sup>			
	Lower cutoff (cm <sup>-1</sup> ) <sup>2</sup>	50 cm <sup>-1</sup>			

1. The system spectral resolution is measured using ASTM Method E 2529 – 06 and a 100X objective.

The difference between system spectral resolution and spectrograph resolution is primarily determined by the excitation laser bandwidth.

2. 50% maximum transmitted power. The use of some accessories such as fiber optic probes may reduce the spectral range. Check accessory specifications.

3. 780 nm high-power laser recommended for fiber optic measurements only. Not recommended for microscope work.

## Additional Performance Specifications

Spatial Resolution (x, y axes) <sup>4</sup>	Smallest sample that can be analyzed (independent of stage)	< 1 μm
	Resolution with low-resolution motorized stage	3 μm
	Resolution with high-precision motorized stage	1 μm, diffraction-limited
Sensitivity (signal to noise ratio) <sup>5</sup>	532 nm laser	3000:1
	633 nm laser	900:1
	780 nm high brightness laser	750:1
Wavenumber accuracy <sup>6</sup>		± 2 cm <sup>-1</sup>
Reproducibility after changing excitation lasers <sup>7</sup>	Wavenumber axis	1.8 cm <sup>-1</sup> standard deviation with full-range grating

4. Spatial resolution depends on the wavelength of the excitation laser and the objective used.

The DXR Raman microscope achieves these specifications with a 100X objective and with all three standard lasers.

The spatial resolution achieved also depends on the resolution of the motorized stage.

5. Average signal-to-noise ratio (peak height/RMS noise) measured using standard polystyrene, full-range grating.

15-sec measurement time, 5 mW laser power at sample, 25 μm slit aperture.

6. Wavenumber accuracy is measured with full-range grating and without changing lasers or gratings.

Accuracy is based on measurement of polystyrene using peaks at 1001.4, 1602.3, and 3054.3 cm<sup>-1</sup>.

7. Over 10 numbers of exchanges, without recalibration or realignment.

## Lasers

General	Multiple lasers	Optional
	Laser exchange	Lasers are pre-aligned and user-exchangeable, no tools required. Laser may be exchanged and shared between any DXR Raman instruments.
	System alignment	Automatically optimized upon exchange
	Smart lasers	Laser stores wavelength, serial number, lifetime usage
	SmartLock installation	Precision-locked into place
	Laser power regulator	Power regulated in 0.1 mW increments. Power at sample is controlled by Laser Power Regulator and reported in mW.
	Filtering	All lasers include laser line filters to prevent laser artifacts from showing up in measured spectra
	Depolarization	All lasers are depolarized. Minimizes orientation dependence in measurements.
532 nm Laser	Laser type	Diode-pumped, solid state (DPSS)
	Laser output power	Maximum power at sample 10 mW
	Lifetime	Warranty for 12 months
	High brightness	Yes
	Center wavelength	532 ± 1 nm
	Transverse mode	TEM <sub>00</sub>
	Beam quality (M <sup>2</sup> )	< 1.3
633 nm Laser	Laser type	HeNe gas
	Laser output power	Maximum power at sample 8 mW
	Lifetime	Warranty for 12 months
	High brightness	Yes
	Center wavelength	632.8 nm
	Transverse mode	TEM <sub>00</sub>
	Beam quality (M <sup>2</sup> )	< 1.2
780 nm (high brightness)	Laser type	Frequency-stabilized single mode diode laser
	Laser output power	Maximum power at sample 24 mW
	Lifetime	Warranty for 12 months
	High brightness	Yes
	Center wavelength	780 ± 0.2 nm
	Transverse mode	TEM <sub>00</sub>
	Beam quality (M <sup>2</sup> )	< 1.5
780 nm Laser (high power)	Laser type	Multiple transverse mode, narrow-spectrum diode
	Laser output power	Maximum power at sample 150 mW
	High brightness	No
	Lifetime	Warranty for 12 months
	Center wavelength	780 ± 0.5 nm
	Spectral bandwidth	< 0.2 nm
	Beam quality (M <sup>2</sup> )	N/A

## Gratings

General	Installation	Fixed position, pre-aligned, user exchangeable without the need for tools
	SmartLock installation	Grating is precision-locked into place
	Smart technology	Grating stores serial number, wavelength, spectral resolution and calibration parameters
	Grating options	Full-range grating and high-resolution gratings available for each standard excitation wavelength

## Filters

General	Installation	Pre-aligned, user-exchangeable without the need for tools
	SmartLock installation	Filter block is precision-locked into place
	Smart technology	Filters store serial number and wavelength
	Rayleigh filters	Stokes only

## Fiber Optic Port

General	Installation	Pre-aligned, user-installable/removable without the need for tools
	SmartLock installation	Fiber optic port is precision-locked into place
	Compatibility	Compatible with all three standard excitation laser frequencies Accepts probes with standard FC connectors
	Smart technology	Fiber optic port stores serial number and identity

## Spectrograph

Design	Triplet Spectrograph	No moving parts
Spectral Range	Absolute	400–1050 nm
Spectral Dispersion	Full-range grating	Average 2 cm <sup>-1</sup> per CCD pixel element
	High-resolution grating	Average 1 cm <sup>-1</sup> per CCD pixel element
Aperture	Four software-selectable apertures	25 and 50 μm pinhole confocal apertures; 25 and 50 μm slit apertures

## Microscope

Microscope		Infinity-corrected confocal optics
Stages	Manual stage	2" x 3" travel X and Y dimensions Manual Z focus control
	Standard motorized stage	5" x 3" travel X and Y dimensions Step size 1 µm Software-controlled Z focus Joystick controller with focus control knob
	High-precision motorized stage	4" x 3" travel X and Y dimensions Step size 0.1 µm Software-controlled Z focus Joystick controller with focus control knob
	Stage well-plate adapter	Accepts up to 1,536-well microtiter plates
	Illuminator options	Brightfield microscope illuminator, plus nosepiece
Brightfield/Darkfield microscope illuminator, plus nosepiece		Reflection illumination. Accepts brightfield/darkfield objectives, plus brightfield-only objectives, with adaptor. Supports optional transmission illumination
Objectives	Standard working distance objectives	4X, 10X, 20X, 50X, 100X
	Long working distance objectives	10X, 20X, 50X, 100X
	Oil immersion objectives	50X, 100X
	Macro sampling adapter	Includes 4X objective, accepts brightfield objectives
	User-supplied objective	Must be compatible with Olympus BF or BD nosepieces <sup>8</sup>
Microscopy Options		Reflected Light Polarized Light Kit/ Fixed Analyzer
		Reflected Light DIC Illumination Kit

8. Note that some objectives may be Raman-active and may contribute artifacts to the sample Raman spectrum. Objectives offered by Thermo Scientific have been tested to ensure there is no significant interference with sample measurement.

## OMNIC Software Suite and User Interface

Smart Components		OMNIC checks for laser, grating, filter compatibility
		OMNIC restores alignment and calibration settings when lasers exchanged
User interface	Autoexposure	Patented. Optimizes exposure time and number of exposures to deliver spectra with user-determined signal-to-noise ratio
	Autofocus	Optimizes signal from sample
	Smart background	Patented. Collected when instrument is not in use. Eliminates the need for the user to collect backgrounds.
	Automated intensity correction	Consistent instrument response with all excitation lasers
	Laser Power Regulator	Absolute excitation laser power at the sample controlled by OMNIC Laser power at sample reported in mW
Specialty Software	Automatic fluorescence correction	Compensates for fluorescence prior to data analysis; available for 532, 633 and 780 nm excitation wavelengths
	Excitation laser spot size at sample	Reported by OMNIC
	OMNIC Array Automation	Automated data collection and post collection data analysis from multi-well plates and similar array formats
	OMNIC AtJus™ software	Provides software-controlled hyper-spectral mapping and image analysis
	OMNIC Series Software	Supports time-evolved data collection
	OMNIC MacrosVPro	Interface for advanced Visual Basic programming

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## Instrument Alignment and Calibration

Alignment	Entirely software-controlled	Patented autoalignment technique aligns laser, Raman emission and visual beam paths to microscope cross-hairs
Calibration <sup>9</sup>	Wavelength calibration	Software-controlled calibration using multiple neon emission lines
	Laser frequency calibration	Software-controlled calibration using multiple polystyrene Raman peaks
	Intensity calibration	Software-controlled calibration using standardized white light sources

9. Standards incorporated into patented Alignment/Calibration Tool

## Optional System Validation

ValPro System Qualification	Available for the DXR Raman microscope
	DQ documentation for hardware and software
	Comprehensive IQ and OQ procedures in the industry-standard format
	Full system qualification
	OQ tests based on industry-standard methods
	Serialized and traceable standard
	Software for performance verification tests
	Support for user-specific OQ or PQ tests

## Instrument Serviceability

Replacement lasers	User-installable
Laser Lifetime	Laser monitors number of hours of use
Laser Power Regulator	Reports when laser power at sample has fallen below laser specification
Additional laser, filter, grating sets	User-installable

## Physical Dimensions

Spatial Dimensions	Width: 97 cm
	Depth: 69 cm
	Height: 61 cm
	Weight: 56.7 kg

## Other Specifications

Environmental	Minimum temperature: 16 °C
	Maximum temperature: 27 °C
	Humidity range: 20–80%
Power Requirements:	100–250 VAC, 48–63 Hz, 3.2 A max.
Regulatory Approval	CE, UL/CSA/ETL, 21CFR1040.10
Warranty Information	12-month warranty standard on the complete DXR Raman Microscope. Extended warranties are available

The DXR Raman microscope is a Class IIIb laser-safe product, unless installed with the Class I Laser Safety Enclosure. Installation of a fiber optic probe launcher and fiber probe will convert all microscopes to Class IIIb laser-safe, even with the Laser Safety Enclosure installed.



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