

VeeMAX III with ATR – Variable Angle, Single Reflection ATR for Depth Profiling Studies



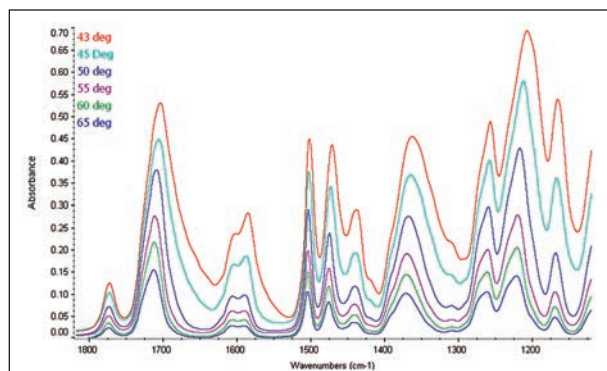
FEATURES OF THE VEEMAX III WITH ATR

- Continuously variable set angle of incidence – 30 to 75 degrees
- 0.4 to 46 micron depth of penetration – dependent on crystal material, angle of incidence, sample's refractive index and wavelength of IR beam – ideal for depth profiling studies
- High throughput for excellent quality spectra in a short time period
- Optional, high-pressure clamp for sampling of films, coatings or powdered samples
- Integrated position for optional manual or automated polarization
- Motorized option with electronic control module and AutoPRO software for automated, high-precision experiments
- VeeMAX III can be used as a variable angle of incidence specular reflection accessory
- Configurable for specialized applications – monolayer studies and spectroelectrochemistry
- Sealed and purgeable optical design to eliminate water vapor and carbon dioxide interferences

The VeeMAX III with ATR offers continuous variable angle of incidence and a variety of crystal plates to selectively control the depth of penetration of the IR beam into the sample. ATR applications include the study of layered samples, coatings, release agents, monolayers on silicon and chemical migration studies.

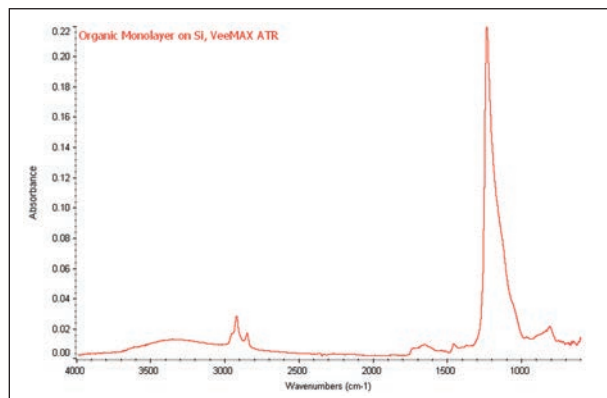
The VeeMAX III with ATR accessory provides exceptionally high throughput (over 50% with 45 degree ZnSe crystal) to minimize sampling time and enable detection of low concentration components in samples of complex composition. The flat plate crystals offered for the VeeMAX III are ideal for solid and layered samples and are designed for use with the optional pressure clamp. The

combination of large crystal diameter (20 mm) and slip-clutch pressure clamp provides sample to crystal contact without altering layered sample composition. The optional liquids retainer may be added to the crystal plate for analysis of liquid samples.



Depth profiling study of layered polymer film. FTIR spectra collected using ZnSe crystal at set angles of incidence from 43 to 65 degrees. IR absorbance band at 1591 cm^{-1} clearly increases relative to other bands as we probe deeper into the sample.

Monolayers and ultra-thin films absorbed on silicon or gold substrate are easily sampled using the VeeMAX III equipped with a high refractive index ATR crystal. Compared to specular reflectance sampling for monolayer analysis, an increase in sensitivity of up to 1–2 orders of magnitude may be realized via ATR sampling. For these applications, the VeeMAX III accessory is configured to include a high-angle Ge flat plate (60° or 65°), the VeeMAX III high-pressure clamp with a 7.8 mm pressure tip, and a polarizer.



Analysis of monomolecular layer on silicon – VeeMAX III with 60 degree Ge crystal, pressure clamp with 7.8 mm tip and p polarization.

A spectroelectrochemical cell option for the VeeMAX III is also available. The innovative design offers a polytetrafluoroethylene cup sealed to an ATR crystal, which is mounted on the VeeMAX. The crystals are interchangeable for optimizing spectral results and are removable to allow electrode coating on the ATR surface. The high throughput of the VeeMAX with ATR provides excellent sensitivity and reduced sampling time. Additionally, a flat IR transparent window may be installed instead to permit specular reflectance sampling. The electrochemistry cell is equipped with a precision micrometer for electrode positioning.

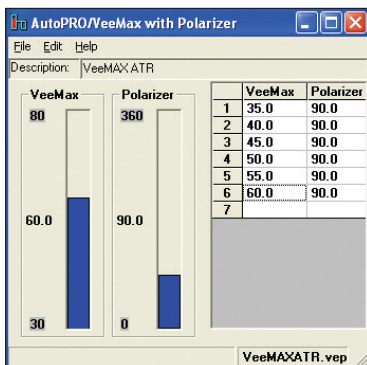


Spectroelectrochemical cell with removable and interchangeable crystals mounted on the VeeMAX

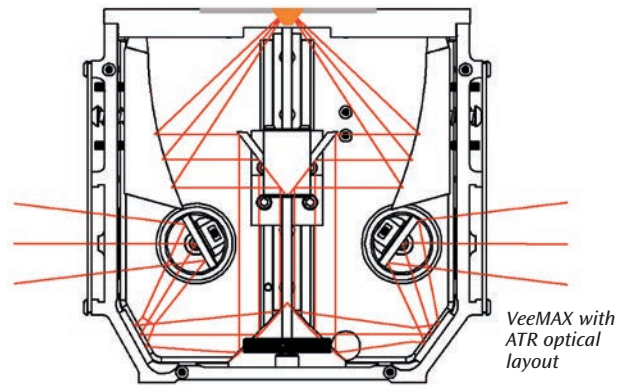


VeeMAX spectroelectrochemical cell offers maximum flexibility by its interchangeable and removable crystals

Motorized control of angle of incidence via personal computer for automated data collection of depth profiling studies and ATR measurements is available for the accessory. The motorized VeeMAX III is ideal for depth profiling studies as it greatly speeds and improves the precision and reproducibility of the data collection process.

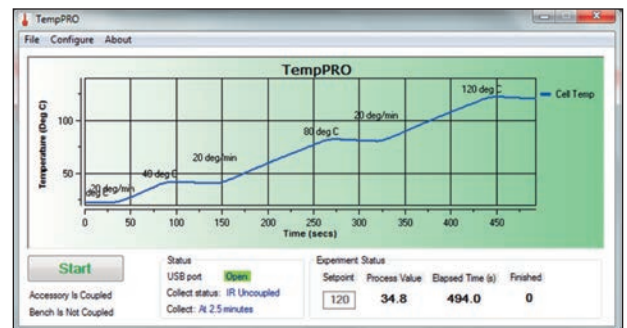


AutoPRO Software control of VeeMAX III angle of incidence (automated polarizer available) for automated depth profiling studies, angle of incidence and polarization angle can be set independently.



VEEMAX III WITH ATR SPECIFICATIONS	
ATR Crystal Choice	ZnSe, Ge, Si, ZnS
Crystal Plate Mounting	User changeable plates
Crystal Plate Mounts	Stainless Steel
Crystal Dimension, Surface	20 mm diameter
Optics	All reflective
Pressure Device	Rotating, continuous variable pressure; click stop at maximum
Heating Options	130 °C
Accuracy	+/- 0.5%
Sensor Type	3 wire Pt RTD (low drift, high stability)
Temperature Control	Digital or digital with PC control (up to 10 ramps, automated data collection, USB interface)
Input Voltage	100–240 VAC, auto setting, external power supply
Operating Voltage	24 VDC/50 W
Purge Sealing	Purge tubes and purge barb included
Accessory Dimensions (W x D x H)	177 x 92 x 162 mm (excludes clamp height and baseplate)
Spectroelectrochemical Vessel Dimensions	19 mm diameter tapering to 25 mm, 25 mm tall
Spectroelectrochemical Vessel Volume	7.5 mL
Spectroelectrochemical Vessel Material	Polytetrafluoroethylene
FTIR Compatibility	Most, specify model and type

Temperature controlled crystal plates are available for thermal study of materials. PIKE Technologies offers temperature controllers with digital and PC programmable set points.



TempPRO software for graphical setup and control of kinetic measurements



Heated crystal plates are available for the VeeMAX III for Temperature Studies

ORDERING INFORMATION

VeeMAX III Base Optics (must select, insert spectrometer model for XX)

PART NUMBER	DESCRIPTION
013-11XX	VeeMAX III Variable Angle Specular Reflectance Accessory

Notes: VeeMAX III includes specular reflectance masks (2", 5/8" and 3/8"), purge tubes, purge kit and spectrometer base mount. Please see the FTIR instrument code sheet.

VeeMAX III ATR Crystal Plates (must select 1 or more for ATR)

PART NUMBER	DESCRIPTION
013-4021	Flat Plate, ZnSe, 45°
013-4031	Flat Plate, ZnSe, 60°
013-4041	Flat Plate, Ge, 45°
013-4051	Flat Plate, Ge, 60°
013-4061	Flat Plate, Ge, 65°
013-4081	Flat Plate, Si, 45°
013-4071	Flat Plate, Si, 60°
013-4091	Flat Plate, ZnS, 45°
013-4096	Flat Plate, ZnS, 60°
013-3401	Liquids Retainer for VeeMAX III ATR crystals
013-3501	VeeMAX III ATR Flow Cell

Notes: VeeMAX III Crystal Plates are pre-aligned and pinned-in-place. Changing crystal plates is easy and fast to optimize sampling results. ZnS crystal plate is excellent for deepest penetration of IR beam. Si crystal plate is excellent for Far IR ATR. If you need a crystal not listed here, please contact us. Reconditioning service for used VeeMAX crystal plates is available.

Heated VeeMAX III ATR Crystal Plates (optional)

PART NUMBER	DESCRIPTION
013-4121	Heated Flat Plate, ZnSe, 45°
013-4131	Heated Flat Plate, ZnSe, 60°
013-4141	Heated Flat Plate, Ge, 45°
013-4151	Heated Flat Plate, Ge, 60°
013-4161	Heated Flat Plate, Ge, 65°
013-4171	Heated Flat Plate, Si, 60°
013-4181	Heated Flat Plate, Si, 45°
013-4191	Heated Flat Plate, ZnS, 45°
013-4196	Heated Flat Plate, ZnS, 60°
076-1220	Digital Temperature Control Module
076-1420	Digital Temperature Control Module, PC Control

Notes: Heated VeeMAX crystal plates may be heated to 130 °C. A temperature controller must be selected.

VeeMAX III Pressure Clamp (must select for solids, films or powder analysis)

PART NUMBER	DESCRIPTION
013-3101	VeeMAX III ATR Pressure Clamp
025-3094	7.8 mm ATR Pressure Tip

Notes: Pressure clamp supplied with 20 mm tip for polymer films. The 7.8 mm pressure tip is required for monolayers on silicon or small samples. The pressure clamp is required for solids, films, coatings and powdered samples.

VeeMAX III Sampling Options

PART NUMBER	DESCRIPTION
013-2851	Motorized Option for VeeMAX III
013-2801	Motorized Upgrade for VeeMAX III
090-1000	Manual Polarizer, ZnSe
090-1200	Manual Polarizer, KRS-5
090-3000	Precision Manual Polarizer, ZnSe
090-3200	Precision Manual Polarizer, KRS-5
090-5000	Polarizer, USB Automated, ZnSe
090-5100	Polarizer, USB Automated, KRS-5
007-0300	PIKECalc Software

Notes: PIKECalc software provides easy calculations of depth of penetration, effective angle of incidence and critical angle for ATR measurements. Motorized Option includes PIKE Technologies AutoPRO software and controller. Other polarizer options are found in the polarization section of this catalog. Motorized VeeMAX III and Automated polarizer interface simultaneously with the same controller.

Spectroelectrochemical Configuration

PART NUMBER	DESCRIPTION
013-3300	Electrochemical Cell
013-3110	ZnSe Crystal, 45°
013-3130	ZnSe Crystal, 60°
013-3112	Ge Crystal, 45°
013-3132	Ge Crystal, 60°
013-3114	Si Crystal, 45°
013-3134	Si Crystal, 60°
013-3115	ZnS Crystal, 45°
013-3135	ZnS Crystal, 60°
013-3345	45° Crystal Holder
013-3360	60° Crystal Holder

Notes: The electrochemical configuration requires electrochemical cell and the VeeMAX III Specular Reflectance Accessory. Must select one or more crystals. Choose a Crystal Holder to match the crystal angle. A CaF₂ window may be used for specular reflectance sampling. Other window types for specular reflectance measurements may be found in our listing of transmission windows, 20 mm x 2 mm. Either alignment fixture is applicable for mounting a flat window. Electrodes supplied by the end-user.

Replacement Parts

PART NUMBER	DESCRIPTION
013-4010	Mask Set for VeeMAX