

PerkinElmer RamanFlex 400 and 400F Technical Specifications



Introduction

PerkinElmer® RamanFlex™ 400 series spectrometers are built to the highest ISO-9001 manufacturing standards. This document presents confirmed performance specifications based on product testing. All instruments will meet or exceed the confirmed specifications under normal conditions of use as described in the user manual.

The RamanFlex 400 dispersive Raman spectrometer offers research grade performance while maintaining push-button ease of use. The unique Echelle spectrograph and CCD detector deliver complete spectral coverage at high resolution in a single acquisition. With the stabilized near-infrared 785 nm laser, the system obtains the highest quality and most reproducible data with exceptional ease. Since the RamanFlex 400 has no moving parts, it offers unsurpassed calibration stability making it suitable for continuous operation. Spectrum Insight™ software allows for real time quantitative analysis and process feedback. The Raman Flex 400 can accept a single fiber optic probe; the RamanFlex 400F can be fitted with one or two fiber optic probes. The RamanFlex 400 delivers outstanding performance, accuracy and reliability ensuring long-term confidence in your results.

Optical Performance

Excitation source	350 mW near-infrared 785 nm laser; delivering 100 mW at the sample 0.05 nm FWHM
Spectral range	230-3,500 cm^{-1} Raman shift
Peak resolution	4 cm^{-1} FWHM (measured using the Calcite Peak Full Width Half Maximum)
Pixel resolution	1 cm^{-1} with linear cm^{-1} dispersion across entire spectral range Full spectral range can be acquired at this resolution in a single acquisition.

Optical System

Spectrograph	Proprietary F2 Raman Echelle spectrograph with no moving parts
CCD detector	High sensitivity open electrode CCD detector, 1,024 x 256 pixels sensor, hermetically sealed vacuum. Air-cooled, operated at $-50\text{ }^{\circ}\text{C}$.
Optional CCD upgrade	Ultra high sensitivity deep depletion CCD detector, 1,024 x 256 pixel sensor, hermetically sealed vacuum. Water-cooled, operated at $-90\text{ }^{\circ}\text{C}$.
Optics	Kinematically mounted, zero alignment optics. All optics are optimized for NIR performance, offering unsurpassed response at long wavelengths.

Fiber Optic Probe

General	The RamanFlex 400 can accept one fiber optic probe; the RamanFlex 400F can be fitted with one or two fiber optic probes. Data quoted here refers to the standard Raman probe. A wider range of probes is available. See Raman Fiber Optic Probe Technical Specifications.
Probe cable	5 m, armor clad with stainless steel
Probe head length	150 mm
Probe head diameter	12.7 mm
Working distance	7.5 mm
Probe spectral range	230-3,500 cm^{-1} Raman shift
Max temperature	80 $^{\circ}\text{C}$
Upgrade options	Optional immersion sleeve for liquid immersion measurements Additional lengths of fiber optic cabling are available for use in environments where the sample is located at a distance from the spectrometer. A range of high temperature and high pressure probes is also available.

Bench Details

Size	500 x 440 x 195 mm
Weight	35 kg
Laser class	RamanFlex 400 and 400F are Class 3B laser devices. Appropriate laser safety precautions should be observed.
Power requirements	110/230 VAC, 50/60 Hz

Software

General	A single software platform incorporates all of the functions required for Raman data acquisition and processing. This includes instrument control, data manipulation and analysis and flexible reporting utilities. A suite of optional software packages provides advanced capabilities or functions designed for specific applications.
User interface	Password-protected user login function. Access to methods, menu, toolbar and toolbox functions can be controlled by a supervisor.
Reports	Quick print facility for graphs, spectra and results windows. User-defined templates can be created to enable custom printed and electronic reports.
Processing	1st–4th derivative with a variable filter, smooth (Savitsky-Golay, moving average and triangular), difference, normalization, baseline correction, deconvolution, interpolate, peak table, peak height and peak area.
Materials testing	Patented COMPARE™ spectral comparison algorithm and Euclidean searching available. Spectral searching against commercially available or customer-developed libraries.
Quantitative analysis	Spectrum includes Beer's Law single-frequency quantitative method development software. The software is also able to perform PLS and PCR quantitative predictions.
Validation	Software allows calibration to ASTM and NIST standards and performance verification to ASTM standards. Comprehensive IQ/OQ documentation and services are available.

Optional Software Packages

Spectrum QUANT+™	Powerful chemometrics calibration building software
Spectrum Insight	<p>Visualization of chemometric method results through the Spectrum Insight software. Univariate (peak intensity or area) or Multivariate (chemometric) information is displayed in a simple to understand graphical or spreadsheet format. Depending on the type of data collected, Spectrum Insight can represent the data in several ways:</p> <ul style="list-style-type: none">• Reaction monitoring: multiple concentrations to be viewed in graph format, screen is updated in real time.• Spreadsheet: data is presented in a spreadsheet format (compatible with Microsoft® Excel®). <p>Spectrum Insight offers data acquisition functionality for acquiring single spectra or multiple spectra. Multiple spectra can be acquired in a continuous, or kinetic, fashion. Real time univariate or multivariate analysis of acquired spectra is possible.</p> <p>Communication with External Devices: 2–20 mA communication is provided through Spectrum Insight in conjunction with a digital input/analog output PCI card. Note: a PC equipped with a PCI slot is required for this functionality.</p>
LabVIEW™ Drivers	LabVIEW™ drivers are available for instrument control in circumstances where other devices must be synchronized with Raman Data Collection. LabVIEW™ offers a familiar and very versatile interface for many users and is compatible with many other scientific devices.

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