Brochure

ThermoFisher SCIENTIFIC

Thermo Scientific DXR3 SmartRaman+ Spectrometer

Fast, non-destructive, at-line testing for rapid batch release.

thermo scientific

Make your OPC UA controlled fill-and-finish testing more efficient

Pharmaceutical manufacturing: Fill-and-finish testing

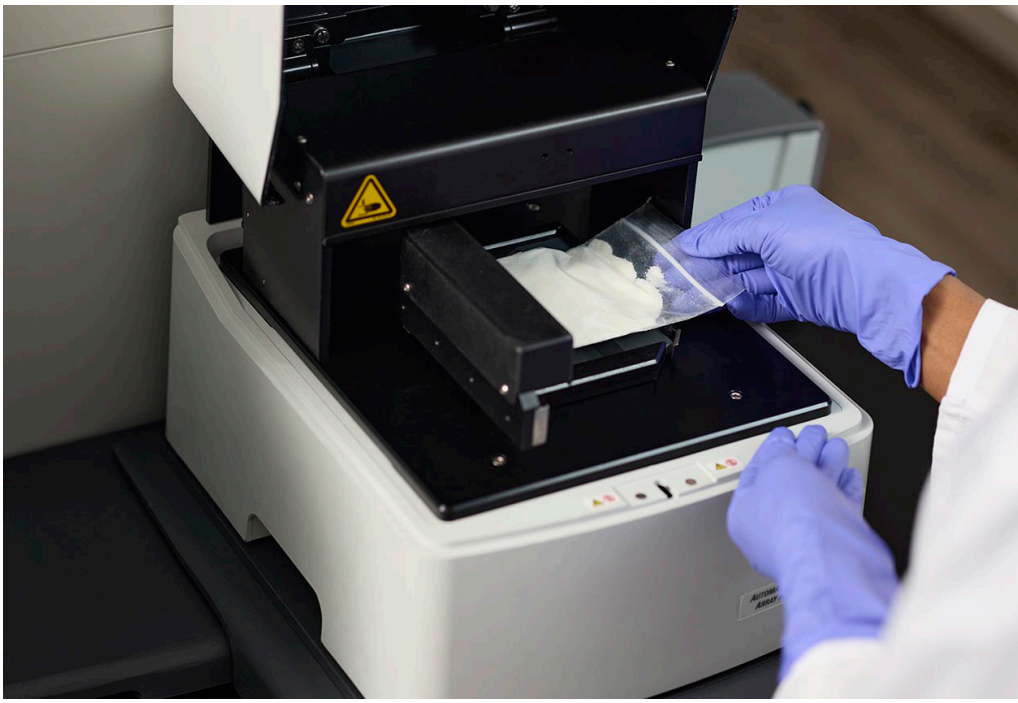
The DXR3 SmartRaman+ Spectrometer enables efficient and accurate quality control via non-destructive analysis, with high throughput rates that can shorten batch release testing from weeks to mere hours.

- Raman technology can perform non-destructive measurement through a wide range of finished packaging, so there is no threat to the integrity of products.
- Automatic batch testing reduces operators' work time and generates results faster.
- High-resolution performance allows for detection of low concentrations of analytes.
- Industry-standard OPC UA connectivity allows for seamless integration into the current manufacturing environment.

The Thermo Scientific™ DXR3 SmartRaman+ Spectrometer was developed in close collaboration with manufacturers to provide the sampling flexibility and efficiency that industry demands. Built on the renowned DXR platform from Thermo Fisher Scientific, the DXR3 SmartRaman+ Spectrometer adds a new level of precise, at-line, semi-automated testing to the dependable performance the DXR3 platform is already known for.

Industrial quality control testing

The DXR3 SmartRaman+ Spectrometer enhances industrial product quality testing by enabling rapid, high-throughput quality checks. Sampling flexibility is aided by custom sample holders. With its intuitive design, the instrument eliminates the need for Raman expertise, delivering seamless integration into industrial quality control operations.



Research and method development

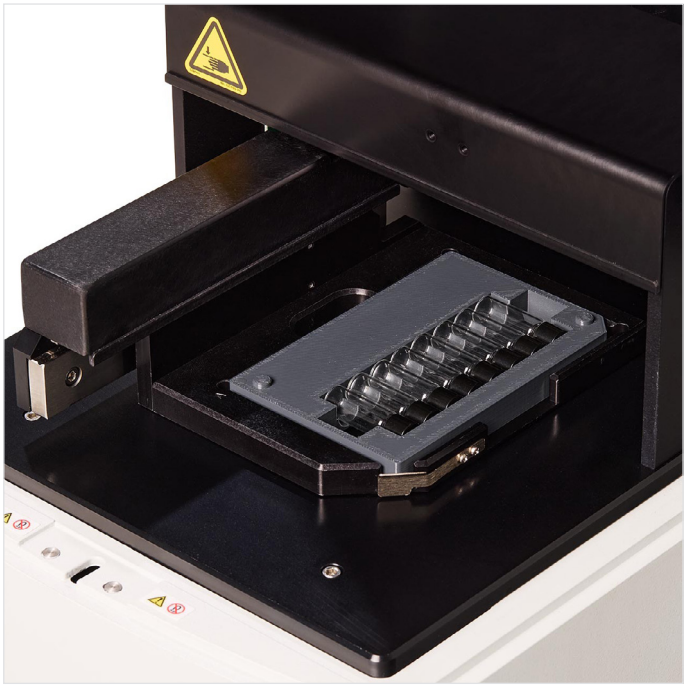
The DXR3 SmartRaman+ Spectrometer is perfect for research and method development. Its versatile design supports multiple applications, featuring user-exchangeable lasers and the ability to acquire spectral data with higher resolution than required for pharmaceutical testing. It enables precise analysis of a wide range of diverse samples, enhancing the effectiveness of R&D efforts.

High throughput

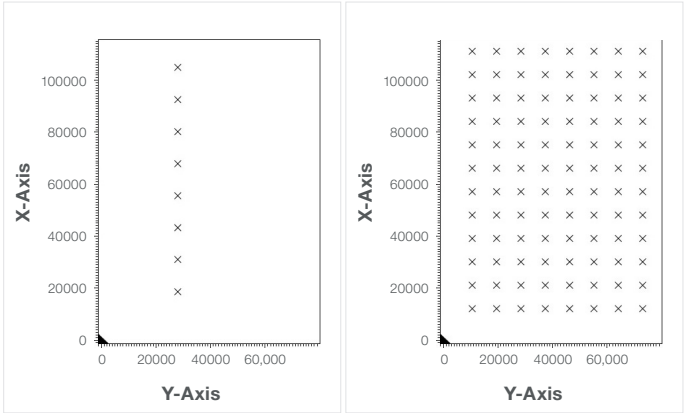
Elevate your pharmaceutical manufacturing process with the DXR3 SmartRaman+ Spectrometer by ensuring your products meet your specifications. Featuring at-line auto-sampling and high-throughput analysis, the DXR3 SmartRaman+ Spectrometer significantly enhances operational efficiency during the critical fill-and-finish stage. Delivering rapid, accurate quality control feedback, the instrument shortens production time, reduces labor costs, and safeguards the highest standards of precision and reliability.

Sampling flexibility

The DXR3 SmartRaman+ Spectrometer offers unparalleled sampling flexibility supporting user-designed custom multi-sample holders that accommodate a wide range of container shapes and sizes, including vials, cuvettes, well plates, and bottles. This means that the DXR3 SmartRaman+ Spectrometer can be employed to perform non-destructive testing directly through the most commonly used product containers, preserving sample integrity without the need for instrument modification. Additionally, the autosampler is also factory calibrated to provide for inter-autosampler positional reproducibility. This increased versatility enhances testing capabilities, while the trusted DXR3 backbone maintains the highest standards of accuracy and efficiency.



User-created 8-vial holder loaded into the Automatic Sampling Array (ASA) accessory.



Left: Measurement setup for 8 positions for the vials.
Right: Measurement setup for 96 positions.

USP and Ph.Eur. validations

Ensure your pharmaceutical processes meet the highest industry standards with the DXR3 SmartRaman+ Spectrometer. Fully qualified to comply with USP and Ph.Eur. quality standards, this spectrometer allows you to perform essential qualification tests as part of your routine validation and maintenance procedures. Maintain consistent adherence to industry regulations and guarantee the highest level of quality in your operations.

Qualification Report

Qualification Test: DXR Smart Raman+ (All) 532nm Full Range, High Power Laser and ASA - PHEUR
Operator:
Date: 04-Sep-25 12:17 (GMT-05:00)
Instrument: DXR SmartRaman+ (SN: AIZ12400001)
Laser(532nm): AJC1200607 Grating(532nm): AJG1200551 Filter(532nm): AJM1200558
Filename: C:\ProgramData\Thermo Scientific\CommonRaman\PHEUR-Spectrum-2025-09-04 12-17-23.spa

Test Description	High Limit	Low Limit	Measured	Result
Polystyrene Wavelength Accuracy				
620.9 (cm-1)	622.4	619.4	621.1	Pass
1001.4 (cm-1)	1002.9	999.9	1001.6	Pass
1031.8 (cm-1)	1033.3	1030.3	1031.6	Pass
1602.3 (cm-1)	1603.8	1600.8	1602.3	Pass
3054.3 (cm-1)	3057.3	3051.3	3055.5	Pass
Polystyrene Spectral Resolution				
FWHM @1001 (cm-1)	15.00	0.00	4.25	Pass

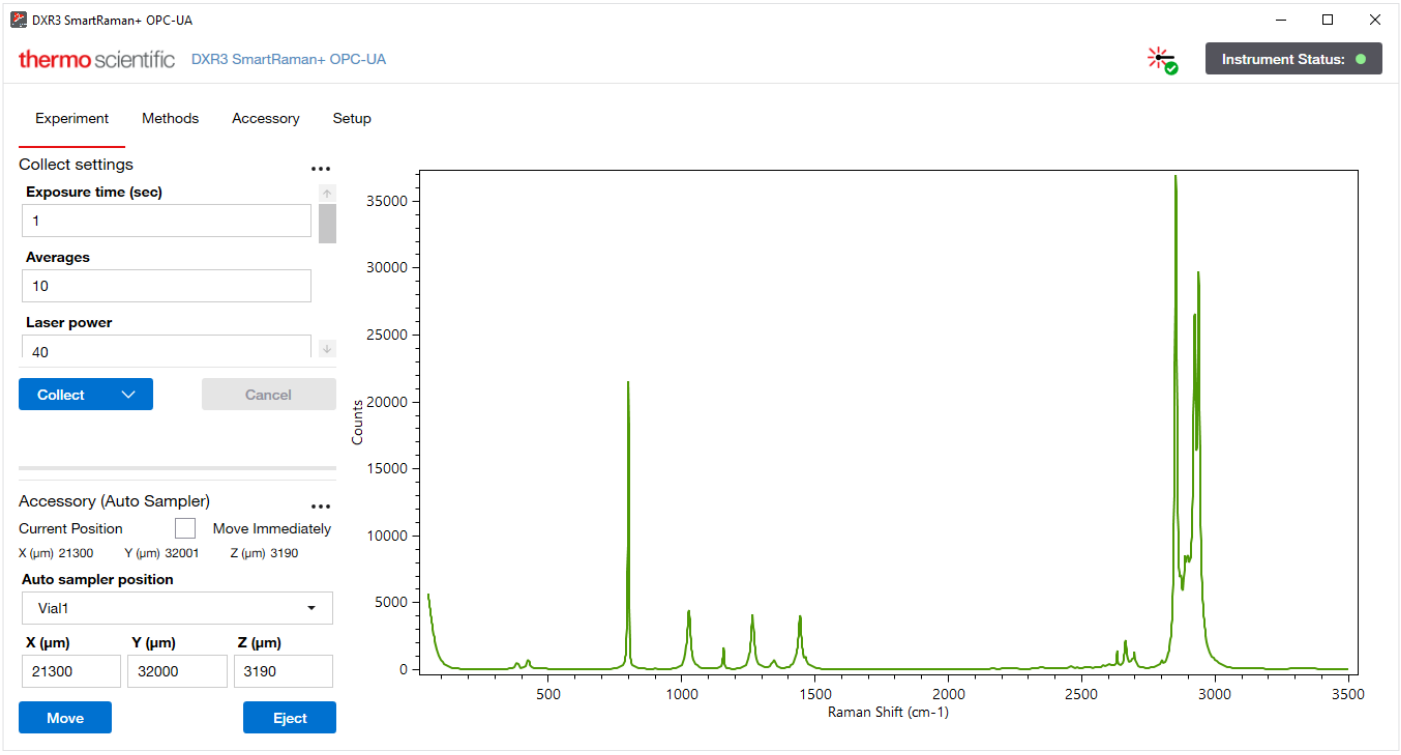
Performed by: _____ Title: _____ Date: _____

Approved by: _____ Title: _____ Date: _____

Comments:

Digital comment(s):
No digital comments found.

Example of a Ph.Eur. qualification report generated by the user software.



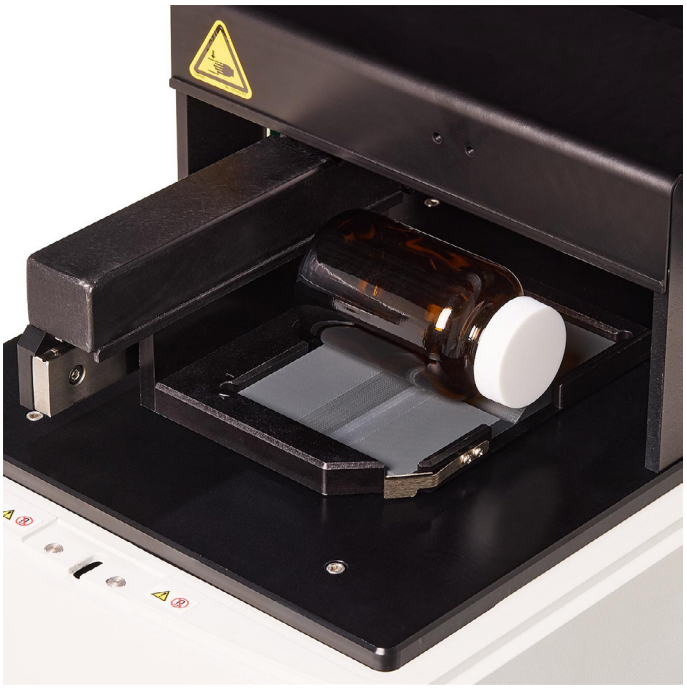
Simple user interface to help optimize measurement parameters and sample position.

Reduced sample wastage

The DXR3 SmartRaman+ Spectrometer helps preserve valuable resources by utilizing non-destructive Raman spectroscopy to ensure sample integrity and eliminate waste. This advanced technique maintains the original state of your samples and delivers accurate results without requiring any consumption or disposal of tested product.

Capability to measure through containers and packaging

Achieve efficient and precise quality control with the DXR3 SmartRaman+ Spectrometer, which facilitates non-destructive measurement directly through vials, containers, and several other forms of packaging. This advanced capability ensures the integrity of your samples is maintained, eliminating the need for sample preparation and streamlining your testing processes.



Industry-standard OPC UA connectivity

Integrate your analytical process seamlessly into your manufacturing environment with the connectivity features of the DXR3 SmartRaman+ Spectrometer. Featuring Open Platform Communications with Unified Architecture (OPC UA), which is recommended for Industry 4.0 connectivity, the DXR3 SmartRaman+ Spectrometer makes communication between your instruments simple. Because OPC UA allows central servers to exchange commands and data with instruments from different makers easily, it is advancing globally as an interoperability standard, facilitating manufacturing and digital transformation (DX). With advanced connectivity at its core, the DXR3 SmartRaman+ Spectrometer is designed for you to maximize your operational efficiency as you advance into the future.

While the local software offers basic measurement and experimental setup capabilities, the instrument is primarily designed for operation through a local or remote server using OPC UA control, making it ideal for manufacturing environments.

User-exchangeable lasers

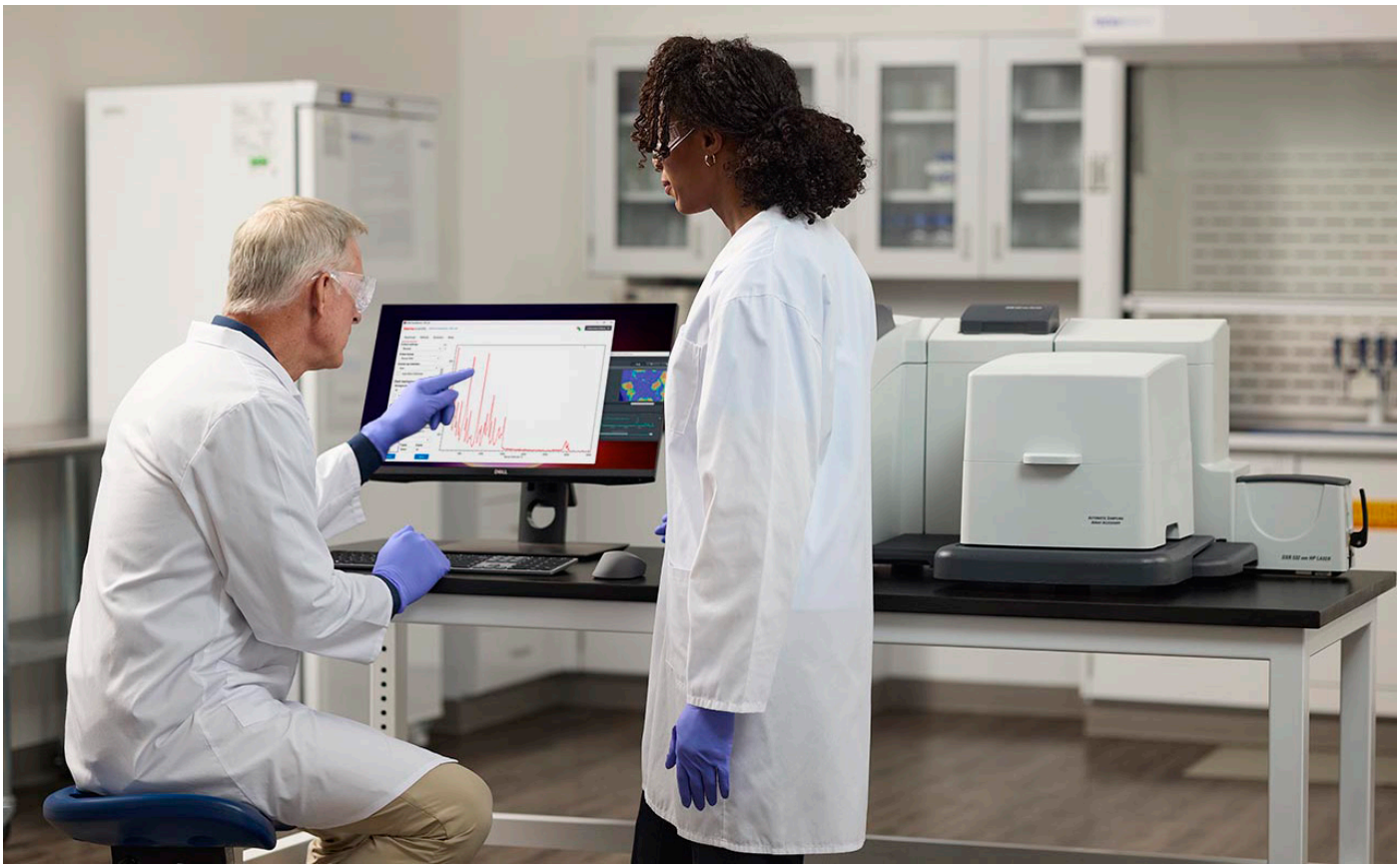
The DXR3 SmartRaman+ Spectrometer delivers unparalleled versatility by supporting user-exchangeable 532nm and 785nm lasers. This flexibility allows for precise analysis of a wide variety of sample types, including highly fluorescent materials. Whether for quality control deployment or method development, the DXR3 SmartRaman+ spectrometer adapts to diverse samples and application.

Ease of use

Simplify your quality control process with the DXR3 SmartRaman+ Spectrometer, which features user-friendly hardware and requires minimal interaction with software. Designed to reduce the need for expert users and minimize training time, its intuitive design and automated software operations ensure quick adoption and efficient use in manufacturing environment. The easy-to-use DXR3 SmartRaman+ Spectrometer will help you streamline your operations and enhance productivity.

Research-grade data

The DXR3 SmartRaman+ Spectrometer delivers research-grade data without compromising on spectral resolution, accuracy or the users' ability to select common excitation wavelengths of 532 nm and 785 nm. Built on the DXR3 platform that has been trusted by experts for over a decade, the DXR3 SmartRaman+ features robust optical, electronic, and mechanical assemblies to power your work with reliable and precise results.



Worldwide service and support

Maximize productivity and optimize performance with Thermo Fisher Scientific's comprehensive service plans, designed to support your DXR3 SmartRaman+ Spectrometer throughout its entire lifecycle. Our global Product and Applications Support keeps your operations productive and running seamlessly—wherever you are.

Exclusive service advantages:

- **On-site training:** Empower your team with hands-on, expert training tailored to your specific needs.
- **Unlimited technical support:** Access our dedicated technical support team anytime, ensuring you always have the help you need.
- **Extended warranties:** Enjoy peace of mind with extended coverage for your spectrometer.
- **Parts-only warranties:** Protect your investment with warranties that cover essential parts.
- **System compliance:** Maintain compliance with industry standards effortlessly.

Speak with your sales representative today to discover how our service and support options can elevate your lab's performance and productivity.

DXR3 SmartRaman+ Raman Spectrometer specifications

Performance			
Excitation wavelengths (user exchangeable without tools)		**532 nm**	**785 nm**
Laser spot size at sample:		Nominal 10 µm	
Maximum laser output power		100 mW	420 mW
Maximum power at sample		40 mW	150 mW
Center wavelength		532 +/- 1 nm	785 ± 0.5 nm
Full range grating	**Spectral resolution**	5.0 cm^{-1}	5.0 cm^{-1}
	Spectral range	50 – 3500 cm^{-1}	50 – 3250 cm^{-1}
Extended-range grating	**Spectral resolution**	11.0 cm^{-1}	
	Spectral range	50 – 6000 cm^{-1}	

Product safety	
Laser safety certification	Class 1
Safety features	• Keyed laser interlock switch • Laser blocked automatically when accessory not connected • Laser blocked automatically when accessory door open

General system features		
Spectrograph	**Design:** Triplet spectrograph	No moving parts
	Aperture: Four software-selectable apertures	25 and 50 µm pinhole apertures and 25 and 50 µm slit apertures
Lasers	Two excitation lasers supported (user exchangeable)	532 nm, 785 nm
	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 power reproducibility
Replaceable components	Smart components	• Pre-aligned, user-exchangeable system components (lasers, filters, gratings) lock into place • Software checks for laser, grating, filter compatibility • Software restores alignment and calibration settings when lasers are exchanged
	System alignment	Automatically optimized upon exchange
Communication		• USB 2.0 or 3.0 ports to PC • Data transfer via OPC UA to server or stored in local PC

Sample handling		
Automatic Sampling Array (ASA) accessory	Accommodates SBS (Society for Biomolecular Screening) titer-plate (85.48 mm x 127.76 mm)	• Design your own sample holder with SBS titer-plate outer dimensions. • Set up to measure multiple samples and/or various points within the same sample. • Autosampler factory calibrated to provide for inter-autosampler positional reproducibility.

Software		
DXR3 SmartRaman+ OPC UA software	• Spectral acquisition parameter optimization • Multi measurements set up • OPC UA set up and settings • Save data to local PC • System qualification (USP and Ph.Eur) • Automated fluorescence correction: Compensates for potential fluorescence in data • Autofocus to optimize 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 alignment and calibration		
Instrument alignment	Entirely software-controlled	Automated alignment technique aligns laser to the sample and Raman emission to the CCD detector
Instrument calibration	Wavelength	Software-controlled calibration using multiple neon emission lines
	Laser frequency	Software-controlled calibration using multiple polystyrene Raman peaks
	Intensity	Software-controlled correction using a white light source
Automatic x-axis calibration		Recurring, fixed interval wavelength calibration eliminating manual calibrations
Environmental, electrical and regulatory		
Environmental	Temperature range: 16 – 27 °C	
	Humidity range: 20 – 80%	
Electrical	100 – 240 VAC, 47-63 Hz	
Regulatory approval	CE, UL/CSA/ETL, 21 CFR1040.10	
Physical dimensions		
Width	94 cm	
Depth	56 cm	
Height	44 cm	
Weight	52.8 kg	

Warranty and support

12-month warranty standard. Extended warranties, parts-only warranties and service plans are available.

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