



VACUUM RESEARCH FT-IR SPECTROSCOPY

# VERTEX NEO R

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Unleash the Future -  
The Revolutionary FT-IR Vacuum Research Spectrometer

Innovation with Integrity

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# VERTEX NEO - Unleash the Future

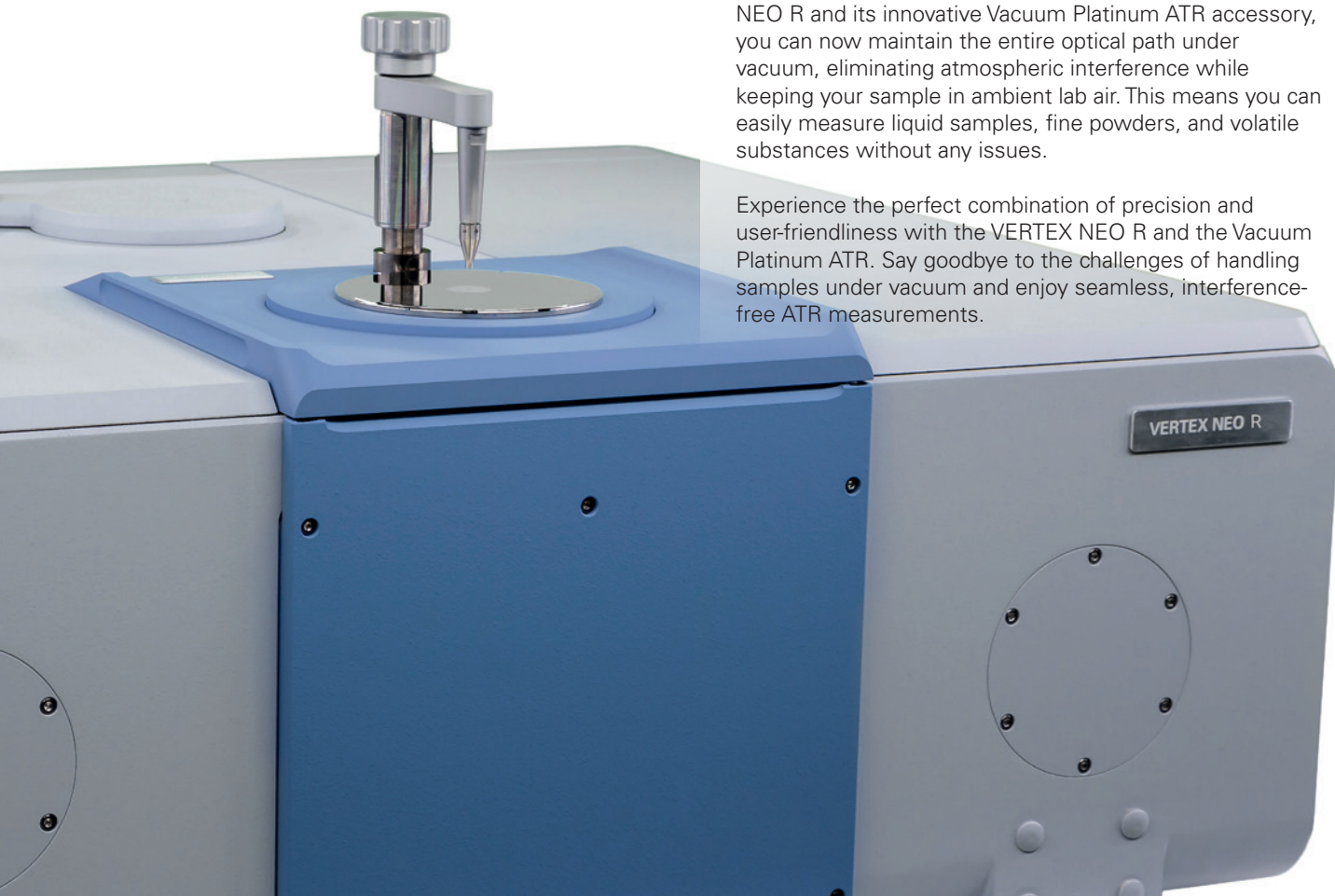
Building on 50 years of success in the FT-IR academic and research market, we proudly present our next-generation FT-IR vacuum research spectrometer VERTEX NEO R. Designed with cutting-edge technology and well-proven unique features, this new instrument is not just an upgrade - it's a revolution! More powerful electronics, more flexible optics bench, all new vacuum ATR technology, VERTEX NEO R is designed to push the boundaries of scientific discovery and continue our legacy of superior VERTEX performance.

## Vacuum Platinum ATR

Are you on one hand benefiting a lot from the ATR measurement in vacuum, but on the other hand tired of the limitations from the constant interruptions for sample exchange? We understand the frustration of not being able to measure all types of samples under vacuum conditions.

Introducing the Vacuum Platinum ATR unit, is the perfect solution to this common problem. With the new VERTEX NEO R and its innovative Vacuum Platinum ATR accessory, you can now maintain the entire optical path under vacuum, eliminating atmospheric interference while keeping your sample in ambient lab air. This means you can easily measure liquid samples, fine powders, and volatile substances without any issues.

Experience the perfect combination of precision and user-friendliness with the VERTEX NEO R and the Vacuum Platinum ATR. Say goodbye to the challenges of handling samples under vacuum and enjoy seamless, interference-free ATR measurements.





### Catalysis

- Enhanced reaction monitoring with real-time spectral analysis in millisecond scale
- Prepared for experimental setups with complete beam path under vacuum



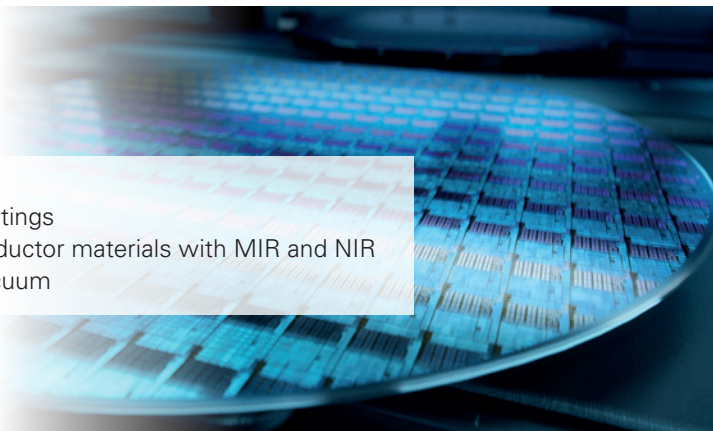
### Green Energy

- Multispectral range characterization of new materials for sustainable energy solutions
- Monitoring efficiency and degradation of electrodes and other cell materials for battery research



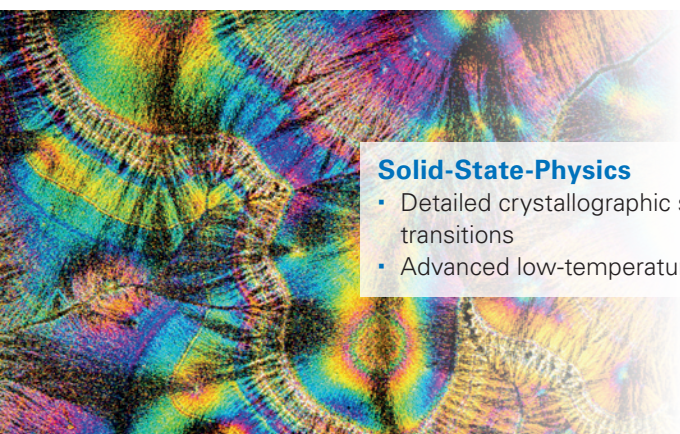
### Life Science

- Non-destructive vacuum FT-IR analysis of biological samples with full-vacuum beam path (e.g. VERTEX NEO vacuum ATR)
- Superior sensitivity for detecting low concentrations of compounds



### Semiconductors

- High-resolution analysis of crystals and coatings
- Revealing electronic structures of semiconductor materials with MIR and NIR photoluminescence solutions under full vacuum



### Solid-State-Physics

- Detailed crystallographic structure analysis and real-time monitoring of phase transitions
- Advanced low-temperature experiments for material properties

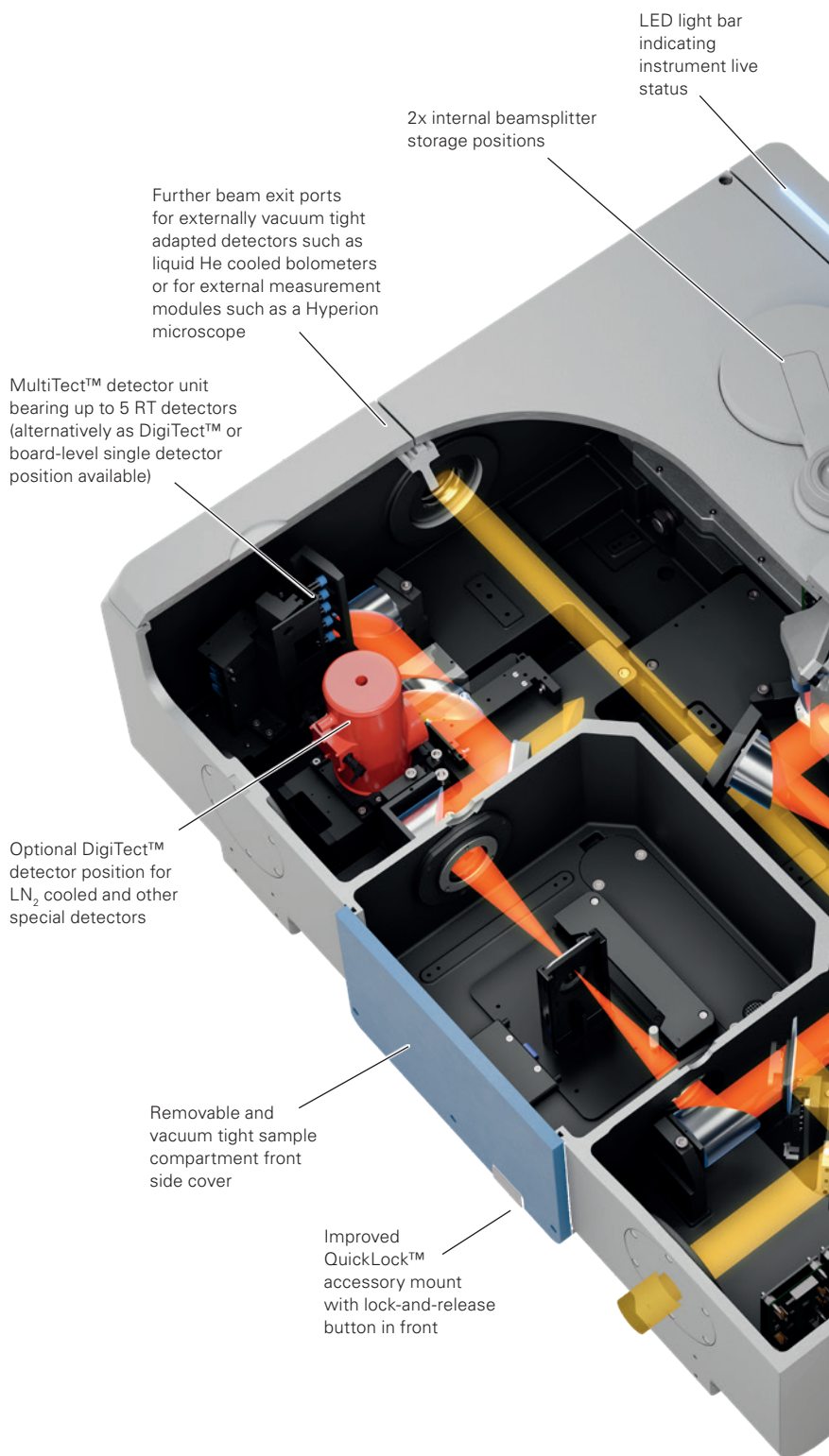


### Astronomy and Space Research

- Determination of molecular composition and the emissivity for samples from space missions
- Characterization of materials and devices used in astronomical field for improvement

# Pioneering Excellence in Vacuum FT-IR

- Full-vacuum optics bench for upmost stability and sensitivity
- Unique vacuum ATR accessory offering fully evacuated beam path with free accessible sample stage for highest stability for the measurement and easiest sample handling
- Permanently aligned RockSolid™ interferometer with 30° angle of incidence for maximum efficiency and minimum polarization effect
- MultiTect™ detector technology for up to 5 room temperature (or TE-stabilized) detectors
- Additional DigiTect™ detector position for liquid N<sub>2</sub> cooled, fast, high gain and other special detectors
- Sufficient space for MCTs with up to 12 h holding time (special cover optionally available for 24 h MCTs)
- Fully digitized signal processing using dual channel 24-bit dynamic range ADC
- Easy in-field upgrade for near IR, far IR and VIS/UV spectral ranges
- Optional touch panel with dedicated OPUS TOUCH software offering an intuitive workflow as well as advanced R&D software features
- 5 exit and 2 input beam ports, all software selectable
- Superior Rapid Scan, Slow Scan, Step Scan and interleaved TRS performance for modulated and time resolved spectroscopy
- Compatible with all VERTEX and INVENIO accessories and external modules
- Big sample compartment for bulky accessories
- Elegant LED light bar indicating instrument status

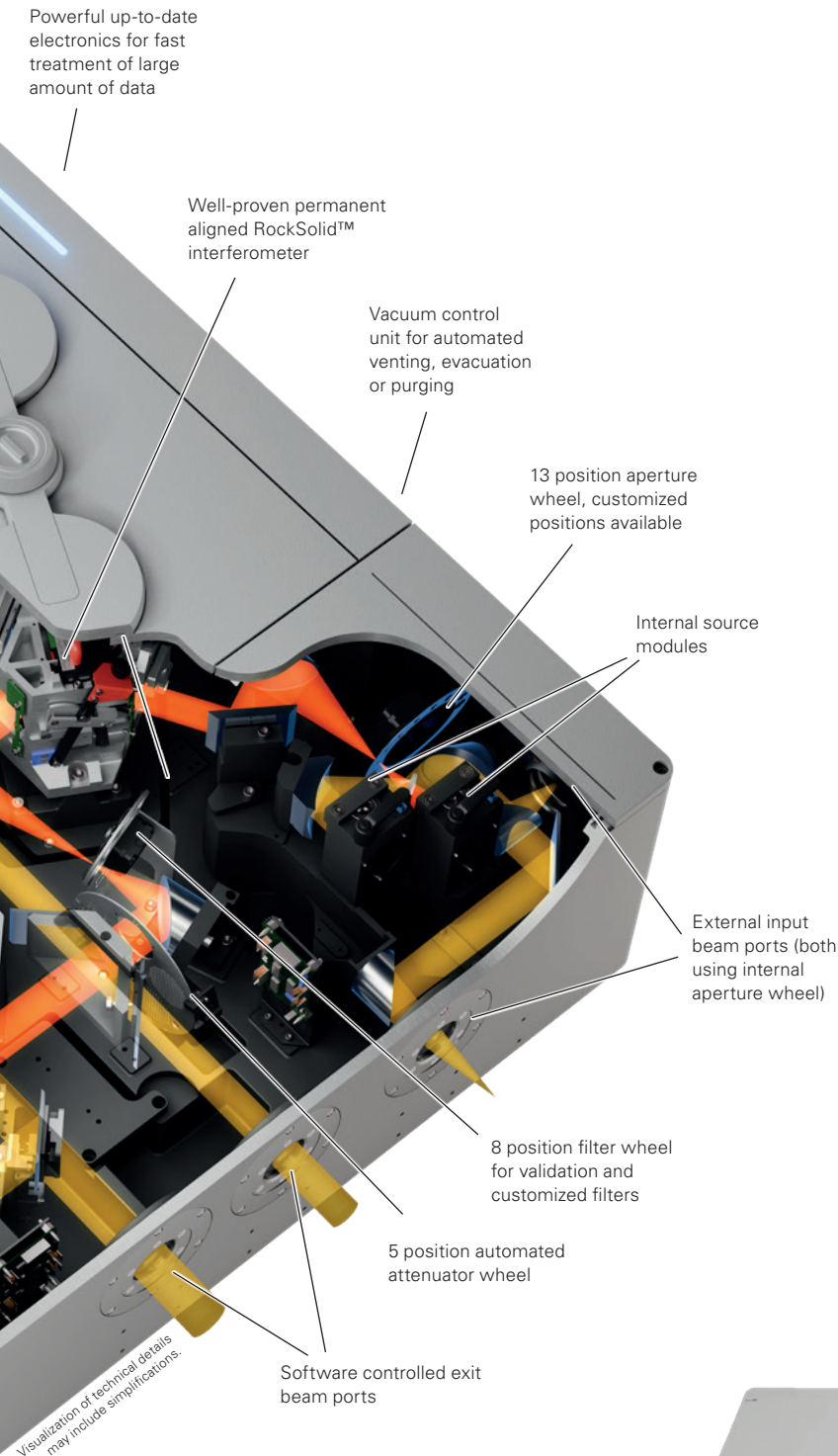


## Flexibility

The VERTEX NEO optics and beam path are designed for highest flexibility and upgradability. Spectral range extensions, additional optical components (sources, beam splitters or detectors) for highest spectral performance, internal accessories or external modules for new applications are easy and cost-efficient to achieve.

## MultiTect™ and DigiTect™ Detectors

Bruker's innovative MultiTect™ detector technology is also available for VERTEX NEO R. It enables automatic control of up to 5 room temperature detectors at once. Furthermore, DigiTect™ user exchangeable detector position for MCTs or other special detectors is available. These two detector options can be freely combined and equipped in a single instrument to suit your specific needs, for example, the MultiTect™ unit with a DigiTect™ position, DigiTect™ with a single RT detector, or two DigiTect™ positions. Additionally, MCT detector with 12 h holding time fits directly without the need for a raised lid. This versatility ensures that you have the optimal setup for any research application, providing you with the precision and adaptability needed for advanced spectroscopy.



## Numerous Sampling Accessories

The VERTEX NEO R sample compartment is even larger than its predecessor. It offers sufficient space for most bulky accessories used in research experiments. For taller or specialized accessories, raised or modified lids are available. With its QuickLock™ mount and the lock-and-release button in front of the sample compartment, exchanging accessories is easier than ever before.



# Why Vacuum Optics?

## Vacuum Advantages

- No atmospheric absorbance masking weak spectral features
- No fake intrinsic features and no interference with high spectral resolution features
- No problems caused by fluctuations of the dry air purge supply
- Cast aluminum housing of the optics bench provides highest stability and reproducibility
- Utmost sensitivity and best effective performance for time resolved spectroscopy (step scan)

The vibrational and rotational modes of water vapor and carbon dioxide in the lab air exhibit intense absorption bands in the MIR and FIR/THz spectral ranges. The most common method of reducing these effects is to purge the optics bench with dry air or  $N_2$ . However, purging gases can contain residual moisture,  $CO_2$  or contaminations, causing significant atmospheric artifacts which effectively limit sensitivity. Software procedures cannot completely remove atmospheric absorption bands because their shape and intensities are temperature and resolution dependent and the uncompensated residuals may mask weak but important spectral features.

Therefore, for demanding R&D measurements it can be difficult or even impossible to obtain desired results using purge spectrometers. Only vacuum spectrometers can completely overcome these inherent limitations and permit results of the highest quality.

## Spectral Range

The VERTEX NEO R is a cutting-edge vacuum spectrometer offering an impressive optional spectral range from 28,000 to  $10\text{ cm}^{-1}$ . Standard instrument configuration covers the spectral range of 8,000 to  $350\text{ cm}^{-1}$ . With spectral range extension packages, it can be expanded into the FIR, NIR, and VIS/UV regions. The FM Package allows measurements from 6,000 to  $50\text{ cm}^{-1}$  in a single scan. Together with the Vacuum Platinum ATR it can provide unparalleled flexibility and efficiency in your MIR-FIR/THz spectral analysis. The VerTera option, combining vacuum FT-IR with continuous-wave terahertz (cw THz) technology, extends the spectral range down to an astonishing  $3\text{ cm}^{-1}$ . This feature opens new possibilities for detailed and comprehensive spectral analysis.

## Temporal Resolution

The VERTEX NEO R boasts an impressive rapid scan option, capable of measuring more than 70 spectra per second at a resolution of  $16\text{ cm}^{-1}$ . This remarkable performance ensures you can capture high-speed spectral data with exceptional accuracy and efficiency.

For repetitive experiments VERTEX NEO R is capable of the powerful step scan feature, which allows you to achieve a time resolution of  $6\text{ }\mu\text{s}$  (with internal ADC) or even  $4\text{ ns}$  (using transient recorder board), providing unparalleled precision for time-resolved spectroscopy (TRS).

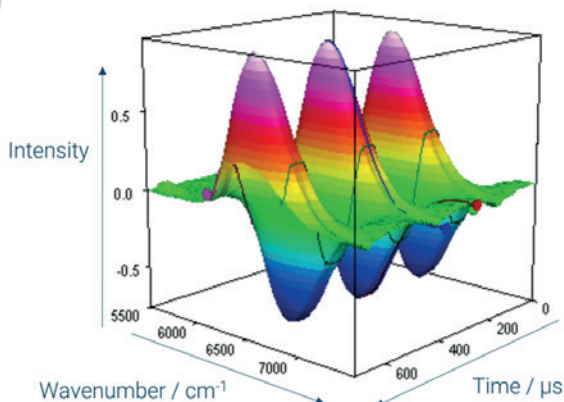
Furthermore, interleaved TRS is an excellent alternative to step scan, providing clear advantages regarding signal-to-noise ratio and measurement duration. With the new powerful CA9 electronics, the full potential of interleaved TRS can be fully realized.

Elevate your research with the advanced time-resolved spectroscopy options and experience the full potential of the VERTEX NEO R.



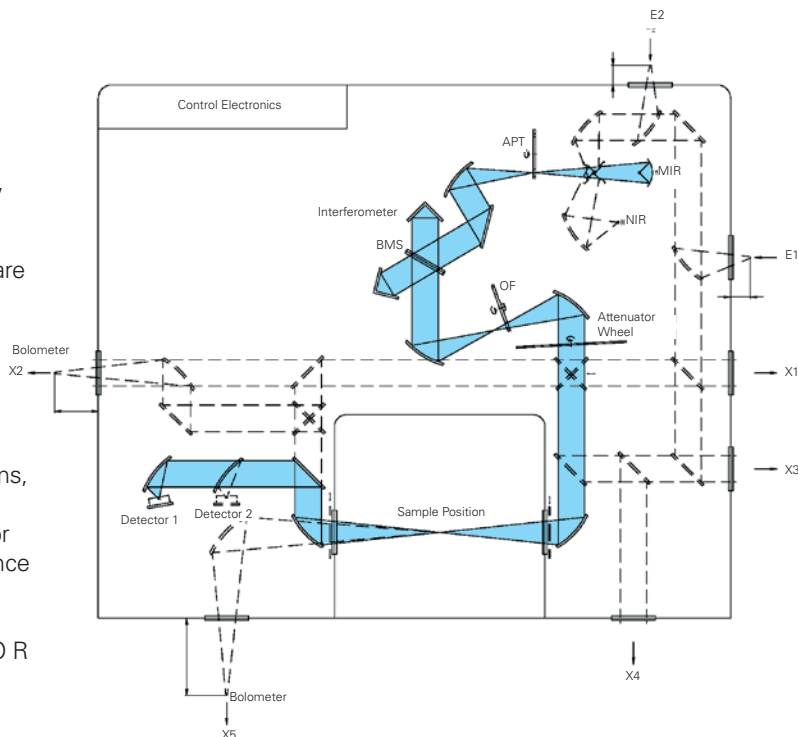
## Spectral Resolution

The spectral resolution of VERTEX NEO R is better than  $0.16\text{ cm}^{-1}$ , which fulfills the requirements for almost any measurement. No matter if condensed phase samples such as solids or liquids, or low temperature crystalline samples, or even gaseous samples, VERTEX NEO R can handle them.



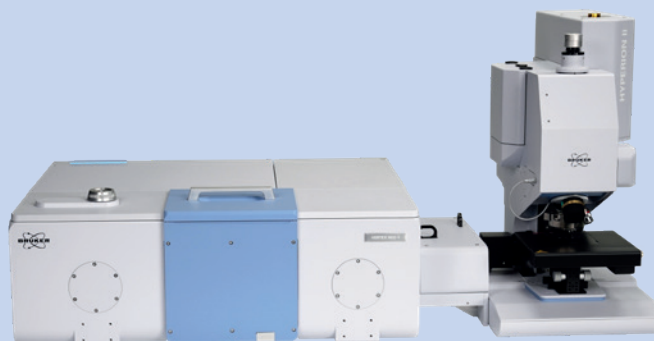
## Expand Your Capabilities

The sample compartment of the VERTEX NEO R can accommodate a wide range of measurement accessories, such as transmission, ATR, IRRAS, specular & diffuse reflectance, integrating sphere and many more. However, when certain applications need experimental setups that are too complex or voluminous for the sample compartment, or in case more than one application should be carried out alternately with one spectrometer, or simply to keep the internal sample compartment free for more routine like measurements, external measurement modules can be adapted to the multiple output ports of the VERTEX NEO R. These modules can be used for various applications, such as IR microscopy, Raman spectroscopy, FIR/THz spectroscopy, polarization modulated experiments (VCD or PM-IRRAS), thermogravimetric analysis, photoluminescence measurements and more. A beam path bypassing the sample compartment, e.g. for emission experiments, is available too. This flexibility ensures that the VERTEX NEO R can meet the diverse needs of advanced research and applications, providing a comprehensive solution for your spectroscopy requirements.



## FT-IR Microscopy

Featuring fully automated infrared chemical imaging, crystal-clear sample viewing and a wide variety of IR and visible objectives, the HYPERION II series microscopes provide all you need to conduct most sensitive microanalysis easily and efficiently. The spectral range of HYPERION II can be extended from MIR to NIR and even to the visible range up to  $25,000\text{ cm}^{-1}$ . By combining HYPERION II and VERTEX NEO R, microscopic ATR, transmission, reflection and even emission measurement of tiny samples with outstanding spatial resolution can be achieved. Large sampling areas can be analyzed at high lateral resolution with minimum recording time by using a modern Focal-Plane-Array (FPA) detector.



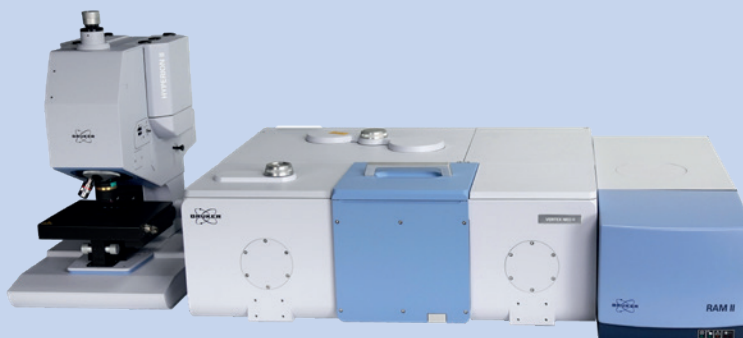
## Polarization Modulation

With dual channel ADC technology and integrated demodulator in the powerful electronics unit the VERTEX NEO R offers fully digitized signal processing. Together with a PMA 50 module and a Photoelastic Modulator (PEM), outstanding performance for double modulation techniques can be achieved, such as Polarization Modulation Infrared Reflection Absorption Spectroscopy (PM-IRRAS) for measuring ultra-thin layers and Vibrational Circular Dichroism (VCD) of chiral molecules.



## FT-Raman Spectroscopy

The RAM II module combines fast and easy sample handling and excellent suppression of fluorescence offered by FT-Raman. Switching between infrared and Raman is easily achieved via software. An optional FT-Raman microscope can be coupled to the RAM II module and at the same time combined with the SENTERRA II dispersive Raman microscope.





## OPUS

The integrated OPUS software is made for state-of-the-art spectroscopic measurement, processing and evaluation of IR and Raman spectra. The basic package combines a wide range of functionality for analytical and research applications with intuitive design and highest flexibility. Powerful evaluation, data processing and report generation functions and versatile programming interfaces contribute to the impressive functional range of the OPUS software. On top of that, many featured packages like OPUS 3D, Quant or AID make OPUS a real all-rounder, capable to handle a wide range of applications. As an example, OPUS/3D is a modern and intuitive spectral imaging software package for comfortable 3D data processing, evaluation and visualization. For TRS spectral data via rapid scan or step scan, the OPUS/3D method editor and post processing window provide powerful functions.

**OPUS TOUCH**, which is a complete spectroscopy software optimized for touch operation, is with all its analysis and research functions available for the optional panel PC for VERTEX NEO R.

Laser class 2 product.

## Application and Support

The application possibilities of IR spectroscopy are almost endless and range from analysis of powders, granules, liquids, particles, coatings, microplastics, laminates, composite materials, tissue samples, fibers, paints, pigments, and pharmaceuticals to food safety. We want to make your application a complete success. For this reason, Bruker is mainly staffed by scientists and engineers with practical experience and in-depth knowledge. Therefore, you can trust us at all times when it comes to questions regarding the selection of the best equipment or if you face difficult analytical problems. Bruker's FT-IR devices ensure consistent performance over many years. However, if an unforeseen problem should occur, you can count on a network of Bruker employees ready to deal with these issues as quickly as possible.

Bruker Optics is continually improving its products and reserves the right to change specifications without notice.  
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