SPECIFICATIONS

FT-NIR Spectroscopy

Spectrum Two N FT-NIR Spectrometer

Introduction

The PerkinElmer Spectrum Two N™ is a high-performance, yet robust and transportable FT-NIR system platform enabling simple, reliable NIR solutions for product quality testing.

A flexible design with optimized "plug-and-play" sampling and analysis modules ensures the best solution for a range of qualitative, quantitative and adulterant screening applications. Simple user interfaces can be configured via the unique Spectrum Touch™ and Touch ES software. Whatever your specific NIR analysis requirements, in or out of the lab, the Spectrum Two N delivers outstanding performance and reliability to provide high-performance, dependable NIR measurement solutions.

PerkinElmer Spectrum Two N FT-NIR spectrometers are built to the highest ISO-9001 manufacturing standards. This document presents technical information and typical performance specifications for the Spectrum Two N instruments based on recent factory tests.

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For the Better

OPTICAL PERFORMANCE			
	Transmission System (Standard Sampling Module)	**Reflectance System (NIR Reflectance Module)**	**Remote Sampling System (Remote Sampling Module)**
Wavelength Range			
	680 - 4800 nm (ca 14700 - 2000 cm^{-1})	700 - 2500 nm (ca 14700 - 4000 cm^{-1})	700 - 2450 nm (ca 14300 - 4100 cm^{-1})
	680 - 2630 nm with InGaAs option (ca 14700 - 3800 cm-^{1})		
Spectral Resolution			
	0.19-6.4 at 1390 nm (1 cm^{-1} to 64 cm^{-1})	0.8-6.4 nm at 1000 nm (8 cm^{-1} to 64 cm^{-1})	0.8-6.4 nm at 1000 nm 8 cm^{-1} to 64 cm^{-1})
Wavelength Accuracy			
	0.028 nm at 1670 nm (0.1 cm^{-1} at 6000 cm^{-1})	0.028 nm at 1670 nm (0.1 cm^{-1} at 6000 cm^{-1})	0.028 nm at 1670 nm (0.1 cm^{-1} at 6000 cm^{-1})
Wavelength Repeatability			
	Better than 0.004 nm at 1390 nm (0.02 cm^{-1} at 7200 cm^{-1})	Better than 0.004 nm at 1390 nm (0.02 cm^{-1} at 7200 cm^{-1})	Better than 0.004 nm at 1390 nm (0.02 cm^{-1} at 7200 cm^{-1})
Signal-to-noise			
	Typically < 10 uA RMS noise around 1600 nm over 250 nm range for 1 minute scan	Typically < 15 uA RMS 1600 nm over 250 nm range 1 minute scan	Typically < 20 uA RMS 1600 nm over 250 nm range 1 minute scan

OPTICAL SYSTEM	
General	Long-life sealed and desiccated optical unit incorporating Opticsguard™ design, Vibration isolated baseplate.
Interferometer	Rotary Michelson interferometer, High stability, self-compensating for dynamic alignment changes due to a tilt and shear.
Optics	Gold-coated kinematically mounted, zero alignment optics , with high reflectivity and a low-angle off axis design. Proprietary OpticsGuard system for extended desiccant life and additional optical component protection.
Detectors	Standard Universal Sampling Module: Choice of high linearity room temperature detector or high sensitivity InGaAs. Reflectance Module: High sensitivity InGaAs. Remote Sampling Module: High sensitivity InGaAs.
Source	Air-cooled, pre-aligned tungsten halogen source. User replaceable from outside instrument.
Beamsplitter	Proprietary, wide range, multi-layer calcium fluoride.
Desiccant	Long-life desiccant system accepts disposable packs. Software controlled desiccant status indicator.
Validation	Software controlled validation wheel containing a polystyrene reference material, traceable to a NIST standard for wavenumber accuracy and a Schott NG11 filter for ordinate repeatability.

DATA SYSTEM AND ELECTRONICS	
Signal Sampling	Over-sampling delta-sigma converter.
Communication	USB, wireless and TCP/IP interface allows direct connection with LAN. Instruments can be configured with wireless router communication.
Calibration Transfer	Absolute Virtual Instrument (AVI) – actively standardizes instrument response to further improve repeatability and protect data integrity.
Atmospheric Compensation	Minimizes effect of atmospheric water on the sample spectra without the need for reference or calibration spectra. Operates at various instrument settings without having to recalibrate the correction.
Accessory Recognition	Spectrum Two N sampling modules are automatically detected as soon as they are locked into the sampling area. Instrument parameters are optimized for the installed accessory. Accessories information stored with spectral data.
Error Trapping	All sample spectra are checked for common spectroscopic and sampling problems. Key instrument components are continuously monitored.
Component Checks	Individual component checks under software control can be executed on-demand or automatically scheduled at preset times/intervals.
Powersave Mode	Instrument standby and power-up can be automatically scheduled.

SOFTWARE	
General	A single software platform incorporates all of the functions required for infrared analyses; instrument control, data manipulation and analysis, and flexible report utilities. A suite of optional software packages provides advanced capabilities or functions designed for specific application areas. Optional Spectrum Touch functionality optimized for touchscreen operation allows simple user interface for turnkey operation with selected applications.
Sample Table	Increases productivity by enabling multiple samples to be defined in batches, facilitating continuous operation.
User Interface	Password-protected user login function. Access to methods and routines, 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 using the Report Designer module to enable custom printed and electronic reports. Send To Word functions for simple formatting via Microsoft Word.
Processing	1st-4th derivative with a variable filter, smooth (Savitsky-Golay, moving average and triangular), difference, normalization, A, %T, %R, KM, LOG (1/R), ordinate modes, cm^{-1}, nm and micron abscissa modes, +, -, *, /, difference, baseline correction, smooth, deconvolution, normalize, interpolate, blank, Kramers-Kronig, peak table, peak height and peak area. Cell Pathlength data command, enables effective handling of cell pathlength with demountable transmission cells.
Scanalyse™	Enables real-time update of spectral information plus results to provide faster feedback of information data status.
Materials Testing	Intelligent SIMCA (Soft Independent Modelling by Class Analogy) model-building module option with AssureID™ and ability to call qualitative and quantitative models from user-defined workflows.
Quantitative Analysis	Single frequency, method development software. Spectrum includes Beer's Law, and chemometrics-based quantitative prediction including Quant Advanced Algorithms and Unscrambler™ quantitative predictions.
Validation	Instrument performance, user-configurable system suitability routines and international Pharmacopeia test methods available in standard software. Instrument Scheduler facility allows auto-programming of instrument validation testing.

OPTIONAL SOFTWARE MODULES	
Adulterant Screening	Chemometrics-based adulterant screen module option for improved detection and estimation of suspected adulterant threats. Simple setup with no quantitave calibration required.
Macros	Macro Editor and Equations Editor provide the ability to setup sequences of data collection and custom spectral processing. These procedures can then be stored and repeated using a single mouse click. Spectrum Touch user interface software for exceptional ease of use in touchscreen-driven and handheld-PC-driven systems.
User Training	Instrument use, common maintenance and software operation. Context-sensitive help provides assistance throughout the software wizards for guided instructions with common maintanance operations such as source change.

OPTIONAL SOFTWARE PACKAGES	
21 CFR Part 11	Spectrum 10 Enhanced Security™ (ES) software meets the technical requirements for the FDA's 21 CFR Part 11 with SQL database audit trail and data storage/retrieval. Spectrum Touch ES for executing measurement and analysis workflows in the ES environment.
Sample Analysis Workflows	Spectrum Touch and Touch Enhanced Security (ES) modules for simple scan and analysis workflows, incorporating simple screens optimized for tablet PCs. AssureID software designed for materials testing and product verification. Incorporating assisted method development for simple turnkey Compare, SIMCA, quantitative analyses with user-defined instructions and reports can be readily configured. OLE-DB compliant data storage with ES and non-ES versions available for 21 CFR Part 11 compliance.
Quantitative Analysis	Spectrum Quant and Quant ES Advanced Algorithms pack for chemometrics-based quantitative method development.
Validation CD	Data validation CD contains test algorithm descriptions, test data and results for data transform algorithms. Comprehensive IQ/OQ documentation and services available.

HEATABLE TRANSMISSION MODULE	
Temperature Range	30-80 ˚C, software controlled
Stability	Better than 0.5 ˚C
Accuracy	Better than 1 ˚C
Detector	Uses instrument pyroelectric or InGaAs detector
Disposable Vial Range	5-12 mm diameter
Cuvette Pathlength Range	0.5-10 mm
Cell Equilibration	Additional heated vial storage area to allow simultaneous next sample equilibration and scanning

BENCH DETAILS	
Dimensions	45 x 30 x 21 cm (W x D x H)
Weight	13 kg
Power Supply	Universal voltage power supply enables operation from mains. Optional rechargeable battery pack for remote operation, chargeable from mains or car battery. Optional power pack also serves as an Uninterrupted Power Supply (UPS).
Operating Range	5-45 ˚C
Typical Desiccant Lifetime	5 years at 25 ˚C and 90% relative humidity

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