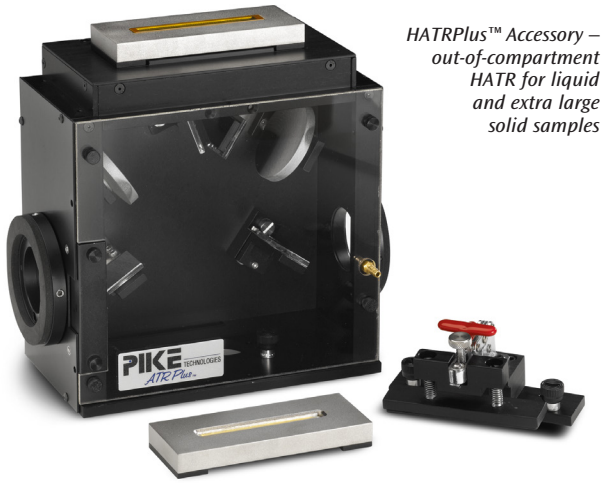
Multiple Reflection HATR –
Maximum Sensitivity and Highly Versatile FTIR Sampling

HATR Accessory – in-compartment HATR for liquid and solid samples

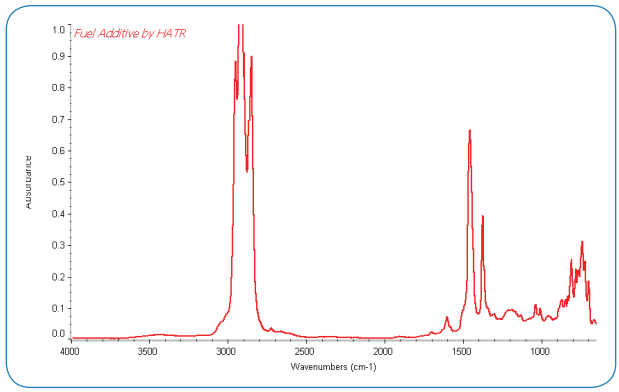


HATRPlus™ Accessory – out-of-compartment HATR for liquid and extra large solid samples

Horizontal Attenuated Total Reflectance (HATR) accessories successfully replace constant path transmission cells, salt plates and KBr pellets used in the analysis of liquid, semi-liquid materials and a number of solids. HATRs feature a constant and reproducible effective pathlength and are well suited for both qualitative and quantitative applications. In general, sampling is achieved by placing the sample onto the HATR crystal – generally eliminating sample preparation.

The PIKE Technologies HATR accessory provides high sensitivity for analysis of low concentration components in liquid, solid, and polymer samples. To optimize spectral measurements a selection of crystal materials, sample formats, and temperature and flow-through configurations are available.

PIKE Technologies HATR products are available in two base optic configurations. The HATR is an **in-compartment** design for samples which fit into the FTIR sample compartment. The HATRPlus is an **out-of-compartment** design for samples which are larger and do not fit into the FTIR sample compartment. The sampling surface of the HATRPlus extends above the FTIR cover, thereby permitting analysis of very large samples. Applications examples include coatings on large manufactured components, layered composition analysis on large objects, and skin analysis in the health and personal care industries.



FTIR spectrum of fuel additive using HATR trough plate with ZnSe crystal.

Features

- **Excellent energy throughput offering high signal-to-noise ratio and spectral quality**
- **Up to 20 internal reflections on the sample for maximum sensitivity for low concentration components**
- **Removable crystal plates with pinned positioning for high precision and quick cleanup**
- **HATR plates with ZnSe, KRS-5, Ge, AMTIR or Si crystals with selectable face angles to optimize sampling depth**
- **In-compartment (HATR) and out-of-compartment (HATRPlus) versions for small and extra large sample sizes**
- **Several temperature controlled and flow-through crystal plate options**

The PIKE Technologies HATRs are high-performance accessories, carefully designed to provide excellent results with minimum effort. Accessories are easily installed in the sample compartment, locking into position on the sample compartment baseplate.

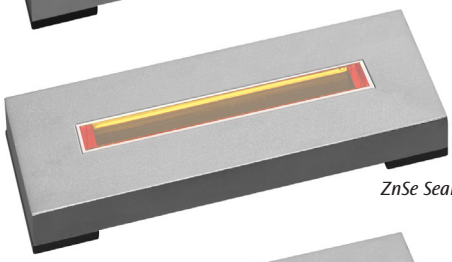
Stable alignment provides excellent analytical precision. Crystal plate changeover is rapid, allowing a wide range of samples to be analyzed with maximum convenience. PIKE Technologies HATRs have been optimized for maximum optical throughput and excellent quality spectra can be obtained from demanding samples. Several high-quality crystal materials covering a full spectrum of applications are available. Trough and sealed flat crystal plates are sealed using metallic gaskets, eliminating premature failure and the risk of cross-contamination associated with inferior, epoxy-bonded systems. Flat crystal plates are designed with positive surface relief to aid in improved sample contact.

All PIKE HATRs include a purge tube interface for the FTIR spectrometer. This provides full integration of the accessory with the FTIR spectrometer's purging system (sealed and desiccated or purged) for removal of water and carbon dioxide artifacts from the FTIR spectra. Thanks to this, purging is very efficient and the spectrometer can be operated with the sample compartment door open.

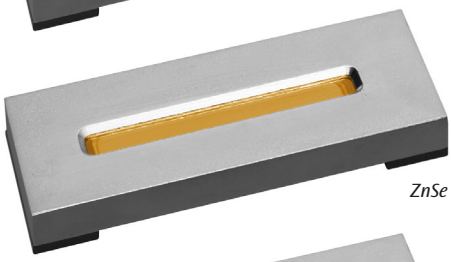
HATR Crystal Plate Choices

PIKE Technologies' HATR crystal plates are available in trough, flat plate and flow cell configurations.

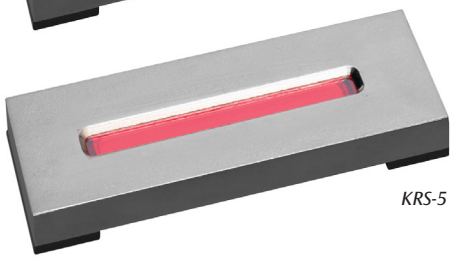
Ge Flat Plate



ZnSe Sealed Flat Plate



ZnSe Trough Plate



KRS-5 Trough Plate

The **flat plate** is used for the analysis of solid materials – including polymer and film samples. It is ideal for solid samples which are too large to fit within the trough plate configuration. The crystal is mounted slightly above the surface of the metal plate, which helps to achieve good crystal/sample contact when the flat plate press is used.

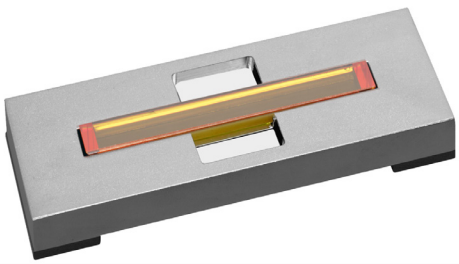
The ZnSe and Ge 45-degree flat plates are available in a sealed version, which is ideal for sampling of oils and other types of low surface tension, non-volatile liquids.

Flat HATR crystal plate – ideal for solids, polymer films and coatings.

The **trough plate** is designed for easy sampling, with a large, recessed crystal to accommodate the sample – generally a liquid, powder, or paste. The trough plate is ideal when samples must be cleaned from the crystal with some type of aqueous or organic solvent. Typically, only a thin layer of the sample needs to be applied onto the crystal surface. For fast evaporating samples, a volatiles cover should be used to cover the sampling area.

Soft powders will often produce good spectra when analyzed by HATR, assuming that they can be put in intimate contact with the crystal. A powder press option is used to achieve this. This device is placed directly on top of the sample filled trough and pressed by hand until the desired result is obtained.

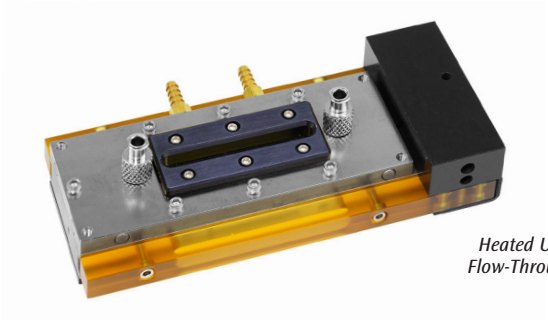
Trough HATR crystal plate – ideal for liquids, powders, pastes and gels.



RCPlate

RCPlate™

For special applications where you need to look at coatings on an HATR crystal, PIKE Technologies offers the RCPlate option. The RCPlate is designed to enable easy removal and reinsertion of the HATR crystal. Applications include analysis of coatings, mono-molecular layers, or bio-films deposited directly upon the HATR crystal. With RCPlates, it is easy to collect the background spectrum on the clean crystal, remove the HATR crystal from the RCPlate, coat the crystal and then reposition it into the RCPlate to collect the sample spectrum.

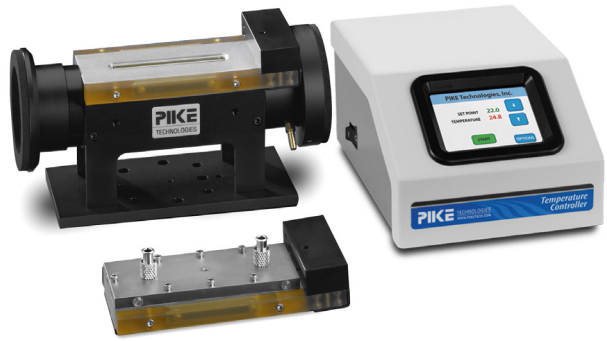


Heated UV HATR Flow-Through Cell

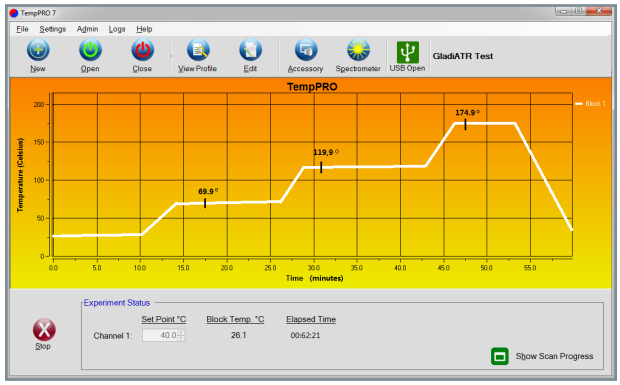
Flow-Through Cell

Flow-through cells are a versatile option for the dynamic laboratory. The ATR crystal is sealed in with O-rings, which allows for user-changeable crystals. The sample may be introduced by syringe or through tubing connected to a 1/16-inch compression fitting. Flow-through cells may be configured for temperature control and with PTFE coating.

In addition to our standard flow-through cells, PIKE offers a flow-through cell with a quartz window for photocatalytic studies. Due to UV-induced degradation of ZnSe caused by the external source probe, we recommend using an AMTIR crystal.



HATR with Heated Trough Plate and temperature control module – foreground shows Heated Flow-Through Cell.

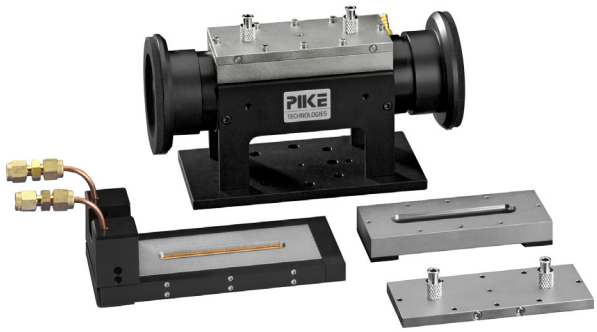


PIKE TempPRO software for kinetic experiments with our Resistively Heated Crystal Plates.

The PIKE controller has a touch-panel interface with USB port and is ready for use with PIKE TempPRO software (sold separately) if PC control is desired. TempPRO software can be used for graphical setup and automated data collection with most FTIR spectrometers for thermal experiments.

A large number of flat, trough and flow-through sampling plates are available for PIKE Technologies HATRs – all are pin-mounted to the HATR with no alignment required. They are compatible and interchangeable with HATR and HATRPlus products which allows optimizing the accessory's configuration for best spectral results.

Do you need an HATR product or feature not shown here in our catalog? Please contact us to discuss your application.



HATR with Flow-Through Cell (background). Liquid Jacketed Trough Plate is shown in foreground (left).

SPECIFICATIONS

Temperature Range	Ambient to 130 °C
Accuracy	+/- 0.5% of set point
Sensor Type	3 wire Pt RTD (low drift, high stability)
Temperature Control	Touch-panel display with USB interface. PIKE TempPRO software (sold separately) for PC control with unlimited ramps and automated data collection.
Input	100–240 VDC, auto setting, external power supply
Output	24 VDC/50 W maximum
HATR Crystals	ZnSe, Si, Ge, AMTIR and KRS-5
Crystal Dimensions	80 x 10 x 4 mm or 80 x 10 x 2 mm
Number of Reflections on the Sample	10 for 45 degree, 4-mm thick 20 for 45 degree, 2-mm thick 5 for 60 degree, 4-mm thick
Base Dimensions (W x D x H)	115 x 55 x 70–104 mm (excludes baseplate and purge collars; base height depends on the beam height of the spectrometer)

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