

# DiffusIR – Research Grade Diffuse Reflectance Accessory



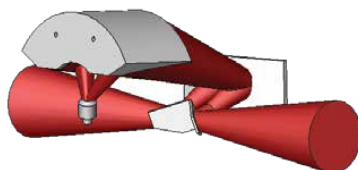
## FEATURES

- 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 an efficient optical design accommodating the optional PIKE Technologies environmental chambers. These specialized chambers can be used to study thermodynamic properties of materials, to determine reaction mechanisms, to 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.

*Optical geometry of the DiffusIR accessory*



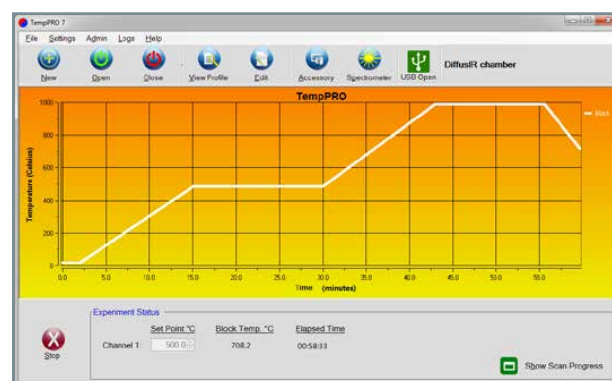
With the DiffusIR, sample introduction is performed using an integral 2-position slide – enabling background and sample spectra to be collected without loss of purge. The sample height can be optimized by using the micrometer sample focusing adjustment. In this manner the sensitivity of the accessory is maximized without sacrificing precision. The DiffusIR comes 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 water and CO<sub>2</sub> interferences.

Advanced temperature studies of materials in controlled environments can be done using the PIKE environmental chambers. Chambers for the DiffusIR can be operated at temperatures ranging from -150 to 1000 °C and at pressures up to 1500 psi. The optional chambers are easily inserted into the DiffusIR and secured using push-lock pins.

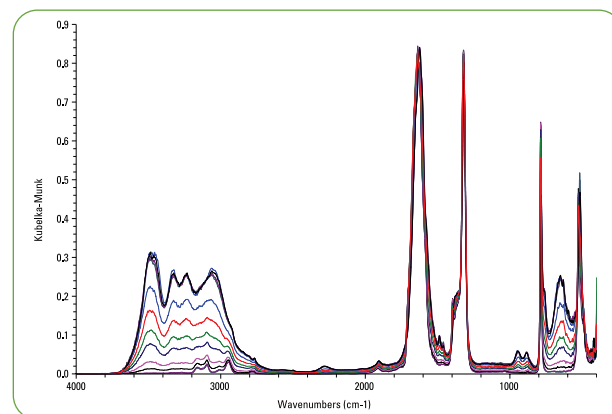


Coupling the environmental chambers with the PIKE Temperature Control Module and TempPRO™ software provides the ability to graphically set up the experiment with unlimited ramps and initiate data collection at specified time or temperature intervals when used with most FTIR instruments.

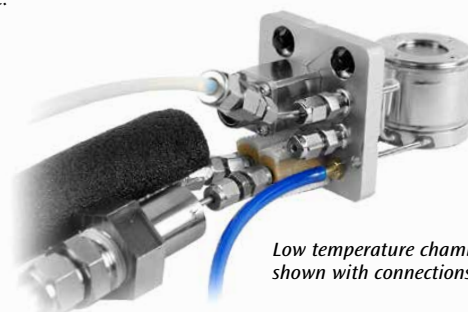
A special version of the DiffusIR with gold-coated optics is available for maximum mid-IR performance and for NIR diffuse reflectance sampling. The DiffusIR and its options are compatible with most FTIR spectrometers.



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



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



*Low temperature chamber shown with connections*

## 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>

Note: Replace XX with your spectrometer's Instrument Code listed on page 191.

### DIFFUSIR OPTIONS

PART NUMBER	DESCRIPTION
162-4200	DiffusIR Environmental Chamber, HTV, ambient to 1000 °C
162-4180	High-Pressure Adapter Dome for Chambers, HTV
162-4140	DiffusIR Environmental Chamber, LTV, -150 to 500 °C

Notes: HTV and LTV chambers require the selection of a temperature control module. DiffusIR Chambers include front plate accommodating environmental chamber (easily changeable with standard DiffusIR front plate), Pin-Loc 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 1000 °C HTV chambers may be fitted with the high-pressure adapter and are easily switchable from standard vacuum to high-pressure operation. The LTV chamber is not compatible with simultaneous pressurization and low temperature operation. Operation of the LTV at sub-ambient temperatures requires part number 162-4165 Liquid Nitrogen-Cooled System and Temperature Control Module and rotary pump for vacuum insulation. All chambers require a liquid circulator to reduce heat transfer to the outer housing and to preserve the life of the chamber heaters.

### TEMPERATURE CONTROL MODULES

PART NUMBER	DESCRIPTION
076-2550	Digital Temperature Control Module
007-0207	PIKE TempPRO Software
162-4165	Liquid Nitrogen-Cooled System and Temperature Control Module DiffusIR Environmental Chamber, LTV, -150 to 500 °C

Notes: Digital Temperature Control Module with TempPRO software (sold separately) provides a graphical user interface for setting experiment parameters and data collection. Please contact PIKE for PC compatibility. The Temperature Control Modules for the HTV and LTV chambers are not interchangeable.

### REPLACEMENT PARTS AND SUPPLIES

PART NUMBER	DESCRIPTION
170-1100	Liquid Recirculator
042-2010	Sample Cup, micro, 6 mm diameter, 1.6 mm deep (2 ea.)
042-2020	Sample Cup, macro, 10 mm diameter, 2.3 mm deep (2 ea.)
042-3030	Sample Cup Holder and Base
160-8010	KBr Powder (100 g)
042-3040	Sample Preparation Kit
042-3010	Abrasion Sampling Kit
042-3020	Abrasion Disks, silicon carbide (100 ea.)
042-3025	Abrasion Disks, diamond (50 ea.)
042-3060	Flat Sample Post
042-3080	Alignment Mirror, aluminum
042-3082	Alignment Mirror, gold
162-4298	Rotary Pump for vacuum insulation, 115V
162-4299	Rotary Pump for vacuum insulation, 230V

### REPLACEMENT PARTS AND SUPPLIES (cont.)

PART NUMBER	DESCRIPTION
160-1132	Disk, KBr, 32 x 3 mm
160-1113	Disk, ZnSe, 32 x 3 mm
160-1231	Disk, ZnSe, 32 x 3 mm, with anti-reflective coating
160-5049	Disk, SiO <sub>2</sub> , 32 x 3 mm
160-5125	Disk, SiO <sub>2</sub> , 32 x 3 mm, low OH
160-1159	Disk, Si, 32 x 3 mm
162-4210	O-Ring for DiffusIR Chamber (10 ea.)
162-4215	O-Ring for DiffusIR Chamber cooling line (10 ea.)
162-4251	Ceramic Cup for DiffusIR Chamber, porous
162-4270	Alignment Mirror for DiffusIR Chamber

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

### DIFFUSIR SPECIFICATIONS

<b>Optical Design</b>	3X ellipsoidal
<b>Angle of Incidence</b>	30 degrees, nominal
<b>Dimensions (W x D x H)</b>	180 x 230 x 130 mm (excluding purge tubes and baseplate)
<b>Sample Focus</b>	Micrometer
<b>Sample Positions</b>	2 positions, slide stops for background and sample with no purge loss
<b>Sample Cups</b>	Micro: 6 x 1.6 mm deep Macro: 10 x 2.3 mm deep
<b>Purge</b>	Standard purge tubes and purge connection

### ENVIRONMENTAL CHAMBER SPECIFICATIONS

<b>Temperature Range, HTV</b>	Ambient to 500 or 1000 °C
<b>Temperature Range, LTV</b>	-150 to 500 °C
<b>Accuracy</b>	+/- 0.5% of set point
<b>Heating Rate, Maximum</b>	Up to 120 °C/minute, 500/1000 °C
<b>Temperature Control</b>	Digital
<b>Kinetic Setup</b> Requires Digital Temperature Control Module and PIKE TempPRO Software (sold separately)	<ul style="list-style-type: none"> <li>• Touch-panel display</li> <li>• Unlimited 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>
<b>Sensor</b>	K Type (for 500/1000 °C) RTD Type, Pt100 (for LTV)
<b>Input</b>	100–240 VAC (for both versions)
<b>Output</b>	28 VDC/84 W max. (500/1000 versions) 54 VDC/84 W max. (-150 to 500 version)
<b>Vacuum Achievable</b>	1 x 10 <sup>-6</sup> Torr (13 x 10 <sup>-4</sup> Pa)
<b>Window Size</b>	32 x 3 mm disk (vacuum) 32 mm ZnSe dome (pressure)
<b>Leak Rate</b>	< 6.0 x 10 <sup>-11</sup> Pa m <sup>3</sup> /sec
<b>Pressure Maximum</b>	<ul style="list-style-type: none"> <li>• 1500 psi, with High-Pressure Adapter (available in HTV versions only)</li> <li>• 14.7 psi (1 atmosphere) using KBr window</li> </ul>
<b>Sample Cup Size</b>	Macro: 6.0 mm OD, 4.0 mm height Micro: 4.7 mm ID, 2.0 mm depth
<b>Sample Cup Design</b>	Porous ceramic compatible with powders and gas flow
<b>Cooling Ports</b>	Quick-Fit, 6 mm ID
<b>Gas/Vacuum Ports</b>	1/8" Swagelok®