

Introducing the PerkinElmer

Spectrum 400

FT-IR and FT-NIR Spectrometer



No matter what you measure...

The NEW Spectrum™ 400 – the first and only fully automated, single platform, research-grade instrument for optimized FT-IR and FT-NIR spectroscopy.

Offering:

All the advantages of Mid-IR spectroscopy...

- Identify highly specific information about molecular structure
- Utilize well-established applications and measurement protocols across all industries
- Benefit from information-rich spectra that reveal small chemical and physical differences
- Increase productivity with faster interpretation of results that can be easily analyzed against a large number of commercial reference libraries

AND, all the advantages of Near-IR spectroscopy...

- Analyze samples directly and non-destructively, measuring through various sampling containers
- Quickly and consistently reproduce quantitative analysis of upstream ingredients and finished products
- Use robust methods for product development and manufacturing environments
- Take advantage of Process Analytical Technology (PAT) in pharmaceutical manufacturing

Greater productivity, versatility and simplicity at the push of a button.

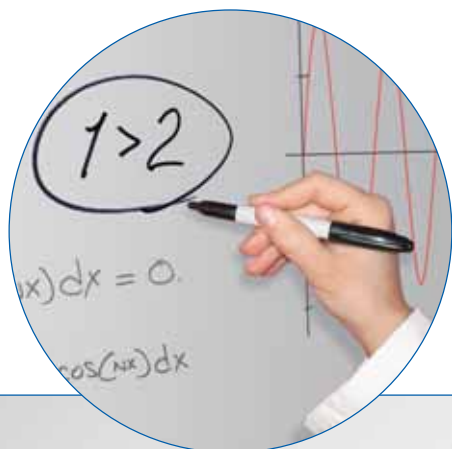
With the Spectrum 400, you can...

- Increase your lab's productivity with the best of both Mid-IR and Near-IR
- Lower the cost of acquiring two instruments, reduce training and save valuable bench space
- Take advantage of the widest range of accessories and imaging options available
- Leverage faster method development and enjoy more robust testing procedures with an extensive suite of software
- Extend your analytical capabilities even further by combining the Spectrum 400 with the new Spotlight™ 400 or one of many other PerkinElmer® microscopy and imaging systems



Spectrum 400

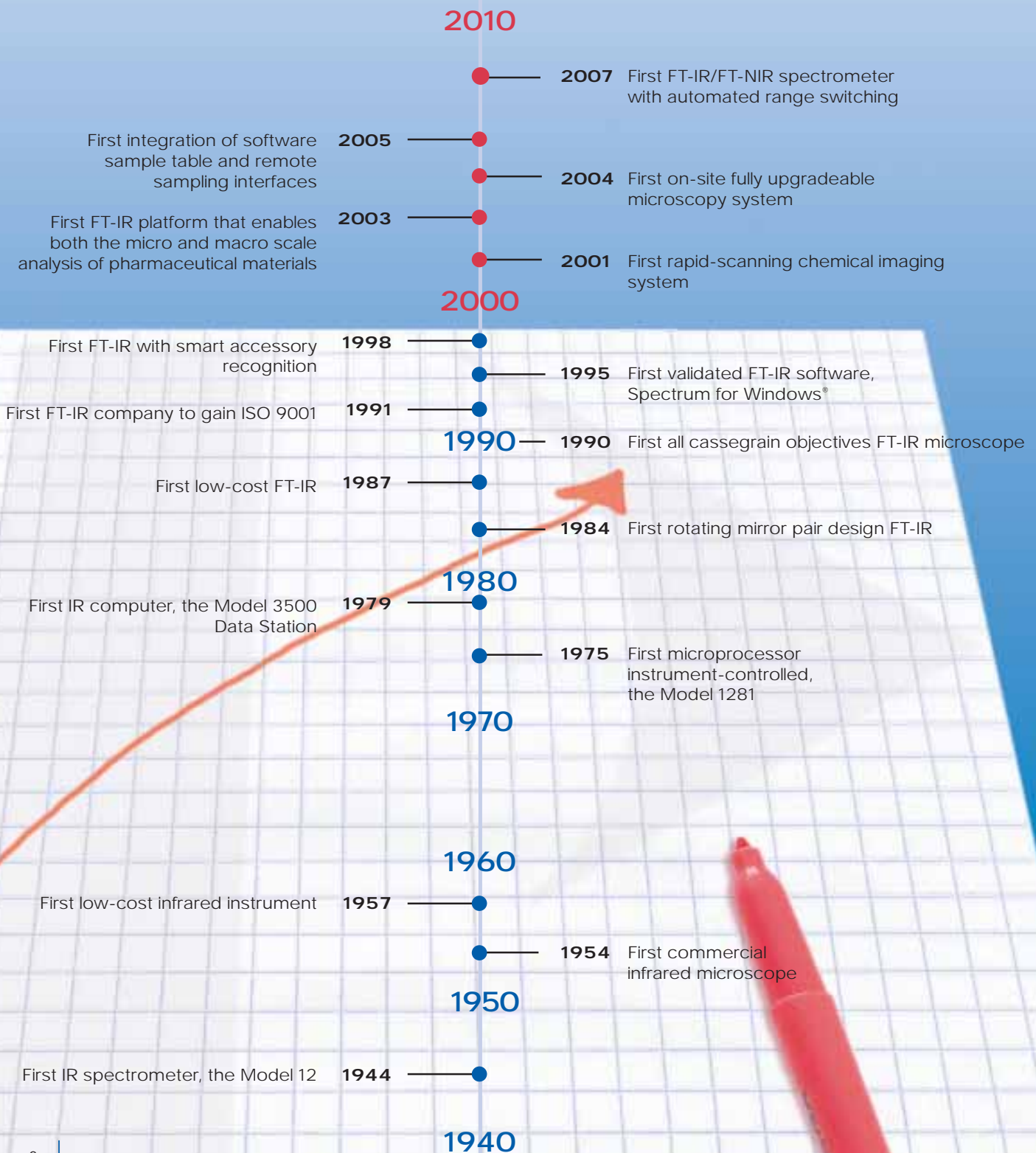
FT-IR and FT-NIR Spectrometer



There is only **one** answer.

The latest innovation in PerkinElmer's long history of IR technology leadership...

For over 60 years, PerkinElmer has been the world leader in infrared spectroscopy because we are committed to providing solutions to the challenges you face in your laboratory. We continually pioneer technology to help you produce more insightful results with greater reliability and ease of use. Through several industry firsts and patented innovations, as well as in-depth training and unmatched service, we are committed to providing you with the gold standard in FT-IR systems.

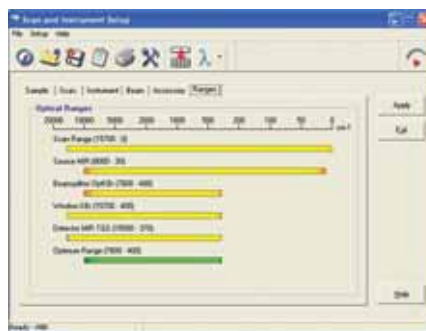


One is no longer a lonely number... Mid-IR and Near-IR together in one system

The Spectrum 400 is an all-new, dual (Mid-IR/Near-IR) system that combines the latest developments in design, sampling and data-handling. Incorporating sophisticated automated range switchover, this amazing instrument provides you with fully optimized performance across the entire measurement range. This tremendous versatility gives you the freedom to select the best combination of measurement range and sampling accessory for a given task. The Spectrum 400 is ideally suited to a wide range of applications in product development, product and process troubleshooting, and method development environments.

Powerful product and process troubleshooting

- A wide range of sampling accessories provides the flexibility to measure almost any solid, liquid, powder or paste across the whole Mid-IR/Near-IR range
- Choice of high-performance IR microscopes allows identification of tiny impurities in virtually any matrix
- Automated setup and range switching enable you to quickly move onto your next sample without manual reconfiguration



Automatic component selection and system optimization via Spectrum software

Rapid characterization of new materials, formulations and processes

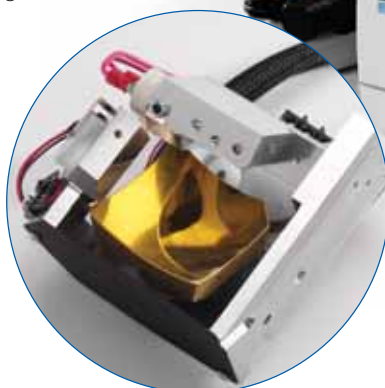
- Fast scanning enables reaction mechanisms and manufacturing processes to be studied
- Mid-IR and Near-IR imaging options provide rapid characterization of product formulations, and additive distribution, in a large range of samples including polymers, biomaterials and pharmaceutical formulations
- A range of software tools, including automatic spectral interpretation, library searching and unique COMPARE algorithms, allows materials to be identified quickly and easily

Productive and reliable method development

- Mid-IR and Near-IR methods on a common platform helps in comparing and selecting the most suitable sampling techniques and measurement conditions
- Simple, powerful method development software increases productivity
- Patented lineshape calibration technology and simple-to-run methods enable smooth rollout of protocols to manufacturing sites

The Spectrum 400 provides a platform for multiple sampling techniques.

For example, Near-IR tablet analysis by transmission for content uniformity can be combined with Near-IR imaging for coarse (>50 μ m) spatial distribution studies in tablets, plus Mid-IR ATR imaging for fine (3 μ m) particle studies and Mid-IR ATR macro sampling for packaging characterization. These four techniques can reside side by side on a single instrument, with rapid switchover made possible by automatic system optimization.



(Inset) The dual source mechanism. Selects either the NIR or Mid IR source.



The NEW Spectrum 400 with the Spotlight 400 system for FT-IR and FT-NIR spectroscopy, microscopy and imaging.

Spectrum 400 – unique technology that increases your productivity, no matter what your industry...



CHEMICALS AND MATERIALS

- Identify product contaminants
- Troubleshoot problems in manufacturing or in the field
- Realize cost-effective QA method development from raw material to final product inspection
- Gain a better understanding of the properties of advanced materials, with a wide range of sampling options



PHARMACEUTICAL

- Handle all troubleshooting and counterfeit studies with a huge toolbox of software tools and sampling accessories
- Facilitate rollout of methods to your manufacturing sites through excellent method transferability and reduced training costs
- Control product quality from formulation development through in-process batch conformity
- Exceed all FDA technical requirements for 21CFR Part 11 Compliance



ACADEMIA

- Take advantage of advanced analytical technology for emerging areas of research
- Quickly reconfigure the flexible design for multiple areas of research or more than one research group
- Enjoy ease of use with software ideal for students, researchers and technicians
- Perform reaction monitoring using fast-scanning capabilities
- Conduct the most challenging research projects, with high sensitivity and extremely high stability

PerkinElmer patented technology

FEATURE	BENEFIT	PERKINELMER EXCLUSIVE
AVC – Atmospheric Vapor Compensation	AVC features an advanced digital filtering algorithm designed to subtract out CO ₂ and H ₂ O absorptions in real time. AVC effectively eliminates interference from these atmospheric constituents, allowing your lab to achieve the most accurate and reproducible results.	YES
AVI – Absolute Virtual Instrument	Our exclusive AVI approach to line-shape calibration allows standardization used on individual measurements to be applied to measurements collected over time. AVI standardizes your instrument's wavenumber scale to a far higher accuracy than can be achieved with conventional calibration methods, resulting in transmission spectra that can be related easily and directly to theory. AVI's internal, traceable protocol allows your data to be transferred quickly and accurately between instruments – whether side by side or across the world.	YES
Delta Sigma Conversion	The Spectrum 400's unique use of delta-sigma modulators in the digitization of the FT-IR interferogram improves dynamic range, reduces spectral artifacts and increases ordinate linearity producing more accurate, reproducible results than conventional systems.	YES

The widest range of imaging options available... in one instrument

The Spectrum 400 is an ideal platform to extend your analytical capabilities with one of PerkinElmer's range of Mid-IR or Near-IR microscopy or imaging systems. Our microscopes and imaging systems share these tremendous features:

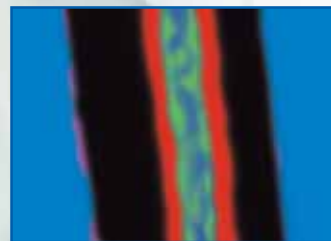
- Easy to learn and simple to use for even the most advanced measurements, allowing you to obtain high-quality results as productively as possible
- Designed with optics that are optimized for all FT-IR applications, providing extraordinary sensitivity for even the most difficult samples
- Engineered with permanently aligned optics, ensuring the system is always working at maximum performance and no time is wasted on adjustments between samples
- Feature spatial resolution down to $3\mu\text{m}$, transmission and reflectance modes of operation and options for micro-ATR sampling, allowing you to handle a wide variety of samples

High-performance microscopy with the Spotlight 200.

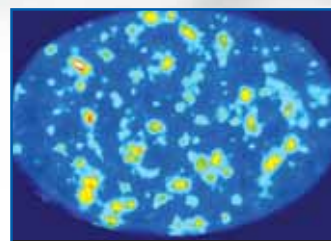
Ideal for the toughest troubleshooting applications, the Spotlight 200 features auto-focus, automated data collection and auto-illumination for fast, productive analysis of virtually any sample.

The Spotlight 400 Family - high-speed, flexible Mid-IR and Near-IR imaging

The Spotlight 400 and 400N imaging systems are the ultimate in infrared and near-infrared imaging, with the ability to collect 170 high-quality spectra per second. Analyses that previously took days can now take hours or even minutes. Coupled with flexible pixel sizes, variable sampling area and full automation, Spotlight also features an Attenuated Total Reflectance (ATR) accessory, increasing the spatial resolution of the system to $3\mu\text{m}$ for identification of even the smallest components. For the ultimate in productivity, multiple image areas can be measured in a single unattended operation. This unique combination of high productivity and incredible analytical power provides a more superior understanding of products and materials than ever before.

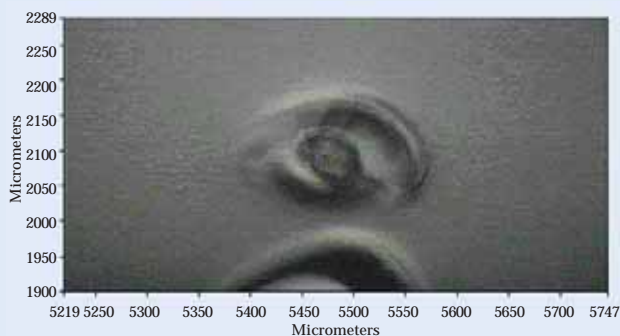


ATR image of a polymer laminate. With a spatial resolution of down to 3 microns, Spotlight is a powerful tool for investigating materials and manufacturing processes.

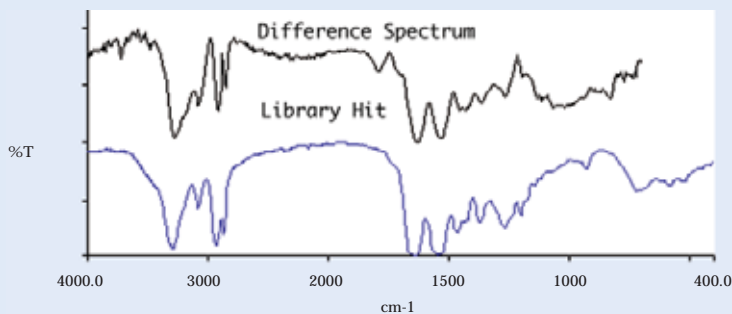


Near-IR image showing the distribution of ingredients in a pharmaceutical tablet. Spotlight is an excellent tool for the study of active and excipient distribution in powder blends and solid dosage forms.

Rapid Impurity Identification



A production defect in an polysiloxane eyeglass lens coating is easily identified in-situ using the Spotlight 200 and a micro-ATR objective.



A library search shows that the contaminant is a polyamide.

The Spectrum 400 offers more sampling options than any other FT-IR system

NIR Tablet Autosampler

- Transmission and reflectance modes enable full tablet characterization
- 30 positions
- Patented custom tablet mold system provides the highest reproducibility

Samples: powders, tablets

Helps identify all tablet components, including cutting agents

Liquid Sipper

- Automated sampling – no need for time-consuming manual filling of cells
- Built-in software contamination check reduces analysis errors
- Range of cell window materials and pathlengths allows measurements in Near-IR and Mid-IR

Samples: liquids

Traditional liquid cells can be labor-intensive and unreproducible

NIRA

- In-situ measurement of materials in blister packs, glass vials and polyethylene bags
- Self-referencing functionality – increases reproducibility and ease of use
- Range of accessories for optimized measurement of liquids or inhomogeneous solids

Samples: liquids, solids, powders, gels, pastes

Non-invasive analysis is essential for ensuring the integrity of the sample and reproducible results

NIR Remote Liquids Probe

- Measurements of liquid samples can be taken remotely from the instrument, including inside reaction vessels and containers
- Universal interface allows compatibility with a wide range of probes

Samples: Remote liquids

Enables convenient and accurate sampling of difficult-to-handle samples



For a complete list of our sampling accessories, visit us at

"With just a click to change from one application to another,
[the Spectrum 400] is like having two dedicated instruments."
- Lab Manager, Product Technology Centre, Nestlé Waters

TG-IR Interface

- Combines FT-IR and Thermogravimetric analysis
- Facilitates identification of the breakdown products of decomposition and combustion analyses
- Unique gas transfer design ensures the highest sensitivity and minimizes sample contamination

Samples: solids

Reveals decomposition mechanisms of polymers and pharmaceuticals, including solvent residuals

HATR

- Automatic recognition of top-plate crystal material, crystal angle and serial number
- Onscreen display of force applied to sample ensures analysis reproducibility
- Wide range of optional top-plate materials and angles of incidence available

Samples: liquids, pastes, gels, solids

Provides reproducible surface sampling for solid, liquid and semi-solid samples

UATR

- Permanently aligned, kinematically mounted sampling ensures perfect measurement-to-measurement reproducibility and high sensitivity
- Automatic pressure release eliminates accessory downtime caused by cracked or broken accessories
- Smart, plug-and-play accessory recognition and integrated diagnostics warn of common sampling or analysis errors, providing high confidence in results

Samples: liquids to solids

Control of force improves the reproducibility and accuracy of measurements

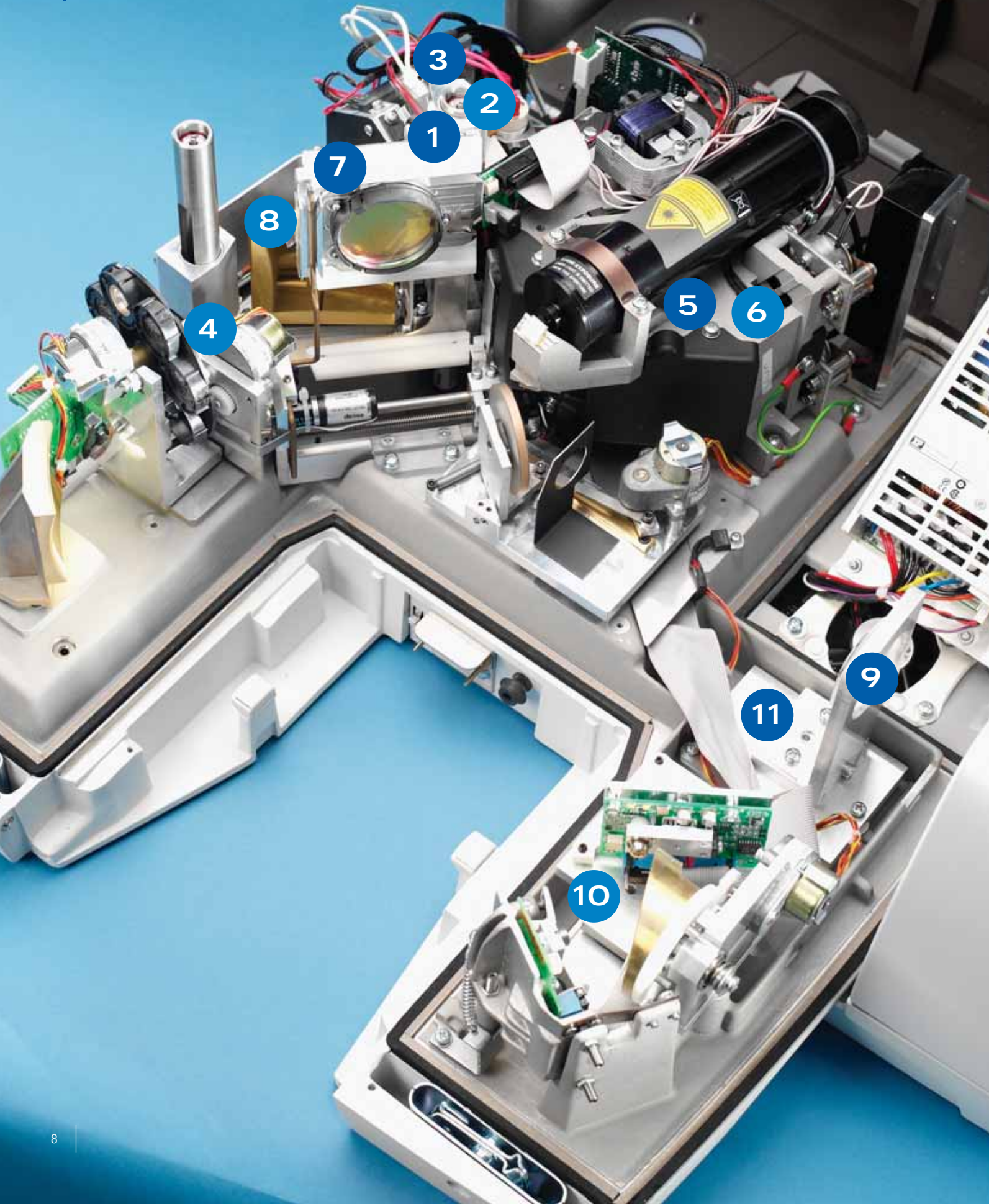
NIR Remote Solids Probe

- Sampling up to 10 meters from the instrument
- Handset user interface and LCD display allow continuously remote operation
- Design facilitates easy and rapid decontamination; electrically safe for use in hazardous environments

Samples: remote powders and solids

Enables convenient and accurate sampling of difficult-to-handle or unusual sized samples

An inside look at the Spectrum 400



Unique PerkinElmer technology enables a single instrument to

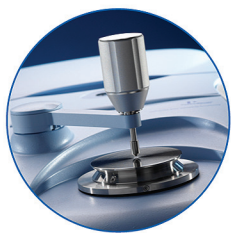
meet all your analytical needs:

- 1 User Replaceable Source** Electronically stabilized hot-spot increases measurement stability and extends source lifetime
- 2 Dual Source Mechanism** Automatically selects either the Mid-IR or Near-IR source
- 3 Source Doubling Mirror** Maximizes source output and provides higher signal-to-noise performance without sacrificing source lifetime
- 4 Variable J-Stop** Limits beam divergence to provide the highest accuracy measurements at ALL resolutions, unlike conventional fixed J-stops
- 5 Patented Dynascan Interferometer** Immune to the effects of tilt and shear that limit the accuracy of linear moving mirror designs
- 6 Stabilized Interferometer** Electronically stabilized to ensure high reproducibility between measurements
- 7 Beamsplitter Changing Mechanism** Automatically changes between the Mid-IR and Near-IR beamsplitters without user intervention
- 8 Upgrade to Microscopy and Imaging Capabilities** Automated mirror can be installed to direct the beam into any PerkinElmer microscope or imaging system
- 9 Focusing Optics for 2nd Sampling Station** Enables two sampling modules to be installed simultaneously, eliminating the need to switch accessories between measurements
- 10 Electronically Temperature-Stabilized DTGS Detectors** Ensure excellent reproducibility and accuracy for all analyses no matter what the ambient laboratory temperature
- 11 Second Detector Expandability** Provides the ability to increase sensitivity by adding, for example, a cooled MCT detector

www.perkinelmer.com/spectrum400



(Inset) Mid and Near IR beamsplitters and the automatic beamsplitter changing mechanism



Spectrum 400:

powered by PerkinElmer

We pride ourselves on offering you the broadest range of instruments, reagents, and consumables in the industry. With over 60 years of experience, you can count on us to be there when you need us. We are backed by the largest and most experienced global service force in the industry. Our 1,200 factory trained and certified engineers have an average of 15 years of experience maintaining leading-edge scientific equipment including preventative maintenance, validation support and instrument repair, along with the training and technical support you have come to rely upon.

We provide the skills and capabilities to deliver solutions that enable your laboratory to be more productive and efficient. Our solutions are customized to meet your individual needs. We can provide you with solutions to address issues ranging from asset management to technical training of your personnel to equipment moves. We also have the capabilities to provide solutions for multi-office environments, including preventative maintenance, validation, repair and compliance. Working with you, we'll make sure that your laboratory achieves its goals today, and tomorrow.

That's precisely our business.

THE SPECTRUM 400 ADVANTAGE

CONSIDER THE BENEFITS:

- **Fully automated range switching between Mid and Near-IR** – allows you to maximize your lab's productivity and minimize any instrument downtime
- **Maximize repeatability and accuracy of results** – with little to no sample preparation, you can analyze your sample using both Mid- and Near-IR by simply pushing a button
- **Answers are just a click away** – with the "Go" button technology there's no need for extensive training in order to get the high quality results you need. Just click and analyze
- **Broadest range of sampling and imaging options available** – our zero-alignment, plug-and-play accessories allow you to achieve the quick, predictable and reproducible results you demand

To speak directly with a PerkinElmer IR and NIR specialist, call **+39 039 2383-1**

E-mail us: productinfo@perkinelmer.com or go to www.perkinelmer.com/spectrum400

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
Phone: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com



For a complete listing of our global offices, visit www.perkinelmer.com/lasoffices

©2007 PerkinElmer, Inc. All rights reserved. The PerkinElmer logo and design are registered trademarks of PerkinElmer, Inc. Spectrum and Spotlight are trademarks of PerkinElmer, Inc. or its subsidiaries, in the United States and other countries. All other trademarks not owned by PerkinElmer, Inc. or its subsidiaries that are depicted herein are the property of their respective owners. PerkinElmer reserves the right to change this document at any time without notice and disclaims liability for editorial, pictorial or typographical errors.