

## DiffusIR – Research Grade Diffuse Reflectance Accessory



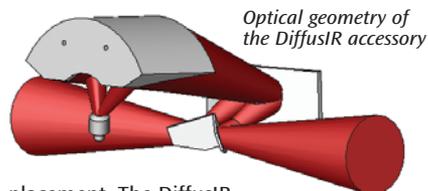
FEATURES OF THE DIFFUSIR

- Large, highly efficient collection optics for maximum sensitivity and detection limits
- Micrometer controlled sample focus to optimize results for every sample
- Optional environmental chambers for heating, cooling, high vacuum and high pressure applications
- Quick release feature of environmental chambers for easy insertion and removal of sealed chambers
- Digital PC controller option for macro control of data collection at user specified temperatures or times
- Sealed and purgeable optical design to eliminate water vapor and carbon dioxide interference

The PIKE Technologies DiffusIR™ is a research grade diffuse reflectance accessory with a large, efficient optical design accommodating the optional PIKE Technologies environmental chambers. These specialized chambers can be used to study thermodynamic properties of materials, determine reaction mechanisms, perform catalytic studies and much more.

The heart of the DiffusIR is a unique monolithic ellipsoidal reflector permanently fixed in place – eliminating the need for repositioning the focus optics for sample placement. The DiffusIR optical design is optimized to efficiently collect diffuse radiation generated from the sample and minimize the effects of the specular radiation component.

With the DiffusIR, sample introduction is performed using an integral 2 position slide – enabling background and sample spectra to be collected without loss of purge. The sample height can be optimized by using the micrometer sample focusing adjustment. In this manner the sensitivity of the accessory is maximized without



Optical geometry of the DiffusIR accessory



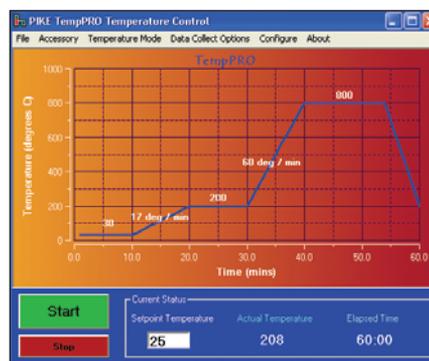
sacrificing precision. The DiffusIR comes equipped with a Sample Preparation and Loading Kit and a Sample Abrasion Kit for the analysis of intractable samples. The DiffusIR optics are enclosed and equipped with purge tubes for the elimination of atmospheric interferences.

The PIKE Technologies environmental chambers can be operated at temperatures ranging from -150 to 900 °C and at pressures up to 1500 psi. The optional heat chambers are easily inserted and removed from the DiffusIR using push lock pins.

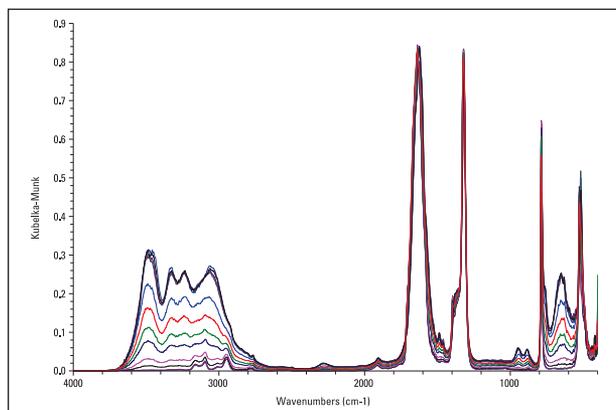
Coupling the DiffusIR and environmental chambers with the PIKE PC Controlled Temperature Module and TempPRO™ software provides the ability to graphically set up the experiment with up to 3 ramps and data collection initiated at specified time or temperature values.

Advanced temperature studies of materials in controlled environments can be done using the PIKE heat chambers.

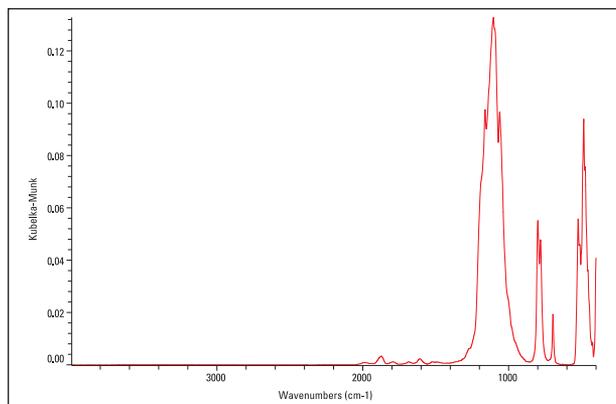
A special version of the DiffusIR with gold-coated optics is available for maximum mid-IR performance and for NIR diffuse reflectance sampling. The DiffusIR and its options are compatible with most FTIR spectrometers.



PIKE Technologies TempPRO software provides a graphical interface for temperature control and kinetic measurements



Thermal transformation of hydrated inorganic compound measured with DiffusIR with heat chamber. Spectra automatically collected between 80 and 160 °C at 5 degree increments using PIKE TempPRO software.



Spectrum of Ottawa sand measured with the DiffusIR

## ORDERING INFORMATION

### DiffusIR Accessory (Must Select One)

PART NUMBER	DESCRIPTION
041-10XX	DiffusIR Accessory <i>Includes Sample Preparation Kit with 2 micro and 2 macro sample cups, sample loading tools, Abrasion Sampling Kit, SiC and Diamond Sampling Disks, Alignment Mirror, 35 mm Mortar with Pestle and KBr Powder (100 g)</i>
041-60XX	DiffusIR Accessory with Gold Coated Optics <i>Includes Sample Preparation Kit with 2 micro and 2 macro sample cups, sample loading tools, Abrasion Sampling Kit, SiC and Diamond Sampling Disks, Alignment Mirror, 35 mm Mortar with Pestle and KBr Powder (100 g)</i>

Notes: Please see the FTIR instrument code sheet.

### DiffusIR Options (Optional)

PART NUMBER	DESCRIPTION
162-4150	DiffusIR Heat Chamber (HTV), ambient to 500 °C
162-4190	DiffusIR Heat Chamber (HTV), ambient to 900 °C
162-4180	High Pressure Adaptation for Heat Chambers (HTV)
162-4140	DiffusIR Heat Chamber (LTV), -150 to 500 °C

Notes: DiffusIR Heated Chambers include front plate accommodating Heat Chamber (easily changeable with standard front plate), Pin-Loc Heat Chamber insertion for easy sample exchange, KBr window, ceramic sampling cups compatible with vacuum and reaction formats, ports and 2 shut-off valves for vacuum operation and ports for connection of water cooling. The 500 °C and 900 °C HTV chambers may be fitted with the high pressure (HP) adaption and are easily switchable from standard vacuum to high pressure operation. The LTV heat chamber is not compatible with simultaneous pressurization and low temperature operation. Operation of the LTV at sub ambient temperatures requires customer supplied liquid chilling equipment. Heated Chamber requires selection of a temperature control module – below.

### Temperature Control Modules

PART NUMBER	DESCRIPTION
076-2410	PC Controlled Temperature Module <i>Includes: Digital Temperature Selection, TempPRO Software with Integrated Data Collection</i>
076-2210	Digital Temperature Control Module

Notes: PC Controlled Temperature Module with TempPRO software provides a graphical user interface for setting experiment parameters and data collection. Please contact PIKE for PC compatibility.

### Replacement Parts and Supplies

PART NUMBER	DESCRIPTION
042-2010	Micro Sample Cup (6.0 mm diameter, 1.6 mm deep), 2 per package
042-2020	Macro Sample Cup (10 mm diameter, 2.3 mm deep), 2 per package
042-3020	Silicon Carbide Abrasive Disks (Pack of 100)
042-3025	Diamond Abrasive Disks (Pack of 50)
042-3030	Sample Cup Holder and Base
042-3040	Sample Preparation Kit
042-3010	Abrasion Sampling Kit
042-3080	DiffusIR Alignment Mirror
160-1132	32 x 3 mm KBr Disk
160-1113	32 x 3 mm ZnSe Disk
160-5049	32 x 3 mm SiO <sub>2</sub> Disk

### Replacement Parts and Supplies (cont.)

PART NUMBER	DESCRIPTION
160-1159	32 x 3 mm Si Disk
162-4210	O-Ring, DiffusIR HC, 10 ea.
162-4215	O-Ring, DiffusIR HC Cooling Line, 10 ea.
162-4251	Cup, DiffusIR HC, Ceramic, porous
162-4270	Alignment Mirror, DiffusIR HC
301-0106	Replacement ZnSe dome crystal high pressure cell

Notes: Please contact PIKE Technologies for items not described in this list.

### DiffusIR Specifications

Optical Design	3X ellipsoidal
Angle of Incidence	30 degrees, nominal
DiffusIR Dimensions	180 mm wide, 230 mm deep, 130 mm high (excluding purge tubes and base plate)
Sample Focus	Micrometer
Sample Positions	2 positions, slide stops for background and sample with no purge loss
Sample Cups	Macro: 10 mm x 2.3 mm deep Micro: 6 mm x 1.6 mm deep
Purge	Standard purge tubes and purge connection

### DiffusIR Heat Chamber Specifications

Temperature Range HTV:	Ambient to 500 or 900 °C
Temperature Range LTV:	-150 to 500 °C
Accuracy	+/- 0.5%
Voltage, Amperage	24 VAC, 3A (maximum)
Input Voltage	110/220 V, switchable
Temperature Control	Digital or Digital PC
Heating Rate, Maximum	120 °C/minute
Kinetic Setup (requires Digital PC Controller, includes PIKE TempPRO software)	<ul style="list-style-type: none"> <li>• Up to 3 temperature ramps</li> <li>• Individual ramp rate and hold time settings</li> <li>• Graphical display of experiment settings</li> <li>• Trigger data collection at specified times or temperatures</li> <li>• USB interface</li> </ul>
Sensor	K Type (for HTV) RTD Type, Pt100 (for LTV)
Vacuum Achievable	1 x 10 <sup>-6</sup> Torr (13 x 10 <sup>-4</sup> Pa)
Window Size	32 x 3 mm disk (vacuum) 32 mm ZnSe dome (pressure)
Leaking Volume	< 6.0 x 10 <sup>-11</sup> Pa m <sup>3</sup> /sec
Pressure Maximum	1500 psi, with HP adaption (HTV versions only)
Sample Cup Size	6.0 mm OD, 4.0 mm height 4.7 mm ID, 2.0 mm depth
Sample Cup Design	Ceramic, porous compatible with powders and gas flow
Cooling Ports	Quick-Fit, 6 mm ID
Gas/Vacuum Ports	1/8" Swage Lock