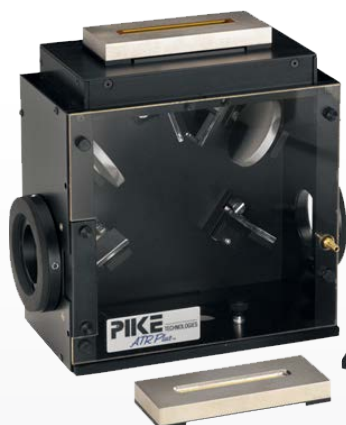


AT A GLANCE

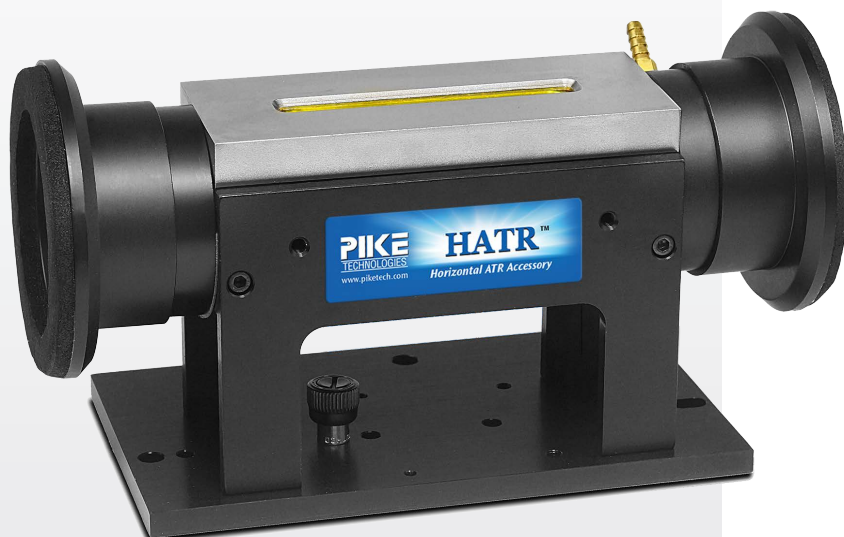
- ▶ Excellent energy throughput
- ▶ Up to 20 internal reflections
- ▶ Interchangeable crystal plates
- ▶ Trough, flat and flow-through plates
- ▶ ZnSe, KRS-5, Ge, AMTIR or Si ATR elements



TEMPERATURE CONTROL
OPTIONS AVAILABLE



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



Horizontal Attenuated Total Reflection (HATR) accessories are multiple reflection ATRs. These are ideal for the IR measurement of liquids, semi-solids, solids and films when additional sensitivity is required.

HATRs feature a constant and reproducible effective pathlength and are well suited for both qualitative and quantitative applications. Typically, sampling is achieved by placing the sample onto the HATR crystal, often eliminating sample preparation. To optimize spectral measurements, a selection of crystal materials, plate formats and temperature control options are available.

HATR AND HATRPLUS

HATR products are available in two base optic configurations. The HATR is an in-compartment design for samples that fit into the FTIR sample compartment. The HATRPlus is an out-of-compartment design where the sampling surface extends above the FTIR cover, thereby permitting analysis of very large samples. Applications using the HATRPlus include coatings on large manufactured components, layered composition analysis on large objects, and skin analysis in the health and personal care industries.

Both HATRs are high-performance accessories, carefully designed to provide excellent results with minimum effort. They are easily installed in the sample compartment, locking into position on the sample compartment baseplate. Stable alignment provides excellent analytical precision.

HATR CRYSTAL PLATES

There are several high-quality crystal materials covering a full spectrum of applications. The most popular crystals are 4-mm thick and generate 10 reflections on the sample (45° face angle). The 2-mm thick crystals (Ge, ZnSe) result in 20 reflections. 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.

All ATR plates are pin-mounted to the HATR base with no alignment required. Crystal plate changeover is rapid, allowing a wide range of samples to be analyzed with maximum convenience. The HATRs have been optimized for maximum optical throughput and excellent quality spectra can be obtained from demanding samples.

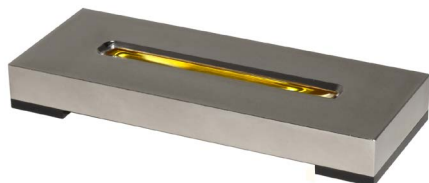
FLAT PLATE

The flat plate is used for the analysis of solid materials, including polymer and film samples. 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.



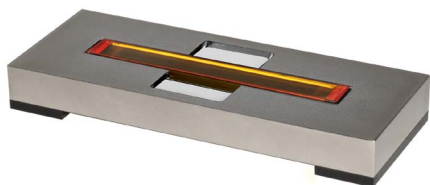
TROUGH PLATE

The trough plate is designed for easy sampling, with a large, recessed crystal to accommodate the sample – generally a liquid, powder, or paste. 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. By using the optional powder press, soft powders often produce quality spectra when analyzed by HATR, assuming that they can be put in intimate contact with the crystal.



RCPLATE™

The RCPlate is designed for special applications, such as measurements of coatings, mono-molecular layers, or bio-films deposited directly upon the HATR crystal. The plate allows easy removal and reinsertion of the ATR crystal.



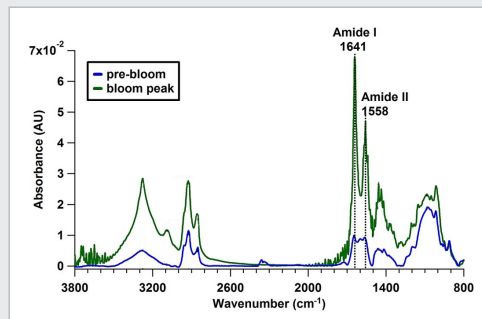
FLOW-THROUGH CELL

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.

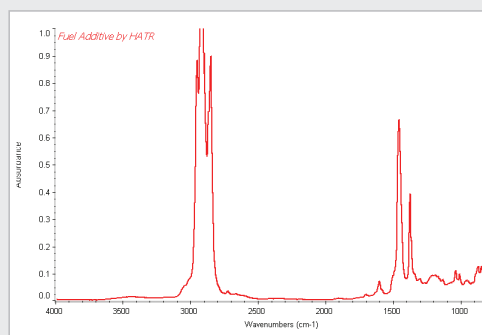


APPLICATION

The HATR is an ideal accessory when requiring added sensitivity. Flat, trough and flow cells make it possible to fully configure this accessory to meet your sampling requirements.



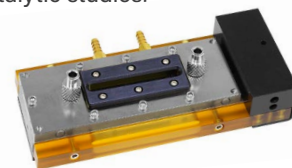
Dehydrated sea water spectra, collected before and after phytoplankton bloom using the ZnSe 20-reflection HATR trough plate.



Fuel additive spectrum, collected using a trough plate with ZnSe crystal.

PHOTOCATALYTIC FLOW-THROUGH CELL

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



TEMPERATURE CONTROL

Resistive heating and liquid jacketed plates are available for thermal studies. The maximum temperature is 120 °C for all crystal types. The Digital Temperature Controller offers touch-screen operation, and may be used with TempPRO software. Ramps and hold times are easily programmed through TempPRO software. Data collection may be initiated as a function of time or temperature with most FTIR spectrometers.

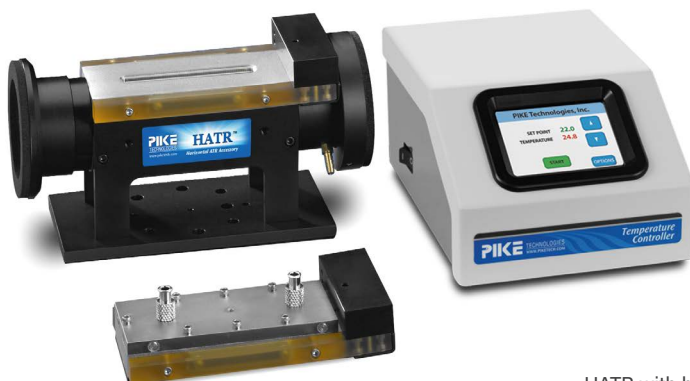
PART NUMBER	DESCRIPTION
Complete HATR Systems	
022-10XX	HATR Trough Plate System with 45° ZnSe Crystal Includes Trough Plate, Volatiles Cover and Powder Press
022-11XX	HATR Flat Plate System with 45° ZnSe Crystal Includes Flat Plate and HATR Pressure Clamp
022-12XX	HATR Combined Trough and Flat Plate System with 45° ZnSe Crystals Includes Trough Plate, Flat Plate, Volatiles Cover, Powder Press and Pressure Clamp
024-11XX	HATRPlus Flat Plate System with 45° ZnSe Crystal Includes Flat Plate and HATR Pressure Clamp
Notes: Replace XX with your spectrometer's Instrument Code listed in the back of the catalog. HATR and HATRPlus systems may be purchased with other crystal plates; just add -Ge for germanium, -KR for KRS-5, -AM for AMTIR, or -Si for silicon to the part number. Additional plates can be added to an order for any system above. Other configurations may be selected from the options below.	

RESISTIVELY HEATED PLATES SPECIFICATIONS

Temperature Range	Ambient to 120 °C
Accuracy	+/- 0.5° up to 100 °C +/- 0.5% of set point > 100 °C
Sensor Type	3 wire Pt RTD (low drift, high stability)
Temperature Control	Touch-panel display with USB interface. PIKE TempPRO software for PC control with unlimited ramps and automated data collection.
  	
Input	100–240 VDC, auto setting, external power supply

Configurable HATR Systems - HATR Base Optics	
022-19XX	HATR Platform Optics Assembly
024-19XX	HATRPlus Platform Optics Assembly
Notes: Replace XX with your spectrometer's Instrument Code listed in the back of the catalog. HATR and HATRPlus Platform Optics Assemblies include purge tubes, purge kit and spectrometer base mount.	
Pressure Clamp for HATR and HATRPlus	
022-3050	HATR (pivoting) Pressure Clamp
022-3054	HATR High-Pressure Clamp
024-3050	HATRPlus (pivoting) Pressure Clamp
024-3053	HATRPlus High-Pressure Clamp
Notes: The pressure clamp is required for solids, films, coatings and powdered samples. Maximum force for (pivoting) Pressure Clamp and High-Pressure Clamp is 13 lbf and 30 lbf, respectively.	
Crystal Plates 45° (must select 1 or more)	
ZnSe	
022-2010-45	Trough
022-2020-45	Flat
022-2024-45	Sealed Flat
022-2012-45	Trough, 2 mm
022-2022-45	Flat, 2 mm
Ge	
022-2050-45	Trough
022-2060-45	Flat
022-2064-45	Sealed Flat
022-2052-45	Trough, 2 mm
022-2062-45	Flat, 2 mm
KRS-5	
022-2030-45	Trough
022-2040-45	Flat
AMTIR	
022-2070-45	Trough
022-2080-45	Flat
Si	
022-2090-45	Trough
022-2100-45	Flat

Notes: Crystal Plates are pre-aligned and pinned-in-place. For most HATR crystal plates, 60 degree face angle is also available. Where not noted, crystals are 4-mm thick and generate 10 reflections on the sample (45° cut). 2-mm thick crystals result in 20 reflections (45° cut). If you need a crystal not listed here, please contact us. Reconditioning service is available.



HATR with heated trough plate and temperature control module—foreground shows heated flow-through cell.

Heated Crystal Trough Plates 45°	
022-5110	ZnSe
022-5120	AMTIR
022-5130	KRS-5
022-5140	Si
022-5150	Ge
Heated Flow-Through Cells 45°	
022-5210	ZnSe
022-5212	ZnSe, 2 mm
022-5220	AMTIR
022-5230	KRS-5
022-5240	Si
022-5250	Ge
022-5252	Ge, 2 mm
022-5225	AMTIR with UV Port
076-1610	Digital Temperature Control Module
007-0207	PIKE TempPRO Software
Notes: Temperature is adjustable from ambient to 120 °C for heated trough plates and flow-through cells. Ge becomes opaque near 100 °C. Resistance heated plates require selection of a PIKE Technologies Temperature Control Module. PIKE TempPRO software (sold separately) can be used for graphical setup and automated data collection for thermal experiments. PTFE-coated flow-through cells available – contact us for more information.	
Flow-Through Cells 45°	
022-4010	ZnSe
022-4012	ZnSe, 2 mm
022-4020	AMTIR
022-4030	KRS-5
022-4040	Si
022-4050	Ge
022-4052	Ge, 2 mm
022-5228	AMTIR with UV Port
Notes: HATR flow-through cells include Luer-Lok® fittings for easy connection with a syringe. A set of 1/16" Swagelok® fittings are also included. Cell volume is 500 µL. PTFE-coated flow-through cells available – contact us for more information.	
Liquid Jacketed Crystal Plates 45°	
022-5310	ZnSe
022-5320	AMTIR
022-5330	KRS-5
022-5340	Si
022-5350	Ge
Notes: Liquid jacketed crystal plates require customer-provided liquid circulator. Liquid jacketed crystal plates enable heating to 120 °C and cooling. Ge becomes opaque near 100 °C.	

Liquid Jacketed, Flow-Through Crystal Plates 45°	
022-5410	ZnSe
022-5412	ZnSe, 2 mm
022-5420	AMTIR
022-5430	KRS-5
022-5440	Si
022-5450	Ge
022-5452	Ge, 2 mm
Notes: Liquid jacketed flow-through crystal plates require customer-provided liquid circulator to enable heating to 120 °C and cooling. HATR flow cells include Luer-Lok fittings for easy connection with a syringe and 1/16" Swagelok fittings. PTFE coated flow-through cells available – contact us for more information.	
HATR RC Plate	
022-2300	RCPlate for HATR (for 45° crystals, 4 mm)
Note: Requires a selection of HATR Crystal – see below	
Replacement Parts	
022-3051	HATR Volatiles Cover
022-3052	HATR Powder Press
Crystal Traps 45° 80 x 10 x 4 or 2mm	
160-5554	ZnSe, 4 mm
160-5559	ZnSe, 2 mm
160-5555	KRS-5, 4 mm
160-5556	Ge, 4 mm
160-5560	Ge, 2 mm
160-5557	AMTIR, 4 mm
160-5558	Si, 4 mm
Flow Cell Parts	
022-3032	HATR Backplate, 2mm Crystal
022-3033	HATR Backplate, 4mm Crystal
022-3040	Viton O-Ring, upper (6 ea.)
022-3045	Viton O-Ring, lower (6 ea.)
022-3041	Perfluoroelastomer O-Ring, upper (1 ea.)
022-3046	Perfluoroelastomer O-Ring, lower (1 ea.)
Notes: Reconditioning service for used HATR crystal plates is available. Contact PIKE Technologies for items not described in this list.	