Nicolet FT-IR Spectrometer

The Power of FT-IR

Highest FT-IR Performance

Multiple Spectral Ranges

Smart Accessories

Microscopy/Imaging, Raman, GC-IR, TGA-IR

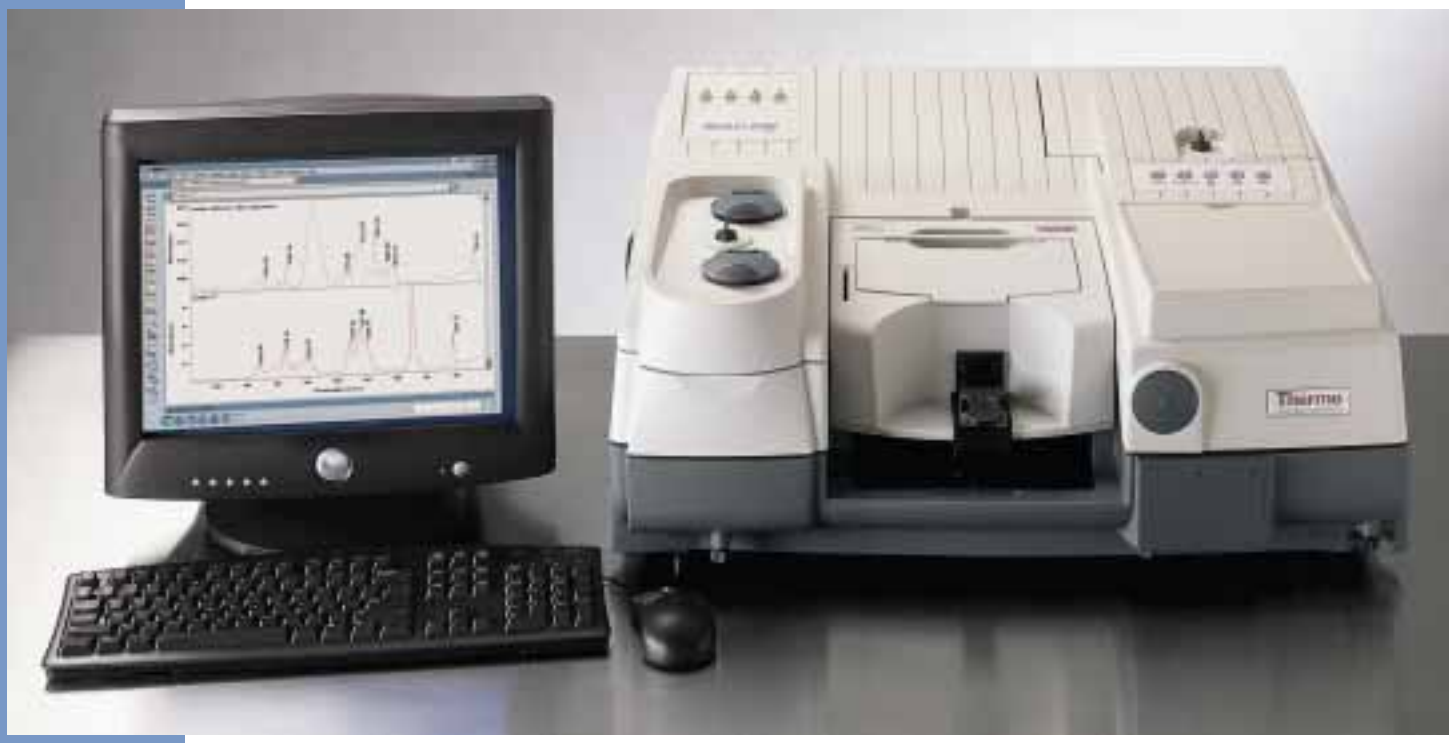
Advanced Experimentation –
Step Scan, VCD, VLD, IRRAS

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

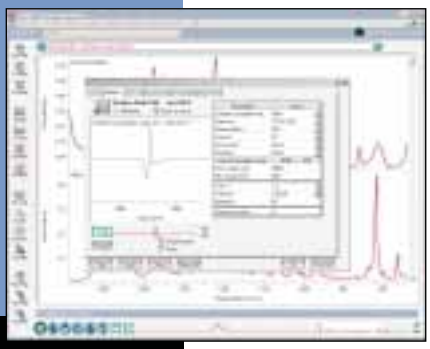
POWERFUL PERFORMANCE

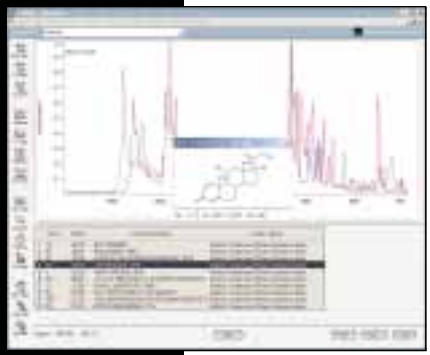
Nicolet™ FT-IR spectrometers from Thermo Electron Corporation are the highest performance FT-IR systems available. While the spectrometer has the power to handle the most advanced research-level experiments, routine analyses are performed just as conveniently. Every facet of the Nicolet FT-IR spectrometer has been engineered to facilitate sample handling, introduce options to scientists, and increase laboratory throughput.



Nicolet FT-IR

Reproducible results speak directly to the bottom line of the laboratory. Stability, reproducibility and throughput have guided the design of Nicolet FT-IR spectrometers.





ETC EverGlo* Source

- Electronically controlled stability
- Rest mode
  - *Extended lifetime*
  - *Greater reliability, lower maintenance*
- Turbo mode
  - *Higher performance on tough samples*

Gold-Coated Optics

- Highest throughput

Precision-Cast Baseplate

Continuous Dynamic Alignment

High Performance Detectors

- TE cooled technology – high stability
- Patented dual technology – over 12-hour hold time

Enhanced Synchronous Protocol (ESP)

- Real time feedback on all aspects of the analysis

Integrated Scan Buttons on the Spectrometer

USB 2.0 Interface

New OMNIC™ Features:

- Advanced ATR correction
- Integrated curve fitting for spectral analysis
- Enhanced reporting and annotation

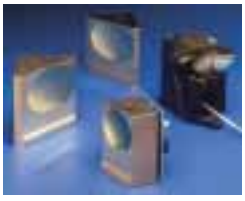
Superior Optics

All Nicolet FT-IR systems can be configured for multiple spectral ranges, with the option of gold-coated or aluminum mirrors:

- Far-IR
- Mid-IR
- Near-IR
- UV-Visible

Precision-Cast Optics

- Unmatched reproducibility
- Pinned-in-place
- Compact optical path
- Monolithic diamond-turned mirrors
- Permanent alignment
- Highest throughput



** Patent Pending*

INTUITIVE SOLUTIONS

Smart Beamsplitters

Smart Beamsplitter technology allows each beamsplitter to be recognized. The system automatically configures and optimizes performance.

BEAMSPLITTER	HIGH (cm^{-1})	LOW (cm^{-1})
Ge-on-KBr	7800	350
XT-KBr	11000	375
Quartz	27000	2800
Si-on-CaF_2	14500	1200
ZnSe	6000	650
CsI	6400	200
Solid-Substrate™	700	15

Smart Detectors

Detectors are recognized instantly on installation. Electrical connection is made at once and the correct beam path is selected.

New thermoelectric design allows for rapid response of the detector, improving the stability and accuracy of results.

DETECTOR	HIGH (cm^{-1})	LOW (cm^{-1})
DLaTGS	12500	350
TE-cooled DLaTGS	12500	350
MCT-High D*	11700	800
MCT-A	11700	600
MCT-B	11700	400
Time-resolved MCT	11700	650
Silicon	27000	8600
PbSe	13000	2000
InGaAs (1.9 µm)	12000	5300
InGaAs (2.6 µm)	12000	3800
InSb	11500	1850
CsI	6400	200
Poly(ethylene)	700	50
Si bolometer	600	15
Photoacoustic	10000	400

External Beam Options

All external beam mirrors are motorized and controlled through the software allowing for rapid reconfiguration of the system.

Five External Beam Options

- Emission port
- Right-side Passport™
- Left-side Passport
- Front-facing external port
- Front-facing external detector port

Environmental Options

Nicolet FT-IR offers system purge and a sealed and desiccated option to meet the needs of your climate, laboratory environment, and sample type. The unique Smart Purge option optimizes and speeds up purge recovery without requiring you to close off manual purge ports. Smart Purge senses when you are changing samples and automatically turns up the purge. This ensures rapid recovery of purge – in a few seconds!

Smart Accessories™

Smart Accessories snap into your Nicolet FT-IR system and give you uncompromising sampling performance. Using innovative technology unique to Thermo Electron spectrometers, Smart Accessories provide the highest optical throughput and sampling flexibility. Smart Accessories are pinned-in-place and permanently aligned, ensuring your results are reliable and reproducible. The smart system automatically recognizes the accessory and loads the correct operating parameters for your unique experiment. It then performs a set of quality checks to verify that the accessory and system are working optimally. With over 18 and counting to choose from, there is a Smart Accessory for almost any sampling need:

- Transmission
- Diffuse Reflectance
- Diamond HATR
- Single bounce ATR
- Multiple bounce ATR
- Specular reflectance
- Mid-IR fiber optics
- Near-IR fiber optics

Smart Accessories are the cornerstones to successful sample handling. Thermo Electron's Smart Accessory standard is supported by all major accessory vendors.

Sampling Ergonomics

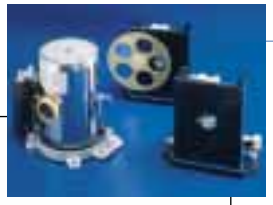
Thermo Electron proudly takes you on a trip into the most powerful FT-IR spectrometer.

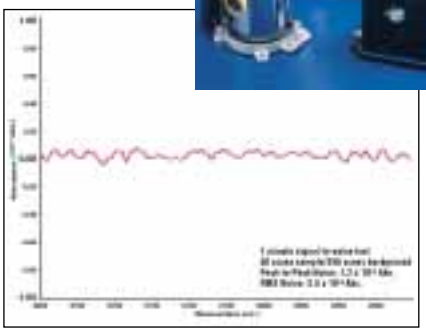

Thermo
ELECTRON CORPORATION
Unleash The Power

Productivity & Efficiency

SPECTRAL RANGE CONFIGURATIONS

	UV	Visible	Near-IR	Mid-IR	Far-IR
Source	Quartz-Halogen (27,000-2,000 cm^{-1})				
			Ever-Glo (9,600-20 cm^{-1})		
Beamsplitters	Quartz (27,000-2,800 cm^{-1})				
			CaF_2 (14,500-1,200 cm^{-1})		
			XT-KBr (11,000-375 cm^{-1})		
			KBr (7,400-350 cm^{-1})		
			CsI (6,400-200 cm^{-1})		
					Solid Substrate (700-20 cm^{-1})
Detectors	Silicon (27,000-8,600 cm^{-1})				
			InGaAs (12,000-3,800 cm^{-1})		
			PbSe (11,000-2,000 cm^{-1})		
			InSb (11,500-1,850 cm^{-1})		
			MCT-HighD* (11,700-800 cm^{-1})		
			MCT-A (11,700-600 cm^{-1})		
			MCT-B (11,700-400 cm^{-1})		
			DTGS/KBr (12,500-350 cm^{-1})		
			Photoacoustic (10,000-400 cm^{-1})		
			DTGS/CsI (6,400-200 cm^{-1})		
					DTGS/PE (700-50 cm^{-1})
					Si Bolometer (600-20 cm^{-1})
cm^{-1}	27,000	25,000	15,800	12,800	8,000	4,000	2,000	1,000	400	200	50	20
microns		.5		1	2	5	10	25	50	200	500	





Standard Accessories

- Accommodates all commercially available accessories
- Smart Purge keeps sample environment stable during sample or accessory changes
- Compatible with Nicolet FT-IR accessories for the added benefit of accessory recognition
- Multimedia tutorials and training

Smart Accessories

- Snap-in installation and pinned, permanent alignment
- Automatic accessory recognition and experiment setup
- High throughput, high performance
- Spectral quality checks
- Fast, automatic purge (on purged systems)
- Multimedia tutorials and training

High-Performance Electronics

- 24 bit A/D converter
- 500 KHz A/D speed
- Blazing speed USB 2.0 interface
- Energy efficient
- Fully upgradeable

Qualification and Regulatory Compliance

- DQ, IQ, OQ software, services and documentation to facilitate regulatory audits
- Automated performance testing and tracking for proof of performance
- Comprehensive 21 CFR Part 11 compliance tools for meeting regulatory requirements in the pharmaceutical industry

Smart Detectors

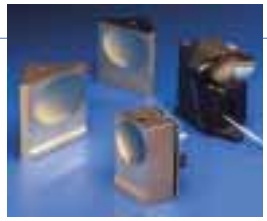
- Automatic detector recognition and beam path setup in any position
- Detectors for applications covering: Mid-IR, Near-IR, Far-IR, UV/Vis
- High-performance TE cooled detectors. Faster cooling using less power – higher stability, quicker response time

Optical Configuration Options (software controlled)

- Filter Wheel: multiple high or low pass filters
- Energy Screen Wheel: multiple screens for IR beam attenuation
- Polarizer Accessory: rotation of filter at 1 degree intervals

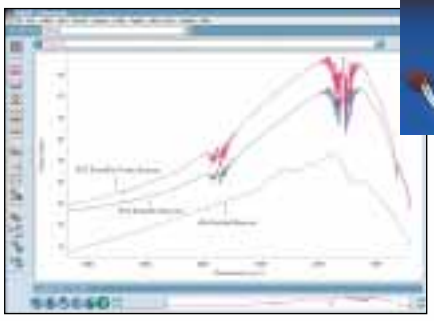
Vectra-Piezo Step-Scan Technology

- Best performance in the industry
- Better than 0.2 nm positional stability
- 5 to 1,000 Hz phase modulation
- 0.5 to 3.5 λ_{HeNe} phase modulation amplitude



Smart Sources (ETC EverGlo*)

- More efficient than water-cooled sources
- Electronically controlled stability
- User-controlled rest mode – longer lifetime (five-year warranty)
- Turbo-mode option

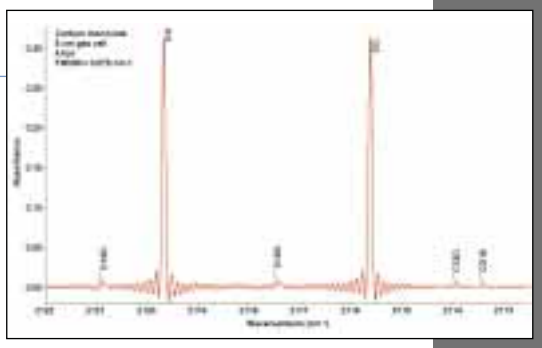


** Patent Pending*

Innovation & Support

High Performance Interferometer – Dynamic Alignment

- Dynamic alignment – a MUST for research FT-IR
- Exceptional high-resolution line shapes
- Superior long-term and short-term stability
- Easy beamsplitter interchange mechanism
- Automated diagnostics for peak performance



Smart Beamsplitters

- Beamsplitter auto-recognition and setup of the spectral range
- Instant alignment
- A variety of beam-splitter options for full spectral range coverage
- Swap beamsplitters in less than 10 seconds

Continuing Support

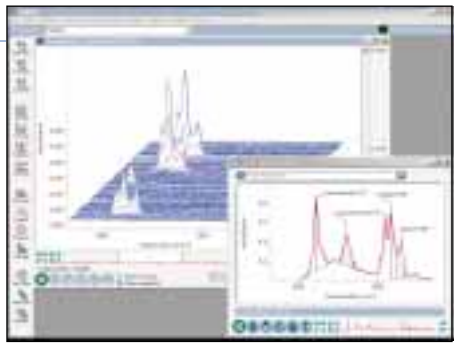
- Maintenance contracts
- Validation programs
- A variety of training options
- Internet support
- Trained and certified field service experts

Precision Cast Optics

- Pinned-in-place – no adjustments or glue
- Automatic optimization of optical signal
- Installation, testing and optimization of any component in under 15 seconds
- Reproducible results
- Up to five external beam ports

System Software

- Powerful and flexible OMNIC software
- Unprecedented integration with spectrometer
- Expandable with built-for-purpose add-ons
- Intuitive operation



Manufacturing Excellence

- ISO 9001 certified design and manufactured hardware and software
- Certified Product Development Process
- More than 10,000 installed FT-IR systems worldwide

FUTURE PROOF

The Nicolet FT-IR spectrometer has full upgrade potential. Thermo Electron is the only FT-IR spectrometer manufacturer who can offer you true upgradeability from the basic unit to a fully loaded advanced research system at any time as your needs change. This is possible because all Nicolet FT-IR spectrometers share a common optics and electronics platform.

Nicolet FT-IR Spectrometer with Nicolet Continuμm XL Imaging System and FT-Raman Module

Start with the basic system, and when your needs grow, you can add multiple beamsplitters, detectors and sources for expanded spectral range. You can add microscopy imaging, gas chromatography (GC-IR), thermogravimetric analysis (TGA-IR), FT-Raman, and polarization modulation (PEM Module) capabilities. You can even add step-scan capabilities to your system for advanced applications, such as time resolved spectroscopy (TRS), dynamic polymer rheology and phase modulation photoacoustic spectral (PAS) depth profiling.

External Experiment Options

- Infrared Microscopy
- Infrared Imaging
- Step Scan
- FT-Raman
- ns TRS
- GC-IR
- Phase modulation PAS
- TGA-IR
- Sample modulation
- PEM module (IRRAS, VCD, VLD) (polymer stretching)

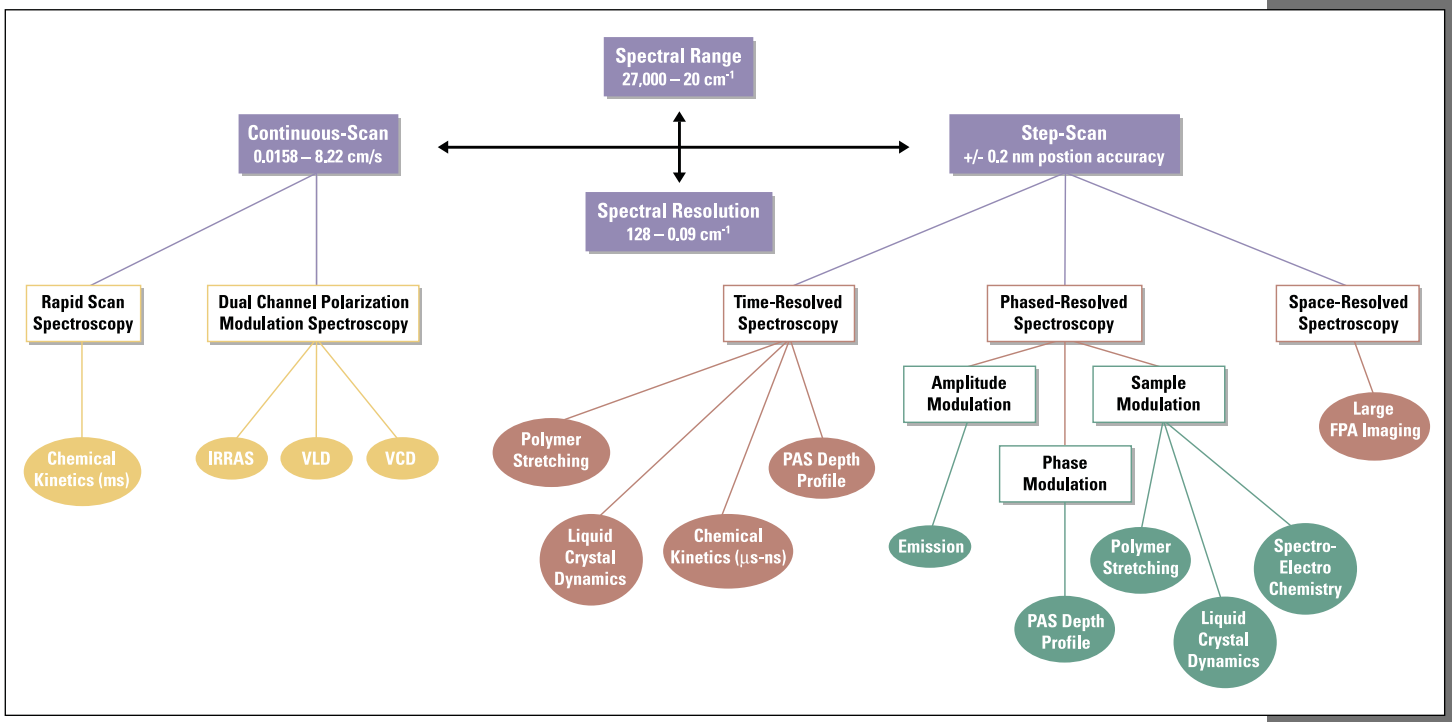
Every Nicolet FT-IR spectrometer can take advantage of all advanced capabilities available, whether part of the original system configuration or added at a later date.

Nicolet FT-IR Spectrometer with TGA Interface

Nicolet FT-IR Spectrometer with GC Module

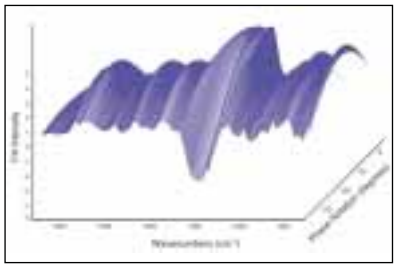
ADVANCED APPLICATIONS

Research-grade Nicolet FT-IR spectrometers offer a full range of step-scan operation modes for time-resolved, phase-resolved and space-resolved experiments, and dual-channel continuous-scan mode for polarization modulation/demodulation experiments, as well as conventional single-channel continuous-scan operation for conventional applications.

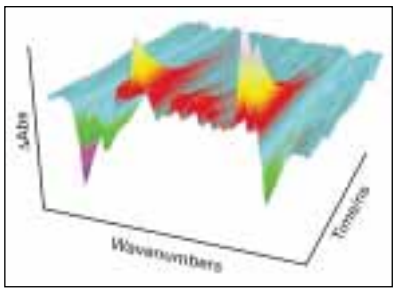


There are nine, typical experimental categories, including:

1) Extended spectral range experiments (27000 – 15 cm^{-1}, i.e. from far-IR up to near ultra violet)
2) High resolution spectroscopy (better than 0.09 cm^{-1} for gas phase measurements)
3) Single-channel rapid-scan kinetics (77 spectra/sec at 8 cm^{-1} spectral data resolution)
4) Dual-channel polarization modulation spectroscopic experiments (IRRAS, VLD, and VCD, absorbance level on the order of 10^{-3} to 10^{-5})
5) Step-scan amplitude modulation (electroluminescence measurement)
6) Step-scan phase modulation (photoacoustic depth profiling)
7) Step-scan sample modulation (polymer stretching, liquid crystal dynamics, and spectro-electrochemistry)
8) Step-scan time-resolved spectroscopy (ns chemical kinetics, polymer stretching, liquid crystal dynamics and photoacoustic depth profiling)
9) Step-scan space-resolved spectroscopy (focal plane array detector-based IR imaging)

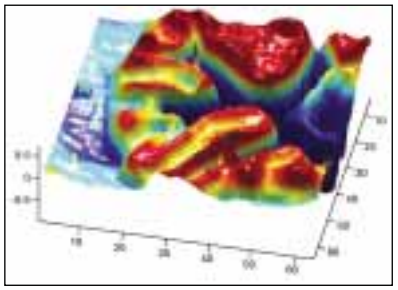


Phase-resolved FT-IR



Time-resolved FT-IR

Data courtesy of Dr. Mike W. George of the University of Nottingham (UK).



Space-resolved FT-IR

Thermo Electron – The Leader in FT-IR

Thermo Electron, through its line of Nicolet FT-IR spectrometers, is the worldwide leader in FT-IR instrumentation. Smart firmware, user-friendly software, and robust hardware come together to create the most powerful tools for applying FT-IR solutions to chemical identification problems. With more than 10,000 systems installed and an unparalleled reputation steeped in a rich heritage, it is no surprise that Thermo is the best-rated FT-IR company.

FT-IR Spectrometers

Present

Nicolet FT-IR
High-performance FT-IR-multiple ranges, Imaging, Raman, Step Scan capabilities

Nicolet Avatar™
First, smart FT-IR with fully integrated accessories

Magna™
OMNIC software – revolutionized reproducibility with unique pinned-in-place optics

5PC
First precision-cast baseplate with PC-based system

60 SXB
First highly flexible research FT-IR with microprocessor

Nicolet 7199
First FT-IR including real time data acquisition system

1970

FT-IR Microscopes

Nicolet Continuμm™ XL
Novel imaging design and uncompromised spatial resolution

Nicolet Centaurμs™
10X objective with integrated video and binocular viewer, and swappable ZnSe, Ge, Si ATR

Nicolet Continuμm
Unmatched spatial resolution, simultaneous sampling and viewing, dual detectors, infinity corrected

Nic-Plan
Introduced remote sample aperturing with grazing angle and ATR objective

IR-Plan Advantage
First IR microscope with Redundant Aperturing and Reflachromat feature

In addition to these offices, Thermo Electron Corporation maintains a network of representative organizations throughout the world.

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Avoid long-term viewing of direct laser light. Class IIa Laser Product

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Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

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