

# Raman at the speed you need

## Thermo Scientific DXR3 Raman Family

Advanced imaging options provide Raman data faster than ever with the Thermo Scientific™ DXR3 Raman Family of instruments.



### 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 enables mapping of lines, areas, depth profiles, and cross-sectional slices



## Performance specifications

Spatial resolution	Resolution (X, Y axes) with high-precision motorized stage	Better than 1 $\mu\text{m}$
	Confocal depth resolution	Better than 2 $\mu\text{m}$

## Automated polarization

Laser polarization	Horizontal, vertical, or depolarized	
Analyzer polarization	Not in beam, horizontal, vertical, or custom angle ( $1^\circ$ increments)	

## Spectrograph

Design	Triplet spectrograph	No moving parts
Aperture	Four software-selectable apertures	25 And 50 $\mu\text{m}$ confocal pinhole apertures 25 And 50 $\mu\text{m}$ slit apertures

## Stage options

Standard motorized stage	125 mm $\times$ 75 mm travel X and Y dimensions Step size 1 $\mu\text{m}$ Software-controlled Z focus Joystick controller with focus control knob
High-precision motorized stage	100 mm $\times$ 75 mm travel X and Y dimensions Step size 0.1 $\mu\text{m}$ 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 users to easily exchange pre-aligned laser, filter, and grating components among instruments without using tools.

## General system features

Lasers	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 or USB 3.0 ports Some accessories may require additional USB or serial ports

# DXR3xi Raman Imaging Microscope

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



## Performance specifications

Spatial resolution	Resolution (X, Y axes)	Better than 0.5 $\mu\text{m}$
	Confocal depth resolution	Better than 2 $\mu\text{m}$

## Automated polarization

Laser polarization	Horizontal, vertical, or depolarized	
Analyzer polarization	Not in beam, horizontal, vertical, or custom angle ( $1^\circ$ increments) Imaging with polarization is possible	

## Spectrograph

Design	Triplet spectrograph	No moving parts
	Camera technology	TE cooled back illuminated EMCCD TE cooled front illuminated EMCCD
Aperture	Four software-selectable apertures	25 and 50 $\mu\text{m}$ confocal pinhole apertures 25 And 50 $\mu\text{m}$ slit apertures

## Imaging performance

Typical image collection time	Single 100 $\mu\text{m}$ $\times$ 100 $\mu\text{m}$ image with 1 $\mu\text{m}$ image pixel size in both directions	35 seconds
	10 mm diameter tablet with 20 $\mu\text{m}$ image pixel size	11 minutes
Maximum spectral acquisition rate	600 spectra per second	
Maximum image area	101.6 mm $\times$ 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

Laser	455 nm	532 nm (high brightness)	532 nm (high powered)	633 nm (high brightness)	633 nm (high powered)	785 nm (high brightness)	785 nm (high powered)
Laser type	Frequency-stabilized single mode diode laser	Diode-pumped, solid state (DPSS)	Diode-pumped, solid state (DPSS)	HeNe gas	Single transverse mode, high power diode laser	Frequency-stabilized single mode diode laser	Multiple transverse mode, narrow-spectrum diode
Maximum laser output power	25 mW	24 mW	100 mW	20 mW	60 mW	80 mW	420 mW
Laser Power at Sample	Maximum power at sample 6 mW	Maximum power at sample 10 mW	Maximum power at sample 40 mW	Maximum power at sample 8 mW	Maximum power at sample 25 mW	Maximum power at sample 30 mW	Maximum power at sample 15 mW
Center wavelength	455 $\pm$ 0.2 nm	532 $\pm$ 1 nm	532 $\pm$ 1 nm	632.8 nm	632.8 nm	785 $\pm$ 0.2 nm	785 $\pm$ 0.5 nm
Transverse mode	TEM <sub>00</sub>	TEM <sub>00</sub>	–	TEM <sub>00</sub>	–	TEM <sub>00</sub>	–

# 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 enables rapid averaging over large sample area



## Performance specifications

Laser spot size at sample	Nominal 10 $\mu\text{m}$
Sampling area	User-selectable from single spot to 5 mm x 5 mm with Variable Dynamic Point Sampling (VDPS) technology (available with the Universal Platform Sampling Accessory)

## Physical dimensions

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

## Spectrograph

Design	Triplet spectrograph	No moving parts
Aperture	Four software-selectable apertures	25 and 50 $\mu\text{m}$ pinhole apertures 25 and 50 $\mu\text{m}$ slit apertures

## DXR3 family shared component specifications

System Performance – Spectral Range and Resolution

		Lasers					
		455 nm	532 nm (high brightness)	532 nm (high powered)	633 nm (high brightness)	633 nm (high powered)	785 nm
Full-range grating	Spectral resolution	Better than 5.0 $\text{cm}^{-1}$ FWHM	Better than 5.0 $\text{cm}^{-1}$ FWHM	Better than 5.0 $\text{cm}^{-1}$ FWHM	Better than 5.0 $\text{cm}^{-1}$ FWHM	Better than 5.0 $\text{cm}^{-1}$ FWHM	Better than 5.0 $\text{cm}^{-1}$ FWHM
	Spectral dispersion	2 $\text{cm}^{-1}$ /CCD pixel element	2 $\text{cm}^{-1}$ /CCD pixel element	2 $\text{cm}^{-1}$ /CCD pixel element	2 $\text{cm}^{-1}$ /CCD pixel element	2 $\text{cm}^{-1}$ /CCD pixel element	2 $\text{cm}^{-1}$ /CCD pixel element
	Upper cutoff	3500 $\text{cm}^{-1}$	3500 $\text{cm}^{-1}$	3500 $\text{cm}^{-1}$	3500 $\text{cm}^{-1}$	3500 $\text{cm}^{-1}$	3250 $\text{cm}^{-1}$
	Lower cutoff	85 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$
High-Resolution Grating	Spectral resolution		2 $\text{cm}^{-1}$ FWHM	2 $\text{cm}^{-1}$ FWHM	2 $\text{cm}^{-1}$ FWHM	2 $\text{cm}^{-1}$ FWHM	2 $\text{cm}^{-1}$ FWHM
	Spectral dispersion		1 $\text{cm}^{-1}$ /CCD pixel element	1 $\text{cm}^{-1}$ /CCD pixel element	1 $\text{cm}^{-1}$ /CCD pixel element	1 $\text{cm}^{-1}$ /CCD pixel element	1 $\text{cm}^{-1}$ /CCD pixel element
	Upper cutoff		1800 $\text{cm}^{-1}$	1800 $\text{cm}^{-1}$	1800 $\text{cm}^{-1}$	1800 $\text{cm}^{-1}$	1800 $\text{cm}^{-1}$
	Lower cutoff		50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$
Extended-range grating	Spectral resolution		11 $\text{cm}^{-1}$ FWHM	11 $\text{cm}^{-1}$ FWHM			
	Upper cutoff		6000 $\text{cm}^{-1}$	6000 $\text{cm}^{-1}$			
	Lower cutoff		50 $\text{cm}^{-1}$	50 $\text{cm}^{-1}$			



## 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.

### Objectives

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



### Microscopy options

Reflected and transmitted light polarized kit/ fixed analyzer
Reflected and transmitted light differential interference contrast (DIC) or Nomarski Illumination Kit
Rotatable Analyzer

### Sampling stage options

Heated and cooled stage from Linkam Scientific	Temperature range: -196 °C–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 mm × 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 XPS System

## DXR3 macro sampling options

### Sampling accessories

Universal Platform Sampling Accessory <i>Toolheads for universal platform sampling accessory: well-plate/tablet autosampler, tablet holder, bottle holder, universal plate</i>	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

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	Fiber optic port stores serial number



## Available Thermo Scientific software options

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

### Software

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
<b>NEW</b> OMNIC Atlas Particle Analysis Software	Image directed particle location and analysis
OMNIC Atlas™ Software	Provides software-controlled hyperspectral mapping and image analysis
OMNIC Spectra	Provides efficient data management, simplifies data process, and provides powerful spectral identification
OMNIC Macros\Pro™ Software	Interface for advanced Visual Basic programming
<b>NEW</b> OMNICxi 3D Visualization Software	3D image rendering of confocal Raman data
<b>NEW</b> 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
ValPro™ System Qualification Software	Full featured system qualification package for verifying instrument performance



### Instrument alignment, calibration and optimization

Alignment	Entirely Software-controlled	Automated alignment technique aligns laser, Raman emission and visual beam paths to microscope crosshairs
Calibration	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
<b>NEW</b> Automatic x-axis calibration		Recurring, fixed interval wavelength calibration eliminating manual calibrations
Automatic Intensity Correction		Provides instrument-independent results with all excitation lasers Absolute excitation laser power at the sample controlled by OMNIC or OMNICxi software
Laser Power Regulator		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

### Instrument serviceability

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.

### 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   Intertek
Warranty information	12-month warranty standard on the complete DXR3 SmartRaman Spectrometer, DXR3xi Raman Imaging Microscope, and DXR3 Raman Microscope. Extended warranties are available.

Find out more at [thermofisher.com/Raman](https://thermofisher.com/Raman)

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