

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



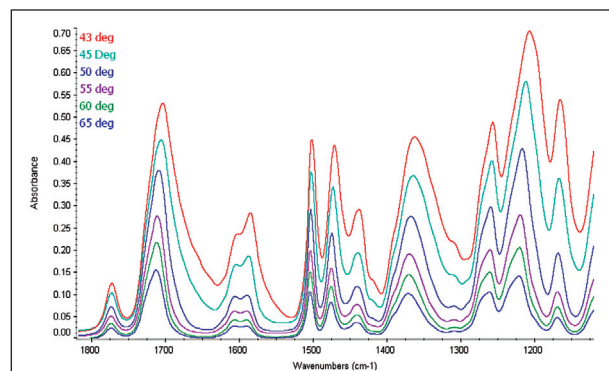
### FEATURES OF THE VEE MAX II WITH ATR

- 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 II 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 II 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.

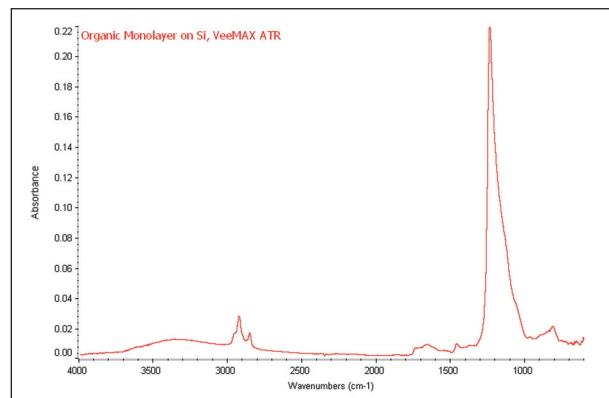
The VeeMAX II with ATR accessory provides exceptionally high throughput (over 50% with 45 degree ZnSe crystal) to minimize sampling time and enable detection of low concentration components in samples of complex composition. The flat plate crystals offered for the VeeMAX II are ideal for solid and layered 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 liquid 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  $\text{cm}^{-1}$  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 II 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 II accessory is configured to include a high-angle Ge flat plate (60 or 65°), the VeeMAX II high-pressure clamp with a 7.8 mm pressure tip, and a polarizer.

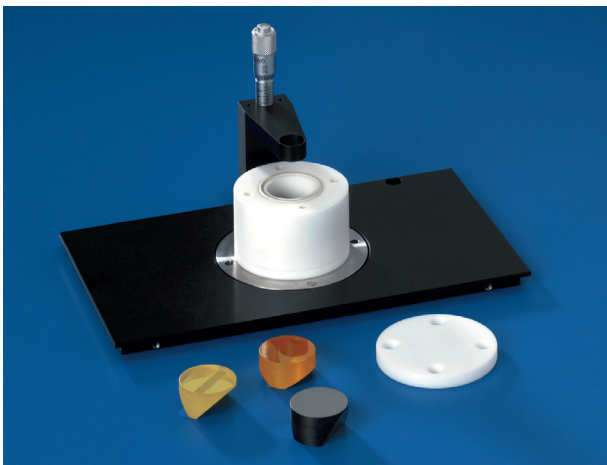


Analysis of monomolecular layer on silicon – VeeMAX II with 60 degree Ge crystal, pressure clamp with 7.8 mm tip and p polarization.

A spectroelectrochemical cell option for the VeeMAX II 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.

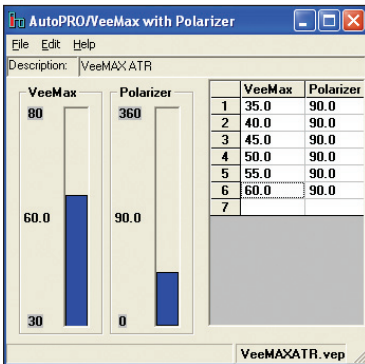


Spectroelectrochemical cell with removable and interchangeable crystals mounted on the VeeMAX

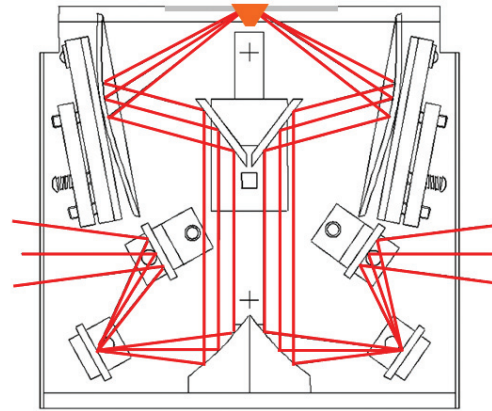


VeeMAX spectroelectrochemical cell offers maximum flexibility by its interchangeable and removable crystals

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 II 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 II angle of incidence (automated polarizer available) for automated depth profiling studies, angle of incidence and polarization angle can be set independently.

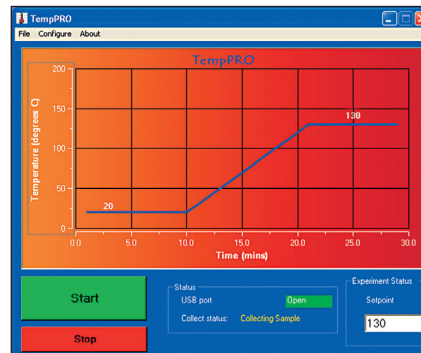


VeeMAX with ATR optical layout

**VEEMAX II WITH ATR SPECIFICATIONS**

<b>ATR Crystal Choice</b>	ZnSe, Ge, Si, ZnS
<b>Crystal Plate Mounting</b>	User changeable plates
<b>Crystal Plate Mounts</b>	Stainless Steel
<b>Crystal Dimension, Surface</b>	20 mm diameter
<b>Optics</b>	All reflective
<b>Pressure Device</b>	Rotating, continuous variable pressure; click stop at maximum
<b>Heating Options</b>	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	90–264 V, auto setting, external power supply
<b>Operating Voltage</b>	24 VDC/36W
<b>Purge Sealing</b>	Purge tubes and purge barb included
<b>Accessory Dimensions</b>	74 mm wide, 69 mm tall, 40 mm deep (excludes clamp height and baseplate)
<b>Spectroelectrochemical Vessel Dimensions</b>	19 mm diameter tapering to 25 mm, 25 mm tall
<b>Spectroelectrochemical Vessel Volume</b>	7.5 mL
<b>Spectroelectrochemical Vessel Material</b>	Polytetrafluoroethylene
<b>FTIR Compatibility</b>	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.



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

TempPRO software for graphical setup and control of kinetic measurements



## ORDERING INFORMATION

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

PART NUMBER	DESCRIPTION
013-10XX	VeeMAX II Variable Angle Specular Reflectance Accessory

Notes: VeeMAX II 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 II ATR Crystal Plates (must select 1 or more for ATR)

PART NUMBER	DESCRIPTION
013-4020	Flat Plate, ZnSe, 45°
013-4030	Flat Plate, ZnSe, 60°
013-4040	Flat Plate, Ge, 45°
013-4050	Flat Plate, Ge, 60°
013-4060	Flat Plate, Ge, 65°
013-4080	Flat Plate, Si, 45°
013-4070	Flat Plate, Si, 60°
013-4090	Flat Plate, ZnS, 45°
013-4095	Flat Plate, ZnS, 60°
013-3400	Liquid Retainer for VeeMAX II ATR crystals
013-3500	VeeMAX II ATR Flow Cell

Notes: VeeMAX II 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 II ATR Crystal Plates (optional)

PART NUMBER	DESCRIPTION
013-4120	Heated Flat Plate, ZnSe, 45°
013-4130	Heated Flat Plate, ZnSe, 60°
013-4140	Heated Flat Plate, Ge, 45°
013-4150	Heated Flat Plate, Ge, 60°
013-4160	Heated Flat Plate, Ge, 65°
013-4170	Heated Flat Plate, Si, 60°
013-4180	Heated Flat Plate, Si, 45°
013-4190	Heated Flat Plate, ZnS, 45°
013-4195	Heated Flat Plate, ZnS, 60°
013-4200	ATR Variable Angle Heating Conversion Plate
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 and the ATR Variable Angle Heating Conversion Plate must be selected.

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

PART NUMBER	DESCRIPTION
013-3100	VeeMAX 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 II Sampling Options

PART NUMBER	DESCRIPTION
007-0300	PIKECalc Software
013-2850	Motorized Option for VeeMAX II
013-2800	Motorized Upgrade for VeeMAX II
090-1000	Manual Polarizer, ZnSe
090-2000	Automated Polarizer, ZnSe

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.

### Spectroelectrochemical Configuration

PART NUMBER	DESCRIPTION
013-3200	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°
160-1144	CaF <sub>2</sub> Flat Window, 20 mm diameter
160-1304	ZnSe Flat Window, 20 mm diameter
013-3245	45° Alignment Fixture
013-3260	60° Alignment Fixture

Notes: The electrochemical configuration requires electrochemical cell and the VeeMAX II Specular Reflectance Accessory. Must select one or more crystals. Choose an alignment fixture to match the crystal angle. A CaF<sub>2</sub> 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