

AUTOMATED ACCESSORY

## AutoATR – An Innovative Breakthrough in Automated ATR Sampling

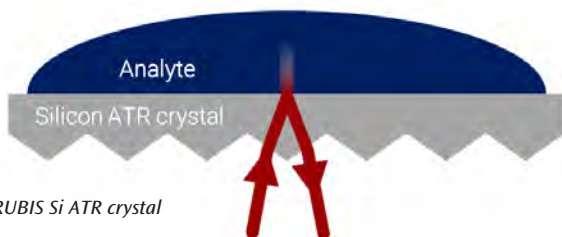


### FEATURES

- Complete hardware and software package for automated ATR analysis
- Up to 24 unique ATR measurements in a single run
- Spectra comparable to a single reflection ZnSe or diamond ATR
- Removable and replacement ATR elements
- Fully enclosed, purgeable design with front-loading tray
- In-compartment mounting, compatible with most FTIR spectrometers

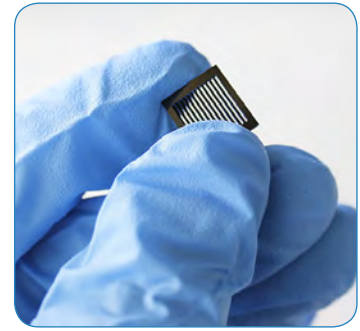
The development of an automated attenuated total reflection (ATR) accessory on a non-micro scale has been elusive despite ATR being the most popular mid-IR sampling technique due to its ease-of-use and small fixed pathlength. The primary advantage of FTIR-ATR measurements is minimal sample preparation. However, cleaning of the ATR crystal after every measurement is mandatory and has hindered the development of a commercial automated ATR in the past. With new innovations these challenges have been met and the advantages of automation are realized with the introduction of the AutoATR by PIKE Technologies. This new sampling accessory greatly enhances productivity of large-scale studies and facilitates routine measurements for high-throughput labs. The accessory is suitable for making ATR measurements of liquids, gels, pastes, casted films and more.

The AutoATR merges an exciting new ATR crystal developed via microtechnology with a microtiter plate platform offering precision mechanics and automated software control. Using a 24-well microtiter plate format enables 24 unique ATR measurements to be conducted within one run. At the heart of this accessory is a single reflection ATR crystal made from 500- $\mu\text{m}$  thick silicon functionalized with multiple microprisms, which couples the light into the crystal. The dimensions of an individual crystal are 9 x 11 mm; the ATR active area is 7 x 9 mm. Each 24-well plate consists of 24 individual and removable Si ATR crystals.



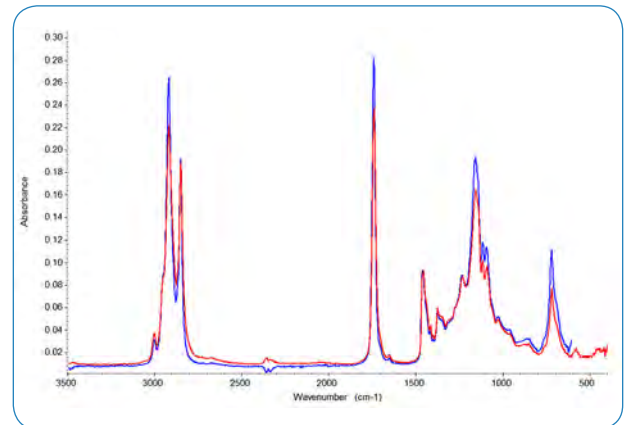
IRUBIS Si ATR crystal

Silicon, in this thin 500- $\mu\text{m}$  form, is an ideal multipurpose ATR element. It has an extremely inert sampling surface and is suitable for use with substances having a pH between 1-12. The changeable ATR crystals also offer the opportunity to store the samples and to prepare different samples at the same time (i.e. drying). In addition, the plain silicon surface may be functionalized outside the microplate, because the crystals are removable and interchangeable.



AutoATR Si element

For traditional Si ATR crystals, the beam pathlength through the crystal is several millimeters in some cases, which results in complete absorption of the Si phonon bands in the fingerprint region (1500 – 400  $\text{cm}^{-1}$ ). The beam pathlength through the thin profile of the Si ATR element minimizes absorption from Si phonon bands and offers a full mid-IR spectral range (5000 – 400  $\text{cm}^{-1}$ ). The absorbance and penetration depth are comparable to a standard diamond ATR. The figure below shows spectra of oil collected using the AutoATR versus a single reflection diamond ATR. Absorbance band position, shape and magnitude are very similar. The efficiency of the accessory's delivery optics and Si ATR element coupled with several microprisms results in exceptional throughput and reproducibility. Thus, high-quality spectra may be collected over a short time period.

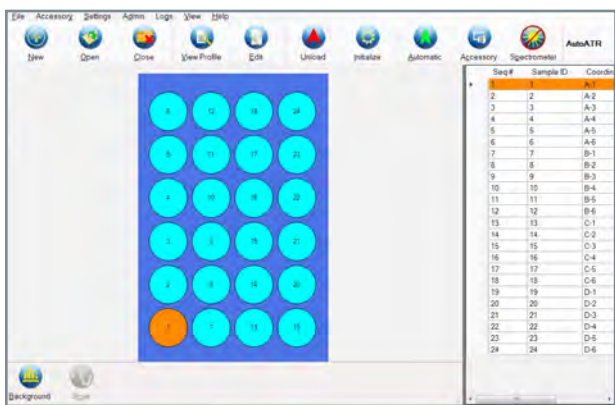


Spectra of oil collected using the AutoATR (red) and a single reflection diamond ATR (blue).

The AutoATR is designed to fit into the sample compartment of most FTIR spectrometers. Its X,Y tray moves to a position outside the accessory for easy loading and unloading of samples while maintaining purge. The stage is driven by precision servo motors with optical encoders for speed and reproducibility. USB and DC power are the only external connections required. The optical design is based upon a precision ellipsoidal reflector, which has been diamond turned for optimal performance. The optics demagnify the beam to a size that fills the active ATR area.

The accessory's control software, AutoPRO, plays an integral role in its usability and value. Data collection is enabled through communication with most FTIR software programs. It allows for traceability by facilitating multiple users. Sample descriptions may be entered manually or uploaded from a spreadsheet; sample information is stored with the spectral file. For ease of file finding, the program offers numerous file naming schemes such as time stamp or unique file prefix naming. It also incorporates options for calling macros to execute post-processing commands such as peak picking, report generation and exporting data to a spreadsheet format.

The AutoATR high-throughput accessory is ideal for comprehensive larger studies. Fields of biology, medical, pharmaceutical and food could benefit from an automated ATR. Additionally, there are ongoing efforts to transfer infrared spectroscopy from academic research into clinics. An automated ATR high-throughput device fulfills this requirement and enables larger studies, while increasing lab efficiency and minimizing workforce requirements, and also is suitable for the high-throughput lab conducting routine measurements.



PIKE AutoPRO software configured for the AutoATR accessory.

## SPECIFICATIONS

<b>Optics</b>	Elliptical – 3X beam demagnification
<b>Accuracy</b>	+/- 25 $\mu$ m
<b>Mechanical Specifications</b>	
Repeatability	+/- 5 $\mu$ m
Resolution	1 $\mu$ m
Minimum Run Time	Time is spectrometer and application dependent
<b>Computer Interface</b>	USB
<b>Dimensions (W x D x H)</b>	159 x 330 x 172 mm
<b>Weight</b>	4.5 kg

## ORDERING INFORMATION

PART NUMBER DESCRIPTION

047-25XX	AutoATR <i>Includes AutoPRO software, 24-well ATR plate with ATR elements</i>
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Notes: Replace XX with your spectrometer's Instrument Code listed on page 164.

## REPLACEMENT PARTS AND OPTIONS

PART NUMBER DESCRIPTION

162-4810	AutoATR 24-well Plate with ATR Elements
162-4812	AutoATR 12-well Plate with ATR Elements
162-4814	AutoATR Replacement ATR Elements (2 ea.)