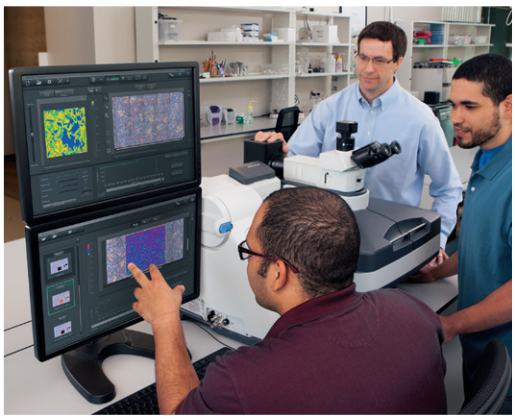
DXR3 Raman Family

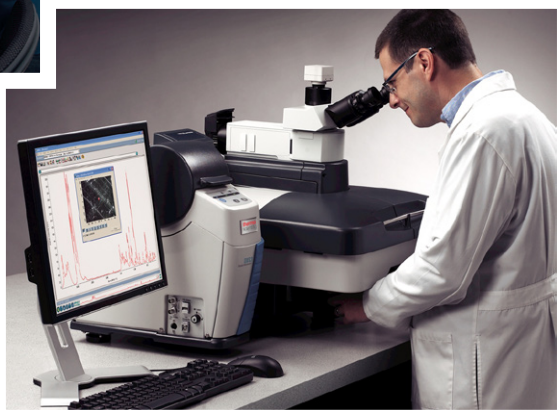
Focus on answers, not the technique

Easily adapt to any sample challenge using the Thermo Scientific™ DXR3 family of Raman instruments. With intuitive and easy-to-use software and instrumentation, you get results faster than ever before.



DXR3xi Raman Imaging Microscope

- High-performance, high-spatial resolution Raman imaging system in a complete, integrated package
- Produces stunning chemical images and gives research-quality results quickly for all users



DXR3 Raman Microscope

- Research-grade microscope offering superior combination of performance and ease-of-use
- Offers high spatial resolution, point-and-shoot Raman microscopy for the most demanding analytical tasks

DXR3 SmartRaman Spectrometer

- Built for high performance, dedicated bulk sample analysis and designed for busy multi-purpose analytical labs
- Provides comprehensive, reproducible, and accurate results in a dependable, low-maintenance platform

DXR3 Raman Microscope

- Industry-leading performance, reproducibility, and reliability
- Versatile platform with research-grade optics and light microscopy options
- Rapid, high-quality point-and-shoot results via an intuitive platform
- Powerful software that enables mapping of lines, areas, depth profiles, and cross-sectional slices

Performance specifications		
Spatial resolution[1]	Resolution (X, Y axes) with high-precision motorized stage	Better than 1 µm
	Confocal depth resolution	Better than 2 µm

1. Measured with 532 nm excitation and 100× objective. Spatial resolution depends on the wavelength of the excitation laser and the objective used.

Automated polarization[2]	
Laser polarization	Horizontal, vertical, or depolarized
Analyzer polarization	Not in beam, horizontal, vertical, or custom angle (1° increments)

2. Optional feature.

Spectrograph		
Design	Triplet spectrograph[3]	No moving parts
Aperture	Four software-selectable apertures	25 and 50 µm confocal pinhole apertures 25 and 50 µm slit apertures

3. Patented design minimizes aberrations in the primary optics.

Stage options	
Standard motorized stage	125 × 75 mm travel X and Y dimensions
	Step size 1 µm
	Software-controlled Z focus
	Joystick controller with focus control knob
High-precision motorized stage	100 × 75 mm travel X and Y dimensions
	Step size 0.1 µm
	Software-controlled Z focus
	Joystick controller with focus control knob

Physical dimensions	
Width	94 cm
Depth	68 cm
Height	61 cm
Weight	66.5 kg

DXR3 family shared component specifications

The DXR3 family of Raman benchtop instruments is based on the same reliable design, allowing you to easily exchange pre-aligned laser, filter, and grating components among instruments without using tools.

General system features		
Lasers[4]	Multiple excitation lasers	Supported wavelengths 455 nm, 532 nm, 633 nm, 785 nm
	Laser safety	Class 1 standard
		Class 3B when fiber optic interface is installed and with some specialized accessories
	Laser power regulator	Active feedback system to control absolute laser power delivered to the sample
	Fine laser power control	Power controlled and reported at samples in 0.1 mW increments
		Facilitates laser-to-laser and system-to-system reproducibility
Replaceable components	Smart components	Pre-aligned, user-exchangeable system components (lasers, filters, gratings, fiber optic launcher) lock into place and automatically optimize system alignment and calibration upon installation
		Software checks for laser, grating, filter compatibility
		Software restores alignment and calibration settings when lasers are exchanged
	System alignment	Automatically optimized upon exchange
Computer interface		Through USB 2.0
		Some accessories may require additional USB or serial ports

4. All lasers have a 12-month warranty.

DXR3xi Raman Imaging Microscope

- Exceptional stability for highest quality Raman imaging over small and large areas
- Intelligent autofocus and automated feature identification tools that reduce total experiment time
- Powerful, real-time component analysis
- Visual control and parameter optimization that lets you focus on the answer, not the technique

Performance specifications		
Spatial resolution[1]	Resolution (X, Y axes)	Better than 0.5 µm
	Confocal depth resolution	Better than 2 µm

1. Measured with 532 nm excitation and 100× objective. Spatial resolution depends on the wavelength of the excitation laser and the objective used.

Automated polarization[2]	
Laser polarization	Horizontal, vertical, or depolarized
Analyzer polarization	Not in beam, horizontal, vertical, or custom angle (1° increments) Imaging with polarization is possible

2. Optional feature.

Spectrograph		
Design	Triplet spectrograph[3]	No moving parts
	Camera technology	TE cooled back illuminated EMCCD[5]
Aperture	Four software-selectable apertures	25 and 50 µm confocal pinhole apertures 25 and 50 µm slit apertures

3. Patented design minimizes aberrations in the primary optics.
5. Front illuminated EMCCD available on request.

Imaging performance		
Typical image collection time	Single 100 × 100 µm image with 1 µm image pixel size in both directions	35 seconds
	10 mm diameter tablet with 20 µm image pixel size	11 minutes
Maximum spectral acquisition rate	600 spectra per second	
Maximum image area	101.6 × 76.2 mm	
Minimum image pixel size in X and Y	100 nm	
Minimum step size in Z	200 nm	

Physical dimensions	
Width	94 cm
Depth	68 cm
Height	61 cm
Weight	86 kg

DXR3 family shared component specifications

Lasers	455 nm	532 nm	633 nm	785 nm (high brightness)	785 nm (high power)[6]
Laser type	Frequency-stabilized single mode diode laser	Diode-pumped, solid state (DPSS)	HeNe gas	Frequency-stabilized single mode diode laser	Multiple transverse mode, narrow-spectrum diode
Maximum laser Output power	25 mW	24 mW	20 mW	80 mW	420 mW
Laser power at sample[7]	Maximum power at sample 6 mW	Maximum power at sample 10 mW	Maximum power at sample 8 mW	Maximum power at sample 30 mW	Maximum power at sample 150 mW
Center wavelength	455 ± 0.2 nm	532 ± 1 nm	632.8 nm	785 ± 0.2 nm	785 ± 0.5 nm
Transverse mode[8]	TEM_{00}	TEM_{00}	TEM_{00}	TEM_{00}	—

6. 785 nm high-power laser recommended for SmartRaman or fiber optic measurements only. Not recommended for microscope work.
7. Continuously variable to the maximum laser power at the sample in 0.1 mW increments.
8. Eliminates the need to aperture the laser and provides a Gaussian profile, optimizing confocality of the laser.

DXR3 SmartRaman Spectrometer

- Large sampling compartment enables flexibility in experimental design
- Ideal for bottles to vials to bulk powders—and everything in-between
- Broad range of sampling accessories for most applications and sample formats
- Powerful, variable dynamic point sampling (VDPS) enables rapid averaging over large sample area

Performance specifications		
Laser spot size at sample	Nominal 10 µm	
Sampling area	User-selectable from single spot to 5 mm × 5 mm with VDPS technology (available with the Universal Platform Sampling Accessory)	

2. Optional feature.

Spectrograph		
Design	Triplet spectrograph[3]	No moving parts
Aperture	Four software-selectable apertures	25 and 50 µm confocal pinhole apertures 25 and 50 µm slit apertures

Physical dimensions	
Width	94 cm
Depth	56 cm
Height	44 cm
Weight	52.8 kg

3. Patented design minimizes aberrations in the primary optics.

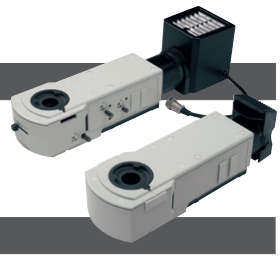
DXR3 family shared component specifications

System performance—spectral range and resolution

		Lasers			
		455 nm	532 nm	633 nm	785 nm
Full-range grating	Spectral resolution[9]	Better than 5.0 cm^{-1} FWHM	Better than 5.0 cm^{-1} FWHM	Better than 5.0 cm-1 FWHM	Better than 5.0 cm-1 FWHM
	Spectral dispersion	2 cm^{-1}/CCD pixel element	2 cm^{-1}/CCD pixel element	2 cm^{-1}/CCD pixel element	2 cm^{-1}/CCD pixel element
	Upper cutoff	3500 cm^{-1}	3500 cm^{-1} [11]	3500 cm^{-1}	3250 cm^{-1}
	Lower cutoff[10]	85 cm^{-1}	50 cm^{-1}	50 cm^{-1}	50 cm^{-1}
High-resolution grating	Spectral resolution		2 cm^{-1} FWHM	2 cm^{-1} FWHM	2 cm^{-1} FWHM
	Spectral dispersion		1 cm^{-1}/CCD pixel element	1 cm^{-1}/CCD pixel element	1 cm^{-1}/CCD pixel element
	Upper cutoff		1800 cm^{-1}	1800 cm^{-1}	1800 cm^{-1}
	Lower cutoff[10]		50 cm^{-1}	50 cm^{-1}	50 cm^{-1}
Extended-range grating	Spectral resolution		11 cm-1 FWHM		
	Upper cutoff		6000 cm-1		
	Lower cutoff[10]		50 cm-1		

9. The system spectral resolutions is measured using ASTM Method E2529-06 and a 100× objective.
10. 50% maximum transmitted power. The use of some accessories such as fiber optic probes may reduce the spectral range. Check accessory specifications.
11. The upper cutoff of the DXR3xi Raman Imaging Microscope is 3,400 cm^{-1} for the full-range spectral grating.

DXR3 microscopy options



Illuminator options	
Brightfield microscope illuminator, plus nosepiece	Reflection illumination. Accepts brightfield objectives.
Brightfield/darkfield microscope illuminator, plus nosepiece	Reflection illumination. Accepts brightfield/darkfield objectives and brightfield-only objectives with adaptor. Supports optional transmission illumination.

Microscopy options
Reflected and transmitted[12] light polarized kit/fixed analyzer
Reflected and transmitted[12] light differential interference contrast (DIC) or Nomarski Illumination Kit
Rotatable analyzer

12. Requires transmission illumination option.

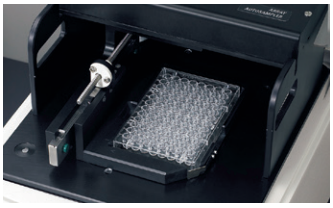
Objectives	
Standard working distance objectives	10×, 20×, 50×, 100×
Long working distance objectives	10×, 20×, 50×, 100×
Oil immersion objectives	50×, 100×
Water immersion objectives	60×
Macro sampling adapter	Includes 4× objective, accepts brightfield objectives only
User supplied objectives	Must be compatible with Olympus® BF or BD nosepieces
Extended-reach sampling accessory[13]	Enables external sampling

13. Class 3B.

Sampling stage options	
Heated and cooled stage from Linkam Scientific	Temperature range: –196°C to 600°C Seamless compatibility with Linkam software
Polymer slicer	Secures a multilayered polymer vertically for cross-sectional analysis
Single- and dual- slide insert	Holds one or two standard microscope slides (75 × 25 mm)
Rotating stage insert	Accepts standard microscope slide, manually rotatable to any position
Sample holder breadboard with clips	Provides maximum flexibility for holding small and uniquely shaped samples without risk of contamination with adhesives
Microtiter well-plate holder	Holds standard 96 well microplates
Capillary tube array holder	Accommodates up to 16 capillary tubes
XPS sample holder	Permits easy transfer of samples from the Thermo Scientific K-Alpha+ X-ray Photoelectron Spectrometer

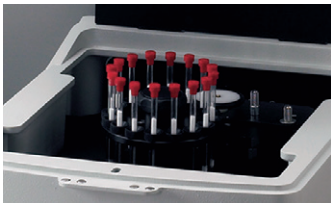
DXR3 macro sampling options

Sampling accessories	
Universal Platform sampling accessory Toolheads for Universal Platform Sampling accessory: Well-plate/tablet autosampler, tablet holder, bottle holder, universal plate	Hot swappable Pinned-in-place Smart: reports identity and serial number to Thermo Scientific OMNIC™ Software
Carousel Autosampler Sampling accessory	
180-degree Sampling accessory	

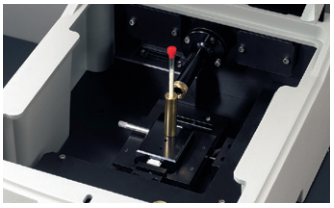


The Universal Platform Sampling accessory with well-plate for the DXR3 SmartRaman Spectrometer.

The Universal Platform Sampling accessory with bottle holder for the DXR3 SmartRaman Spectrometer.



The Carousel Autosampler Sampling accessory for the DXR3 SmartRaman Spectrometer.



The 180 Degree Sampling accessory for the DXR3 SmartRaman Spectrometer.

Fiber optic port for DXR3 Raman family

Sampling accessories	
Installation	Pre-aligned, user-installable/removable without the need for tools
SmartLock installation	Fiber optic port is precision-locked into place
Compatibility	Compatible with 532 nm and 785 nm excitation laser frequencies, accepts probes with standard FC connectors
Smart Technology	Fiberoptic port stores serial number

Shared family specifications

In addition to the common components, the DXR3 instruments share the following general specifications.

Available Thermo Scientific software options[14]	
OMNIC Software	Full featured molecular spectroscopy acquisition and analysis software
OMNIC Series Software	Supports time-based data collection
OMNIC Array Automation Software	Automated data collection and post-collection data analysis from micro-well plates and similar array formats
OMNIC Atlus Particle Analysis Software	Image directed particle location and analysis
OMNIC Atlμs Software	Provides software-controlled hyperspectral mapping and image analysis
OMNIC Specta Software	Provides efficient data management, simplifies data process, and provides powerful spectral identification
OMNIC Macros\Pro Software	Interface for advanced Visual Basic programming
OMNICxi 3D Visualization Software	3D image rendering of confocal Raman data
OMNICxi Advanced Particle Analysis Software	Automated particle identification and analysis of visual and chemical image
OMNICxi Raman Imaging Software	Visually driven chemical imaging and analysis software
Thermo Scientific ValPro™ System Qualification Software	Full-featured system qualification package for verifying instrument performance

14. Not all software packages available on all systems.

Instrument alignment, calibration, and optimization		
Alignment	Entirely software-controlled	Automated alignment technique aligns laser, Raman emission and visual beam paths to microscope crosshairs
Calibration[15]	Wavelength	Software-controlled calibration using multiple neon emission lines
	Laser frequency	Software-controlled calibration using multiple polystyrene Raman peaks
	Intensity	Software-controlled calibration using standardized white light source
Automatic x-axis calibration		Recurring, fixed interval wavelength calibration eliminating manual calibrations
Automatic Intensity Correction		Provides instrument-independent results with all excitation lasers
Laser Power Regulator		Absolute excitation laser power at the sample controlled by OMNIC or OMNICxi Software
		Laser power at sample reported in mW
Automated Fluorescence Correction		Compensates for potential fluorescence in data
User interface	Autofocus	Optimizes signal from sample
	Autoexposure	Automatically sets optimal exposure time and number of repeat scans for highest quality data acquisition
	Smart Background	Automatically accounts for dark current, improving spectral quality and saving time

15. Standards incorporated into patented Alignment/Calibration Tool.†

Instrument serviceability	
Additional lasers or replacement lasers, filter, grating sets	User-installable without tools
Instrument performance monitoring	Software provides real-time visual status of system readiness, including error condition checking and diagnostics

Other specifications	
Environmental	Minimum temperature: 16°C
	Maximum temperature: 27°C
	Humidity range: 20—80%
Electric requirements	100—240 VAC, 47—63 Hz
Regulatory approval	CE, UL/CSA/ETL, 21 CFR1040, 10
Warranty information	12-month warranty standard on the complete DXR3 SmartRaman Spectrometer, DXR3xi Raman Imaging Microscope, and DXR3 Raman Microscope. Extended warranties are available.

Learn more at **thermofisher.com/raman**