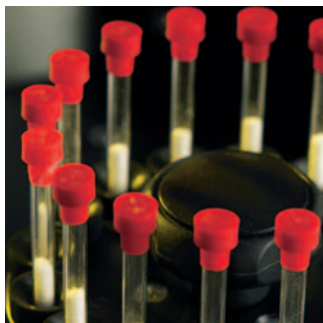


## DXR SmartRaman Spectrometer

For bulk sample analysis

The Thermo Scientific DXR SmartRaman spectrometer is a walk-up, Raman analytical tool designed for bulk analysis in busy multi-purpose analytical labs, where users require reproducible and accurate results from dependable, low maintenance instrumentation. With Smart, pin-in-place sampling accessories designed to address the full range of sampling needs, the DXR SmartRaman takes its place in environments that range from routine QA/QC to the research laboratory



The DXR SmartRaman spectrometer is designed for sampling versatility and to be easy to use. With its unique features, experts and non-experts alike deliver optimal results, effortlessly.

- Class I laser-safe design for use in non-restricted environments
- Up to three customer-exchangeable excitation wavelengths for optimal results with demanding samples
- Patented autoalignment system for guaranteed optimal performance
- Rapid, automated, multi-point calibration for confidence in sample identification
- Patent-pending autoexposure and autofocus for true point and shoot Raman spectroscopy

- Laser Power Regulator to guarantee reproducible laser power at the sample
- Hot-swappable, Smart sampling accessories and dedicated toolheads for a full range of sample configurations
- Full system validation to meet the most stringent regulatory demands

**General System Features**

Lasers	Single laser beam path	
	Multiple excitation lasers	Supported wavelengths 780 nm, 633 nm, 532 nm
	Laser safety	Class I laser-safe. Can be used in a non-restricted environment. Class IIIb when fiber optic interface installed.
	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 (sampling accessories and toolheads, 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 (sampling accessories and toolheads, 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
Fiber Optic Port		Optional and user-installable

**System Performance – Spectral Range and Resolution**

		Lasers			
		532 nm	633 nm	780 nm (high brightness)	780 nm (high power)
Full-Range Grating	Spectral resolution <sup>1</sup>	5.0 cm <sup>-1</sup>	5.0 cm <sup>-1</sup>	5.0 cm <sup>-1</sup>	5.0 cm <sup>-1</sup>
		FWHM	FWHM	FWHM	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> ), 50% maximum transmitted power	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	3.0 cm <sup>-1</sup>	3.0 cm <sup>-1</sup>	3.0 cm <sup>-1</sup>	3.0 cm <sup>-1</sup>
		FWHM	FWHM	FWHM	FWHM
	Upper cutoff (cm <sup>-1</sup> )	1800 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> ), 50% maximum transmitted power	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>	50 cm <sup>-1</sup>

1. The system spectral resolution is measured using ASTM Method E 2529 – 06. The difference between system spectral resolution and spectrograph resolution is primarily determined by the excitation laser bandwidth.

**Additional Performance Specifications**

Laser Spot Size		Nominal 10 μm
Sampling Area		User-selectable from 10 μm to 5 mm <sup>2</sup> with Variable Dynamic Point Sampling (VDPS) technology (available with the Universal Platform Sampling Accessory)
Wavenumber Accuracy <sup>2</sup>	Full-range grating	2 cm <sup>-1</sup> RMS
Wavenumber Precision <sup>3</sup>	Full-range grating	0.25 cm <sup>-1</sup> RMS
Reproducibility after Changing Excitation Lasers <sup>4</sup>	Wavenumber axis	1.8 cm <sup>-1</sup> standard deviation with full-range grating

2. Wavenumber accuracy is measured without changing lasers or gratings.

3. Wavenumber precision is measured without changing lasers or gratings.

Standard deviation for 10 measurements of the polystyrene peak at 1001.4 cm<sup>-1</sup> (ASTM E 1840).

4. Over 10 number of exchanges, without recalibration or realignment.

## Sensitivity

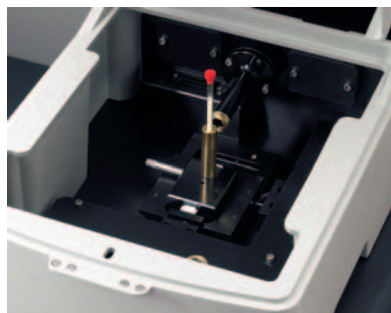
	Lasers			
	532 nm	633 nm	780 nm (high brightness)	780 nm (high power)
UPS with Universal Plate Toolhead <sup>5</sup>	1000	600	150	150
180 Degree Sampling Accessory <sup>5</sup>	1500	900	225	225
Carousel Autosampler Sampling Accessory <sup>6</sup>	667	400	100	100

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.

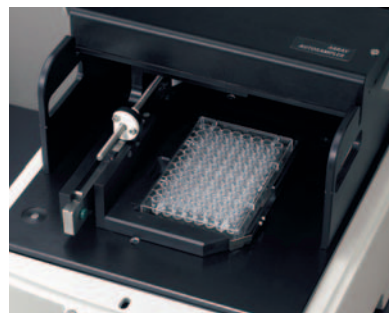
6. Average signal-to-noise ratio (peak height/RMS noise) measured using sodium bicarbonate powder, full-range grating. 15-sec measurement time, 8 mW laser power at sample, 50 µm slit aperture.



**The DXR SmartRaman spectrometer with the Carousel Autosampler Sampling accessory**



**The 180 Degree Sampling accessory for the DXR SmartRaman spectrometer**



**The Well-Plate Autosampler toolhead on the Universal Platform Sampling accessory**

## Sampling Accessories<sup>7</sup>

Universal Platform Sampling Accessory		Hot-swappable, pin-in-place. Smart: reports identity and serial number to OMNIC software.
	Toolheads for Universal Platform Sampling accessory: Well-Plate/Tablet Autosampler Tablet Holder Bottle holder Universal Plate	Hot-swappable, pin-in-place. Smart: report identity and serial number to OMNIC software.
Carousel Autosampler Sampling Accessory		Hot-swappable, pin-in-place. Smart: reports identity and serial number to OMNIC software.
180 Degree Sampling Accessory		Hot-swappable, pin-in-place. Smart: reports identity and serial number to OMNIC software.

7. Sampling accessory specification details available in separate specification sheets.

## Lasers

General	Multiple lasers	Optional
	Installation	Lasers are pre-aligned and user-exchangeable, no tools required
	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.
	Depolarization	All lasers are depolarized. Eliminates 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
	Beam diameter:	< 3 mm
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> > 95%
	Beam quality: (M <sup>2</sup> )	< 1.2
Beam diameter:	2 mm	
780 nm Laser (high brightness)	Laser type	Frequency-stabilized single mode diode laser
	Laser output power	Maximum power at sample 14 mW
	Lifetime	Warranty for 12 months
	High brightness	Yes
	Wavelength stability	< 1 cm <sup>-1</sup> (over 1-hour period)
	Center wavelength	780 ± 0.2 nm
	Transverse mode:	TEM <sub>00</sub>
	Beam quality: (M <sup>2</sup> )	< 1.5
Beam diameter:	< 3.5 mm	
780 nm Laser (high power)	Laser type	Multiple transverse mode, narrow-spectrum diode
	Laser output power	Maximum power at sample 150 mW
	Lifetime	Warranty for 12 months
	Center wavelength	780 ± 0.5 nm
	Spectral bandwidth	< 0.2 nm
	Beam quality: (M <sup>2</sup> )	105 μm fiber launch
	Beam diameter:	6 mm

## 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
	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 lasers 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

## OMNIC Software Suite and User Interface

Smart Components		OMNIC checks for laser, grating, filters compatibility
		OMNIC restores alignment and calibration settings when lasers exchanged
		OMNIC records identity and serial numbers of sampling accessories and toolheads with spectral data
User Interface	Autoexposure	Optimizes exposure time and number of exposures to deliver spectra with user-determined signal-to-noise ratio
	Autofocus	Optimizes signal from sample
	Smart background	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
	Automatic fluorescence correction	Compensates for fluorescence prior to data analysis; available for 532, 633 and 780 nm excitation wavelengths
Specialty Software	OMNIC Array Automation included with the Well-Plate Autosampler toolhead for the Universal Platform Sampling Accessory	Automated data collection and post collection data analysis from multi-well plates and similar array formats
	OMNIC Series Software	Supports time-evolved data collection
	OMNIC Macros\Pro™	Interface for advanced Visual Basic programming

## Instrument Alignment and Calibration

Alignment	Entirely software-controlled	Patented autoalignment technique aligns laser and Raman emissions to sampling position.
Calibration <sup>8</sup>	Wavelength calibration	Software-controlled calibration using multiple neon emission lines
	Laser frequency calibration	Software-controlled calibration using multiple polystyrene Raman bands
	Intensity calibration	Software-controlled calibration using standardized white light sources

8. Calibration standards incorporated into patented Alignment/Calibration Tool.

## Optional System Validation

ValPro™ System Qualification	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 has fallen below laser specification
Additional Laser, Filter, Grating Sets	User-installable

## Physical Dimensions

Spatial Dimensions	Width	97 cm
	Depth	69 cm
	Height	46 cm
	Weight	56.7 kg

## Other Specifications

Environmental	Minimum temperature	16 °C
	Maximum temperature	32 °C
	Humidity range	20 – 80%
Power Requirements		100 – 250 VAC, 48 – 63 Hz, 3.2 A max
Regulatory Approval		CE, UL/ETL, 21CCFR1040.10
Warranty Information		12-month warranty standard on the complete DXR Raman Microscope. Extended warranties are available.

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Thermo Electron Scientific Instruments LLC, Madison, WI USA is ISO Certified.  
The DXR SmartRaman spectrometer is a Class I laser product, unless it is used with the fiber launch option, in which case it is classified as Class IIIb laser-safe.



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