



TENSOR II

- FT-IR Spectrometer
Reliable. Comfortable. Powerful.



TENSOR II is the perfect choice for routine QA/QC and advanced R&D applications in industry and academia.

- TENSOR II provides outstanding performance for highest sensitivity
- TENSOR II eases all steps of your IR analysis from initial sampling to the final report
- TENSOR II is reliable and virtually maintenance-free
- TENSOR II offers flexibility and expandability for unlimited in-compartment sampling and coupling technology
- TENSOR II fulfills all your demands on system qualification
- Bruker supports all your application, validation and technical service needs

• Smooth Work Flow



TENSOR II provides a smooth and complete solution for your analytical work flow. To perform your sample analysis just follow the guideline of the intuitive software step-by-step. Save valuable time by unobstructed sampling, by sensitive thus short measurements and by using the most suitable evaluation method for your analytical question. The generation of a meaningful report closes the cycle before the next sample is analyzed.

TENSOR II always assures you are working within specifications as a network of smart functions continuously verifies the instrument performance and takes care that your validation demands are fulfilled.

• Dedicated to Your Applications



Pharma



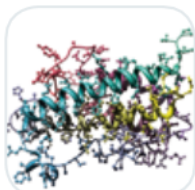
Polymer & Chemical



Material Science



Surfaces



Life Science



Building Materials

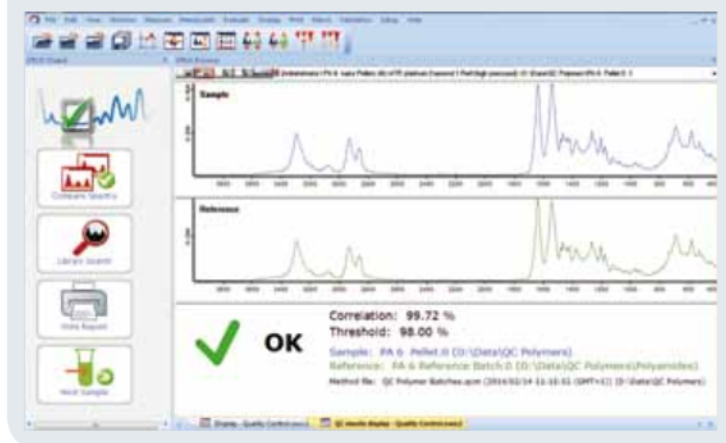


Environment

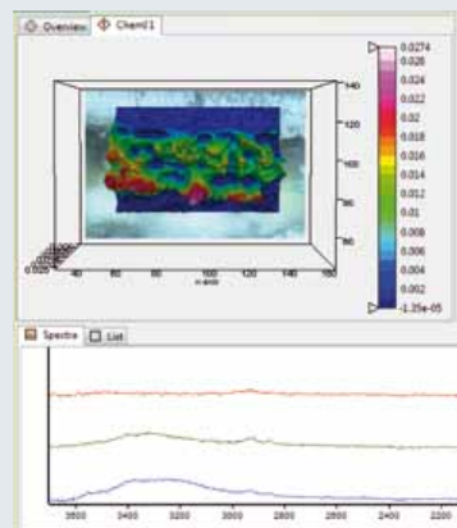
TENSOR II covers all your needs for convenient routine QC/QA analysis.

Moreover TENSOR II provides the performance needed for applications with a demand for highest measurement sensitivity - no matter which configuration is required. The almost unlimited variety of internal and external measurement accessories gives access to a multitude of advanced applications in industrial R&D and academic research.

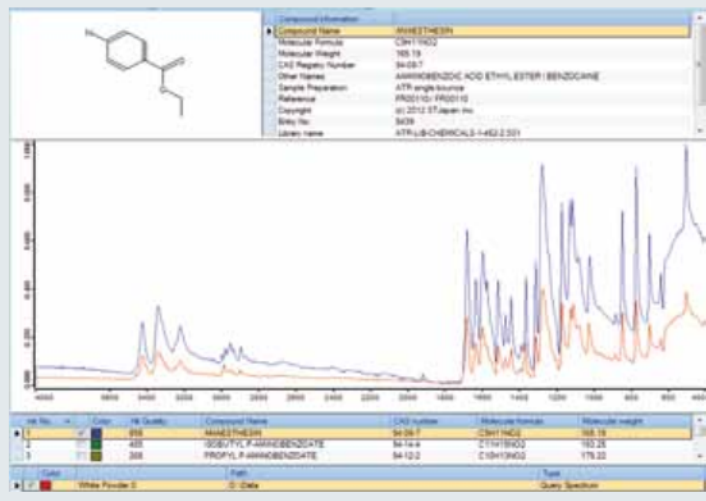
Verify the identity of your incoming raw materials
Assure the quality of your products



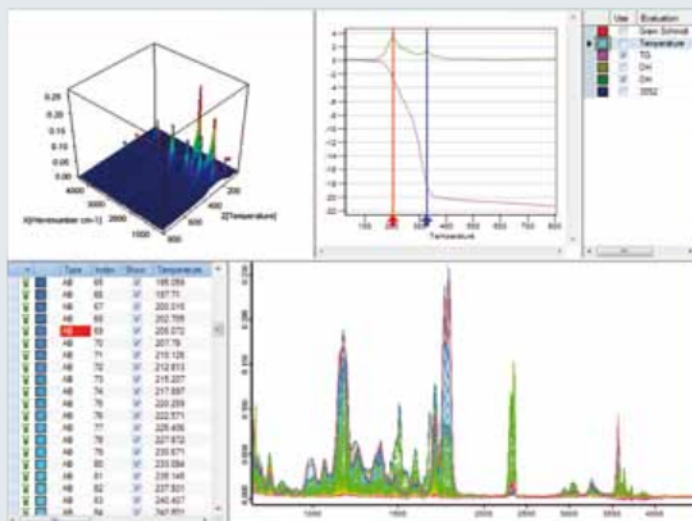
Visualize the distribution of chemical
Investigate thin layers and coatings



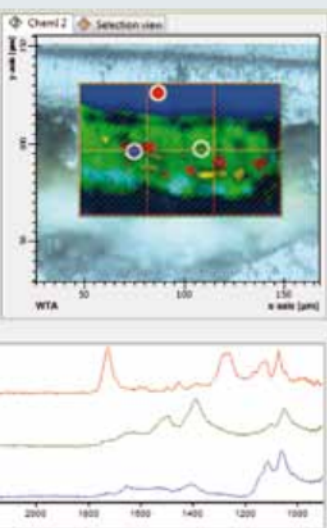
Identify contaminants
Analyze your competitors products



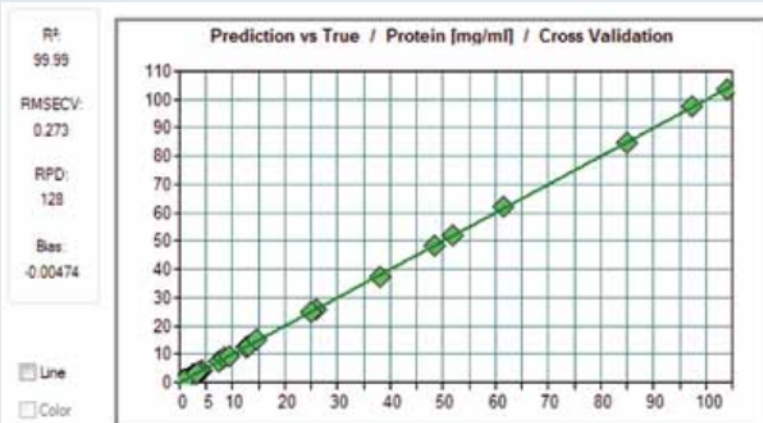
Determine the thermal decomposition behaviour of materials
Follow reaction processes



compounds



Quantify compounds in solution



Low Cost of Ownership

Fourier Transform Infrared (FT-IR) spectroscopy is a technique that has replaced many other expensive and time-consuming methods over the years.

All components of TENSOR II exhibit an exceptionally long life time reducing maintenance requirements to a minimum. The “heart” of each FT-IR spectrometer is the interferometer. TENSOR II uses the RockSolid™ interferometer which to date has proven its reliability in more than twenty thousand Bruker spectrometers delivered worldwide.

With TENSOR II usually no costly exchanges of the spectrometer laser will be required anymore during the spectrometer’s life cycle due to modern diode laser technology. On part of the IR-source a powerful electronic stabilization expands its life time compared to conventional ones.

The fully moisture-resistant windows and beamsplitter of the high humidity option guarantee peace of mind when working under humid conditions. Even instrument downtime caused by the need to regularly evacuate MCT detectors is avoided by using the permanently evacuated Perma-Vac MCT detectors with the TENSOR II.

Validation

Today’s regulated laboratories must comply with extensive regulatory requirements. Bruker Optics offers a comprehensive system validation that provides the documentation and procedures required for an effective compliance. TENSOR II is prepared to fully support your validation needs; from the design qualification (DQ) to daily performance qualification (PQ).

Bruker’s comprehensive system validation manual includes all related documentation and guides you through all the steps of the validation procedure. Validation, instrument installation and annual certification are offered by Bruker’s factory trained, certified service engineers thereby further reducing the cost of compliance. TENSOR II uses integrated certified NIST traceable reference standards for fully-automated instrument validation tests.

• Highest Quality for Highest Performance



Commitment to quality

Engineered with unprecedented quality, our dedication to product excellence is a benefit we offer to all our customers.

We believe that quality optics and high performance should be available even in an instrument designed for routine use.

Performance You Can Rely On

TENSOR II has been designed to extend the strength of the well-established TENSOR series by innovation.

As the first spectrometer in its class TENSOR II utilizes a modern diode laser. Furthermore TENSOR II provides a new electronic stabilization function for the IR-source. These features greatly increase the life time of the two major wear parts in IR-spectrometers and further reduce your maintenance costs and efforts.

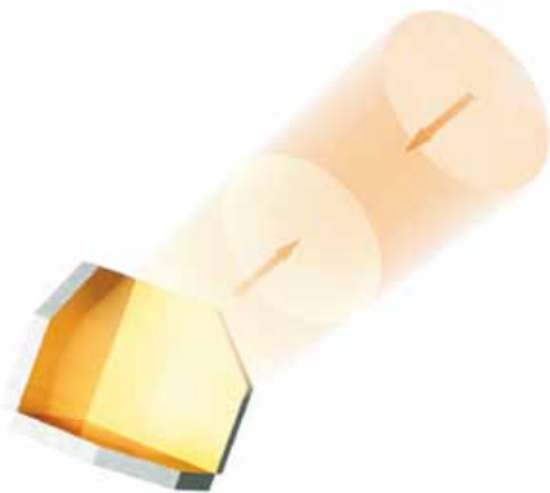
The outstanding sensitivity of the TENSOR II is achieved by the high throughput of the well-proven RockSolid™ interferometer. It is controlled by an advanced electronic platform resulting in a high stability against mechanical shocks and vibrations.

Bruker's DigiTect™ detector technology ensures lowest electronic noise. It is based on modern dual-channel delta-sigma ADC's with true 24-bit dynamic range integrated into the detector preamplifier electronics.

The TENSOR II offers a unique Power-Mode to improve the signal-to-noise in measurements at low light throughput with the standard DTGS detector.

High Performance Interferometer

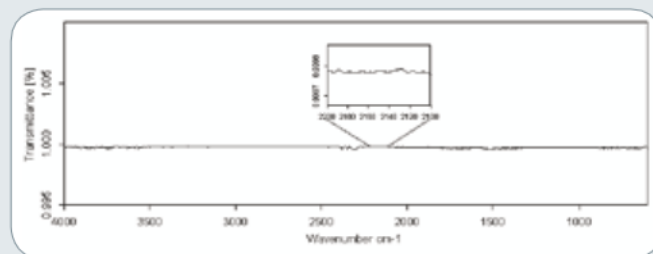
Bruker has led the development for many of today's most important FT-IR innovations and prides itself not only on a high level of customer support but also on technical achievements. The interferometer is the heart of an FT-IR spectrometer and is one of the main reasons for the superior performance of Bruker spectrometers. Cube corner interferometers are widely used for laboratory and process applications and have some unique characteristics. Unlike flat mirrors, cube corners are practically immune to mirror tilt (i.e. angular movement of the mirror). This is an important consideration since the light returning to the beamsplitter must be precisely recombined or a reduction in the stability, resolution, and spectral quality will occur. The RockSolid™ interferometer incorporates dual retro reflecting cube corner mirrors in an inverted double pendulum arrangement. A wear-free pivot mechanism is located at the center of mass. This well approved design optically eliminates mirror tilt and mechanically prevents mirror shear. It is also resistant to vibration and thermal effects. The wear-free nature of the bearing in the RockSolid™ interferometer ensures exceptional stability and reliability even in harsh environments. The high throughput design delivers the highest possible signal-to-noise ratio, resulting in the fastest and most accurate results possible.



Cube Corner mirrors are immune to mirror tilt. By design incoming and reflected lightbeam are exactly parallel. This is the fundamental principle of Bruker Optics' permanently aligned RockSolid™ interferometer.

● Get the Most Out of Your Infrared Analysis

SENSOR II is characterized by a typical signal-to-noise ratio of better than 8000:1 peak-to-peak using 5-second acquisition time conditions and better than 45,000:1 peak-to-peak using 1-minute measurement conditions. Superior sensitivity enables you to get the most out of your infrared analysis using either internal or external accessories.



Better than 45,000:1 SNR = $9.7 \cdot 10^{-6}$ Abs. noise

- 1 minute sample measurement
- 4 cm^{-1} resolution
- Blackman-Harris apodization
- KBr beamsplitter, room temperature detector (DTGS)
- Peak-to-Peak noise from 2,200 - 2,100 cm^{-1}

Why S/N is important?

The signal-to-noise ratio of an FT-IR spectrometer is the measure of performance for the time that is needed to accumulate a good IR spectrum. In FT-IR spectroscopy, multiple scans are accumulated to result in a final spectrum. The acquisition time that is needed depends on the sample and sampling technique, but it always depends on the performance of the FT-IR spectrometer. The better signal-to-noise performance will result in shorter measurements. But due to statistical reasons the measurement time is proportional to the square of the noise ratio. In other words; if one wants to improve the S/N by a factor of 3, one has to measure 9 times longer. Compare the Bruker to other manufacturers' FT-IRs, and you will find that TENSOR provides the most out of your infrared analysis.

• Extend your Sampling Capabilities

Large Sample Compartment

TENSOR II has a large sample compartment to accommodate virtually any FT-IR sampling accessory.

Immediately after the sampling accessory is inserted, it is recognized by the automatic accessory recognition (AAR) system.

A quick test is performed to verify the specification and appropriate measurement parameters are loaded.



TENSOR II with Platinum ATR Accessory

Attenuated Total Reflectance (ATR) is the most often used sampling technique. With the Platinum ATR Bruker offers a single reflection diamond ATR accessory that is designed to significantly ease your daily routine. Its ergonomic one-finger clamp mechanism and the unobstructed access simplifies the infrared analysis of solid and liquid samples.

A pure diamond crystal design allows measurements in the near, mid- and far Infrared. The extremely robust ATR-assembly allows the application of exceptional high pressure so that even very hard samples can be measured. Furthermore, a high chemical resistance is achieved.



CONFOCHECK

To analyze solved proteins and aqueous solutions in general the TENSOR II can be upgraded to the CONFOCHECK.

Due to dedicated accessories and an uncompromising selection of optimal system components the CONFOCHECK system matches perfectly the high demands of IR-spectroscopic protein analysis.

Analyze concentration, conformation and structural transitions of proteins at the conditions defined by you and not by the analytical technique!

External Accessories and Sampling Options

Sampling capabilities of the TENSOR can be expanded by adding an optional external beam port. This allows the attachment of one or more external accessories.

- HYPERION Series FT-IR microscope
- HYPERION 3000 FT-IR imaging system
- HTS-XT High Throughput Screening eXTension
- TGA module
- PMA 50 for VCD and PM-IRRAS
- GC module
- External sample compartment; evacuable or purgeable
- External vacuum tight UHV-chamber adaptation
- Integrating sphere
- Liquid auto samplers



HYPERION Series FT-IR Microscope

HYPERION series provide the highest level of infrared microanalysis capabilities, utilizing state-of-the-art optics for optimal sample visualization and infrared data collection. With its modular design, the HYPERION can be customized to the specific requirements of each application.

Utilizing modern focal plane array (FPA) detector technology HYPERION 3000 facilitates the spectroscopic examination of samples by FT-IR imaging resulting in a lateral resolution that is only limited by the wavelength dependent diffraction of light.

TG-FT-IR-Coupling

The connection of thermal analysis with infrared spectroscopy provides valuable information about thermodynamic transitions, thermal stability, decomposition and chemical reactions in your sample together with the type and quantity of evolved gases.

The TG-FT-IR coupling designed through the joint efforts of BRUKER and NETZSCH is a real functional unit, both for the hardware and the software solution. It is characterized by an outstanding sensitivity for the gas analysis and a comfortable integration between the PROTEUS software for thermal analysis and the OPUS software for FT-IR.

Well-Balanced Design

TENSOR II is designed to optimally combine high light-throughput and a large sample compartment with compactness. The optical bench is precisely arranged and safeguarded by the tightly sealed premium-class housing from high quality structural foam which provides excellent rigidity.

Constantly Verified Performance

TENSOR II automatically and constantly ensures reliable analysis results. All vital spectrometer components like source, detector and interferometer are permanently checked. Periodically performed test measurements verify the functionality of the TENSOR II according to its specification.

Validation

TENSOR II is prepared with fully automated PQ (performance qualification) and OQ (operational qualification) routines for instrument validation in regulated pharmaceutical laboratories. Using internal NIST-traceable standards TENSOR II performs optionally validation tests according to US, European and Japanese Pharmacopeia. The OPUS software is 21 CFR Part 11 compliant.

Expandability

TENSOR II optionally can be equipped with broadband beamsplitters to expand the spectral range either to the Near or Far Infrared. According to the range of interest source and detector can easily be exchanged by the operator. Due to electronic coding parameter settings are adapted automatically.

TENSOR II System Design

TENSOR II FT-IR Spectrometer

- sealed 5 chamber design
- user exchangeable components
- large and flexible sample compartment
- optional external beam

Rigid housing from high quality structural foam

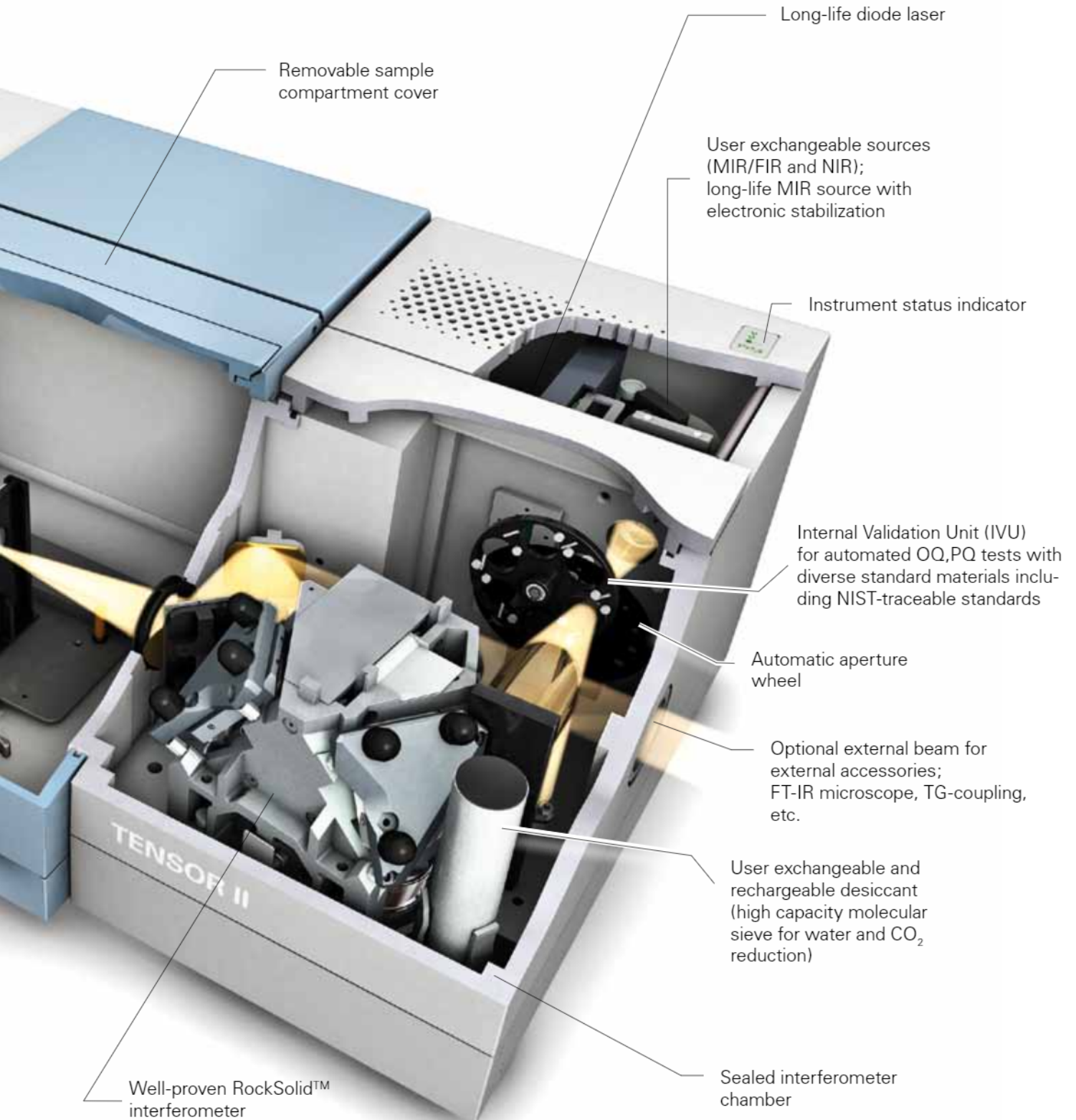
Large sample compartment with QuickLock baseplate for easy exchange and electronic recognition of sampling accessories

Exchange dynamic r



• Design by Quality

able detectors with integrated 24-bit
range electronics



Bruker

Our success stems from our commitment and dedication to provide you the proper analytical tool you require to solve a demanding research problem or run daily quality control routine procedures.

Related Bruker Optics instrumentation



LUMOS

- LUMOS is a stand-alone FT-IR microscope with full automation. It is designed to combine best performance for visible inspection and infrared spectral analysis with highest user comfort.

ALPHA

- About the foot-print of a laboratory notebook, ALPHA is a compact FT-IR spectrometer perfectly suited for the daily routine. An easy-to-use software and the smart QuickSnap™ sampling modules assure intuitive and powerful FT-IR analysis.

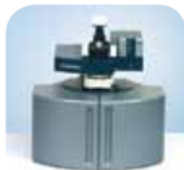


VERTEX Series

- Research level FT-IR spectrometers that is fully customizable to meet your demanding requirements. Its vacuum option can eliminate atmospheric moisture absorptions for ultimate sensitivity and stability.

TANGO

- An ergonomic and easy-to-use FT-NIR spectrometer which can be applied for qualitative and quantitative analysis in laboratory as well as production environments.



SENTERRA

- Raman microscope that provides permanent wavelength calibration and on-demand confocal imaging.

Technologies used are protected by one or more of the following patents:
US 7034944; US 5923422; DE 19704598

Bruker Optics
is ISO 9001 certified.

Laser class 1

www.bruker.com/optics ● **Bruker Optics Inc.**

Billerica, MA · USA
Phone +1 (978) 439-9899
Fax +1 (978) 663-9177
info@brukeroptics.com

Bruker Optik GmbH

Ettlingen · Germany
Phone +49 (7243) 504-2000
Fax +49 (7243) 504-2050
info@brukeroptics.de

Bruker Hong Kong Ltd.

Hong Kong
Phone +852 2796-6100
Fax +852 2796-6109
hk@brukeroptics.com.hk

Bruker Optics is continually improving its products and reserves the right to change any specifications without notice.
© 2014 Bruker Optics BOPT-4000672-01