

FT/IR

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# The X-Series of FTIR Spectrometers

## A Comprehensive Range



FT/IR-4X



FT/IR-6X



FT/IR-8X

The X-Series of FTIR spectrometers provide a complete solution to IR spectroscopy. Each instrument has unique features and specifications that lead to exceptional performance, including a sealed (45 or 28 degree) interferometer with corner-cube mirrors and diode laser (or HeNe) with AccuTrac™ DSP technology.

The X-Series includes the intuitive Spectra Manager™ Suite with integrated search software solution, KnowItAll® Informatics and database.

## FTIR Spectrometers System Features



### Interferometer

The interferometer is manufactured as a solid cast aluminum block and is completely sealed. The FT/IR-4X uses a 45 deg Michelson interferometer, while the 6X and 8X use a 28 degree Michelson interferometer. A near frictionless bearing (without the need for a gas supply) supports the moving-mirror which is driven electromagnetically for accurate vibration-free movement. Laser tracking of the moving mirror is made using a diode laser in the 4X and 6X and a HeNe laser in the 8X, coupled with Accutrak™ digital signal processing. The standard solid KRS-5 windows prevent hygroscopic damage often seen with KBr or coated windows



### High Sensitivity Electrically Cooled DLATGS Detector

A highly sensitive and stable Peltier cooled DLATGS detector is standard for all instruments.



### Diode Timing laser

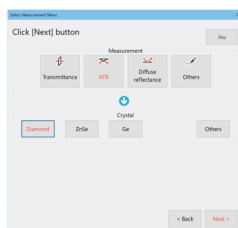
The temperature controlled VCSEL diode laser offers high resolution spectroscopy with an exceptionally long lifetime. HeNe lasers are used for the highest resolution 0.07 cm<sup>-1</sup> and for applications that require visible wavelengths.

used on some products.



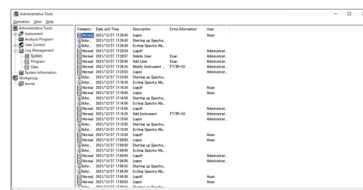
## IQX Accessory Recognition

Automatic recognition of the sampling accessory is made when it is fitted into the sample compartment. It can also be used to automatically load measurement parameters matched to the accessory; this ensures that data is acquired using the correct parameters.



## IQ Start

A sequence of operations, including data processing, can be defined in a sequence in the Spectra Manager measurement application, the sequence can started by the press of the Start button for fast and comprehensive measurement.



## Regulatory Compliance

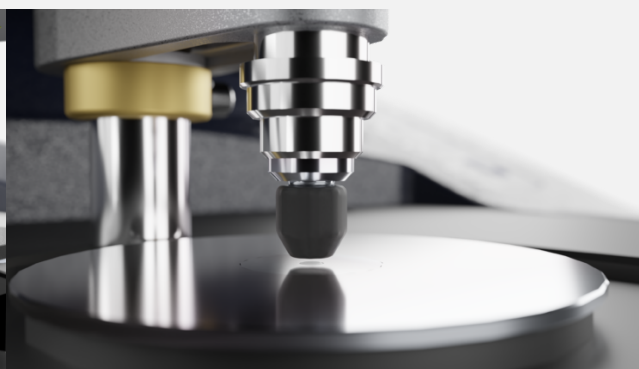
For laboratories that operate under the requirement of regulatory compliance, instrument validation routine standard for verification of instrument performance compliant with ASTM, EP, and JP procedures. Spectra Manager CFR is compliant to the latest requirements of ALCOA+

## FTIR Spectrometers Accessories



### Microscope/IR Imaging

The IRT-1000, 5000, or 7000 infrared microscopes can be easily interfaced to any FT/IR-4X or FT/IR-6X/8X instrument.



### ATR PRO Series

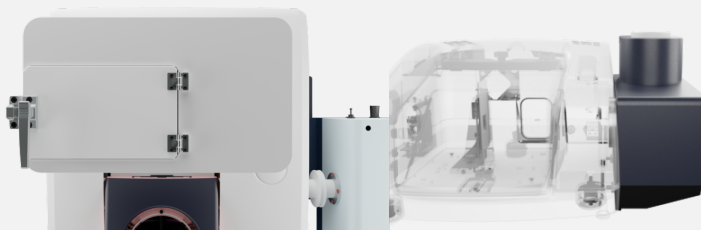
ATR-Pro is fully integrated, but can easily be exchanged with other sampling accessories. The external design is easy to clean with a fully rotatable (360 deg) anvil for full access when placing samples onto the prism.



## Purgeable & Vacuum

The FT/IR-6X and 8X can be fitted with several vacuum options, and can be configured for full vacuum or partial with vacuum interferometer and detector compartments and with the sample chamber nitrogen purged.

All models have fully sealed and desiccated aluminum interferometer chamber. In addition, an integrated purge for the sample compartment (4X) and complete system (6X and 8X) is included as standard.



## Beam Splitter

Automatic beam splitter and window exchange allow uninterrupted measurement across the entire spectral range.

## Additional Detectors

Many optional detectors cover the range from 25,000 to 5  $\text{cm}^{-1}$  and include several LN<sub>2</sub> cooled pv/pc MCT detectors for wide, narrow and mid-band. Other detectors includes -silicon photo-diode, InGaAs, Si bolometer, etc.

# FTIR X-Series Specifications

## FT/IR-X Series Specifications

Model	FT/IR-4X	FT/IR-6X	FT/IR-8X
Standard Wavenumber Measurement Range	7,800 to 350 $\text{cm}^{-1}$		
Optional Extended Wavenumber Range	11,500 to 375 $\text{cm}^{-1}$ , 6,000 to 220 $\text{cm}^{-1}$ , 6,000 to 50 $\text{cm}^{-1}$	25000 to 20 $\text{cm}^{-1}$	
Maximum Resolution	0.4 $\text{cm}^{-1}$	0.25, 0.5, 1.0, 2, 4, 8, 16 $\text{cm}^{-1}$	0.07, 0.25, 0.5, 1.0, 2, 4, 8, 16 $\text{cm}^{-1}$
Sample Chamber	Size: 200 mm (W) × 260 mm (D) × 185 mm Optical path: Center focus, light axis 70 mm high		
Interferometer	45° Michelson interferometer Corner cube mirror interferometer, with auto-alignment mechanism, sealed structure, DSP control	28° Michelson interferometer with corner-cube mirror, sealed structure (KRS-5 window, optional window is also available), auto-alignment mechanism, DSP control, aluminum mirror coating	
N <sub>2</sub> Purge	Sample Compartment, Detector (interferometer - option)	Interferometer, sample/detector compartment	
Vacuum Instrument	N/A	Sealing	
Mirror Coating	Aluminum		Au
Drive Method	Mechanical bearing, electromagnetic drive		
Drive Speed	Auto, 1, 2, 3, 4 mm/sec AUTO DLATGS 2.0 mm/sec MCT (optional) 4.0 mm/sec	0.5, 1, 2, 3, 4, 6, 8 mm/sec. Rapid scan: 32 mm/sec.	0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8 mm/sec Rapid scan: 32 mm/sec.
Rapid Scan	80 Hz (optional)	40 spectra/sec. (16 $\text{cm}^{-1}$ resolution)	40 spectra/sec. (16 $\text{cm}^{-1}$ resolution)
Beam Splitter	Standard: Ge/KBr Option: Si/CaF <sub>2</sub> , Ge/CsI (not interchangeable)	Ge/KBrOptional: Broad band Quartz, Si/CaF <sub>2</sub> , Broad band KBr, Broad band mylar, Mid-far IR broad band, (exchangeable, optional automatic beam splitter changer is available)	

Model	FT/IR-4X	FT/IR-6X	FT/IR-8X
Light Source	Standard: High-intensity ceramic source Option: Halogen lamp (factory option only)		
Detector	DLATGS (with Peltier temperature control) (standard)		
Optional Detectors	W-MCT, M-MCT, N-MCT, Si, InSb, InGaAs (optional) Up to two detectors can be installed.	MCT-N, MCT-M, MCT-W, MCT-PV, Si photodiode (visible, near IR), InSb, InGaAs, DLATGS (PE window), Broad band DLATGS, Si bolometer, DLATGS (for micro measurement) Up to 2 detectors can be mounted inside the main unit, and the external detector unit should be applied if more than 3 detectors are used (PC switching). There are some limited detectors for mounting inside the main unit, and up to 2 detectors can be mounted to external detector unit.	
Signal-to-Noise Ratio: (4 cm <sup>-1</sup> , 1 min, near 2,200 cm <sup>-1</sup> )	35,000:1	47000 : 1	55000 : 1
Gain Switching	AUTO, 1, 2, 4, 8, 16, 32, 64, 128		
Communication	USB 2.0		
Dimensions	386 (W) × 479 (D) × 254 (H) mm, Weight: 18 kg	FT/IR-6X purge model: 600 (W) × 690 (D) × 315 (H) mm, 56 kg FT/IR-6X V Interferometer vacuum model: 600 (W) × 690 (D) × 315 (H) mm, 58 kg FT/IR-6X FV Full vacuum model: 600 (W) × 700 (D) × 355 (H) mm, 70 kg	FT/IR-8X purge model: 600 (W) × 690 (D) × 315 (H) mm, 56 kg FT/IR-8X V Interferometer vacuum model: 600 (W) × 690 (D) × 315 (H) mm, 58 kg FT/IR-8X FV Full vacuum model: 600 (W) × 700 (D) × 355 (H) mm, 70 kg Power supply unit: 85 (W) × 260 (D) × 197 (H) mm, 4.7 kg

## Standard Composition

Item	Quantity	Description
AC Cable	1	AC cable for the power supply
USB Cable	1	Cable connecting the main unit to the PC
Sample Holder	1	
Standard Sample	1	Polystyrene film
Stepped Pin	2	Used for locating optional accessories in the sample compartment
Instruction Manual	1	
Installation Image	1	Spectra Manager™ and KnowItAll® JASCO Edition
Fuses	2	

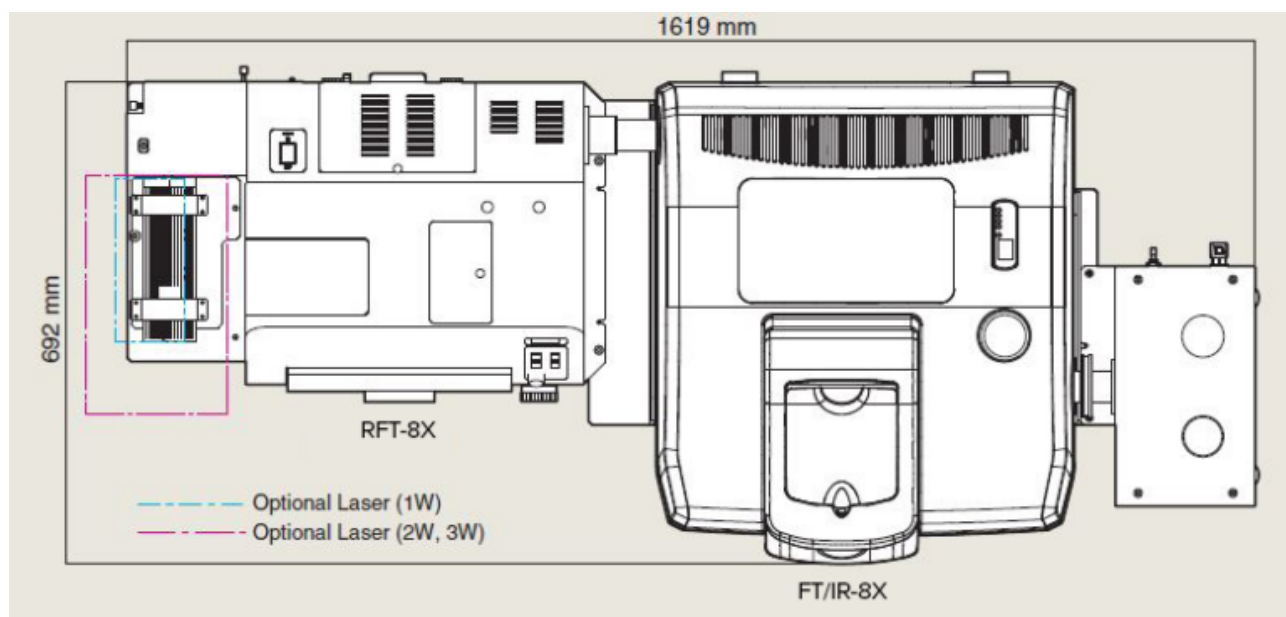
\* LE or LE-CFR Models do not include KnowItAll® JASCO Edition.

## FT-Raman Specifications

Laser (Option)	DPSS laser: 1,064 nm; 1, 2, or 3 W (air-cooled)
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Rejection Filter	150 $\text{cm}^{-1}$ or more (Raman shift value) 50 $\text{cm}^{-1}$ or more (Raman shift value ) (Option)
Detectors	InGaAs: $\sim 3,600 \text{ cm}^{-1}$ or more (at R.T.) $\sim 3,000 \text{ cm}^{-1}$ or more (77 K) (LN2-cooled)
Interferometer	Beam splitter: Si/CaF <sub>2</sub>
Sample Stage	XYZ stage
Beam Collecting System	Lens method: F/0.63
Data Processing Functions	Smoothing, Baseline correction, Peak picking, Sensitivity correction, Arithmetic, Derivatives, Subtract, Raman shift, wavenumber conversion, Data truncate, Overlay, IF conversion, J-CAMP format conversion, Text format conversion
Other Standard Components	Laser plasma line rejection filter, Laser power monitor, Light source for Raman intensity correction (Halogen lamp), Interlock mechanism (Laser safety operation), Raman scattering collecting system (uses gold-coated mirrors)
Optional Accessories	Liquid sample cell / Liquid sample cell holder/ Powder holder, 90 degree scattering measurement system, TV monitor system for sample observation, Microscopic measurement system (Objective lens: X10, X50 including TV monitor system), Polarization measurement system (1/2 plate, Polarizer), Large XYZ stage, Thermal analysis system, Mapping system, Anti-vibration bench

## Dimensions

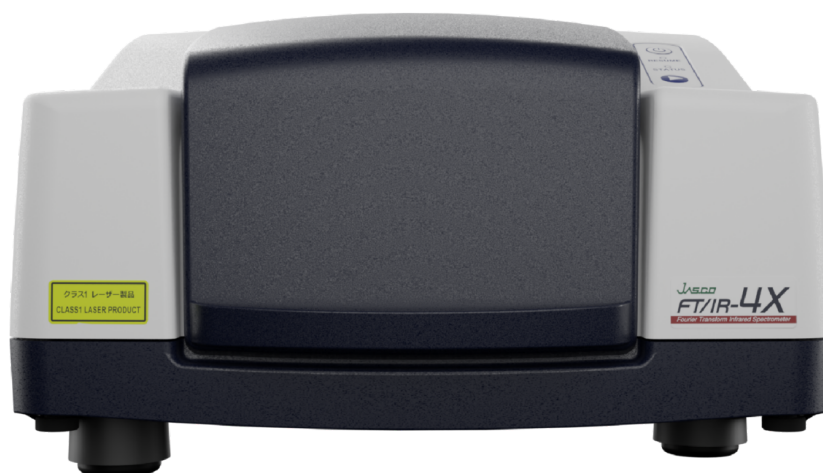


Note: laser power supply not shown

# FT/IR-4X FTIR Spectrometer

## FT/IR-4X Spectrometer

The FT/IR-4X is a powerful Mid-IR FTIR spectrometer, with many features that you find in a research grade instrument, such as non-hygroscopic KRS-5 windows to prevent damage to the interferometer, a temperature controlled DLaTGS detector and a high output ceramic source for maximum sensitivity. Permanent optical alignment is guaranteed by corner cube (retro-reflective) mirrors with auto-alignment for maximum energy.



Wavenumber range 7800 to 350  $\text{cm}^{-1}$

Resolution of 0.4  $\text{cm}^{-1}$

S/N greater than 35,000:1

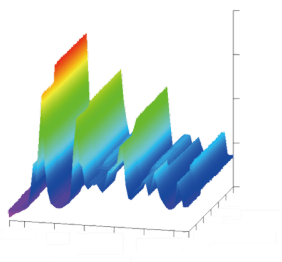
## System Features



IQX Accessory Recognition



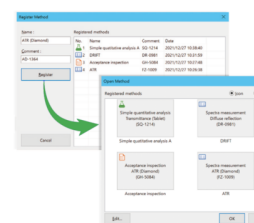
Vibration-proof optical bench



Up to 80Hz Rapid scan with interval scan for fast kinetic measurement

Method	Date and Time	Description	Data Elements	Status
Method 1	2017-10-17 13:00:00	Sample A	Sample A	Active
Method 2	2017-10-17 13:00:00	Sample B	Sample B	Active
Method 3	2017-10-17 13:00:00	Sample C	Sample C	Active
Method 4	2017-10-17 13:00:00	Sample D	Sample D	Active
Method 5	2017-10-17 13:00:00	Sample E	Sample E	Active
Method 6	2017-10-17 13:00:00	Sample F	Sample F	Active
Method 7	2017-10-17 13:00:00	Sample G	Sample G	Active
Method 8	2017-10-17 13:00:00	Sample H	Sample H	Active
Method 9	2017-10-17 13:00:00	Sample I	Sample I	Active
Method 10	2017-10-17 13:00:00	Sample J	Sample J	Active
Method 11	2017-10-17 13:00:00	Sample K	Sample K	Active
Method 12	2017-10-17 13:00:00	Sample L	Sample L	Active
Method 13	2017-10-17 13:00:00	Sample M	Sample M	Active
Method 14	2017-10-17 13:00:00	Sample N	Sample N	Active
Method 15	2017-10-17 13:00:00	Sample O	Sample O	Active
Method 16	2017-10-17 13:00:00	Sample P	Sample P	Active
Method 17	2017-10-17 13:00:00	Sample Q	Sample Q	Active
Method 18	2017-10-17 13:00:00	Sample R	Sample R	Active
Method 19	2017-10-17 13:00:00	Sample S	Sample S	Active
Method 20	2017-10-17 13:00:00	Sample T	Sample T	Active

Optional 21 CFR part 11, IQ/OQ and GxP compliance

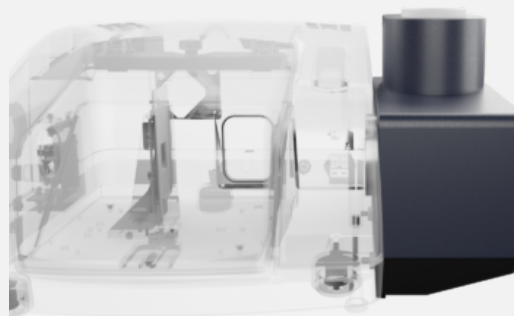


Spectra Manager™ User Adaptive

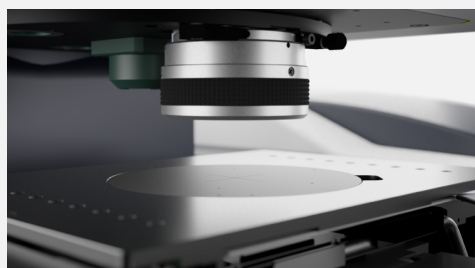
## Accessories



Large sample compartment



For flexible applications a second detector can be added, an MCT or InGaAs with automatic exchange and detection options to work from the near- to mid-IR and from mid-IR.



Options for FTIR microscopy and IR imaging



Wavenumber extension for NIR, mid-IR and far-IR



Integrated ATR-PRO 4X with a high throughput monolithic diamond, germanium

# FT/IR-6X FTIR Spectrometer

**The real advantage of the FT/IR-6X is not just the uncompromising design and high optical throughput, but also the ability to customize them for virtually any experimental requirement.**

## FT/IR-6X FTIR Spectrometer

The FT/IR-6X FTIR spectrometers with 28 degree Michelson interferometer and diode timing laser is an excellent choice for more demanding research applications, where better polarization performance or a more flexible approach to samples and measurement are required.



**Wavenumber range 25,000 to 20 cm<sup>-1</sup>**

**Resolution of 0.25 cm<sup>-1</sup>**

**S/N greater than of 47,000 : 1**

The configurable optical system applicable to virtually any FTIR application, from simple Mid IR measurement to more complex analysis in the near and far IR. Research-based measurements are easily performed using the FT/IR-6X or FT/IR-8X spectrometers with options such as full-vacuum, gold-coated optics, rapid & step scan and FT-Raman.

User-exchangeable components combined with full automation make it possible to perform spectral measurement from 25,000 cm<sup>-1</sup> to less than 20 cm<sup>-1</sup> without touching the system. The FT/IR-6X and FT/IR-8X spectrometers are compatible

with a range of vacuum and configurable emission ports to perform experiments outside the sample compartment, and are also compatible with the comprehensive range of IR microscopes.

## Multi Detector

User exchangeable beam splitters and windows

## FT/IR-6X FTIR spectrometer

FT/IR-6X is an ideal FTIR spectrometer for research applications, with an excellent signal-to-noise ratio (47,000 : 1) . The measurement wavenumber range can be configured from 25,000 to 20 cm<sup>-1</sup> and high resolution (0.25 cm<sup>-1</sup>).

## Wavelength Range

The standard spectrometer uses Ge/KBr beam-splitter with KRS-5 windows and a DLaTGS detector with KRS-5 window, spectral range 7,800 to 350 cm<sup>-1</sup>. There are a wide range of options to change the spectral range from 25,000 to 10 cm<sup>-1</sup>, including fully automated beam-splitter and window exchange for unattended operation. With the widest choice of materials, a wide spectral range can be covered using a minimum number of components including a combination of new broad-band beam splitter, window and detector materials covering the Mid-IR to Far-IR

## Nitrogen Purge and Evacuation

A multi-zone N<sub>2</sub> purge system is standard . This can be used to minimize the interference from environmental gases and vapors (CO<sub>2</sub> and H<sub>2</sub>O elimination algorithms are also included). Available as an option, the interferometer, sample chamber and detector areas can all be independently evacuated in a full or partial vacuum instrument (useful for fast sample loading) to completely eliminate CO<sub>2</sub> and H<sub>2</sub>O for the most sensitive sample measurements and as the moving mirror does not rely on an air-bearing, the vacuum can easily be maintained.

## Emission Ports and Light Introduction

The FT/IR-6X has several options for optical ports with a range of window materials for measurement of external sources of light and black body devices..

## Rapid Scan

Optional Rapid Scan offers spectral collection at up to 40Hz.

## 6X System Features

- Aluminum optics
- Long life VCSEL laser diode (HeNe as an option)
- High output ceramic source, Ge/KBr beam splitter and DLaTGS detector.
- Emission port optics for black body measurement, external light characterization etc.
- A full range of sampling accessories with IQX accessory recognition
- Vibration-proof optical bench
- Large sample compartment
- Corner-cube mirrors with auto-alignment to optimize energy throughput
- Purgeable and vacuum sample compartment and optical bench
- Optional detectors include – photo diodes, DLaTGS, InGaAs, InSb, MCT and
- He-cooled Bolometers
- Range of beam splitter materials with either manual or automatic exchange
- Optional FTIR microscopy and IR Imaging for both micro and macro measurement
- Rapid scan
- Wavenumber extension option (25,000 to 20 cm<sup>-1</sup>)
- Vibrational Circular Dichroism(VCD) option
- Powerful Data Analysis with Spectra Manager Suite 2.5

The FT/IR-6X is controlled by Spectra Manager™ cross-platform software. Spectra Manager™ includes Spectra measurement, Quick-Start, spectral comparison and quantitative analysis as standard functions. Library search and

analysis with KnowItAll Informatics JASCO Edition.

The sample measurement screen can be customized according to user requirements and the customized screen and parameters can be saved for future use (User Adaptive Software capability).

## Advanced Measurement Screen of Spectra Manager™ Sequence

Measurement parameters and data acquisition/spectral processing sequence are displayed.

## Results Display

Data analysis results such as spectral comparison and sample quantification are displayed and readily available.

## Real-Time Monitoring

A real-time data processing function can be used to verify the current spectrum during measurements. Spectra stored in thumbnails can also be overlaid with the current spectrum during sample measurements.

## Zoom

Target peak and functional group information can be easily checked using the zoom function.

## Thumbnail

The measured spectra can be stored as thumbnails within the thumbnail window. The thumbnails can be individually selected and viewed in Spectra view.

## Real-Time Data Processing

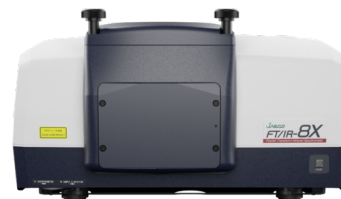
Before start of a sample measurement, the data processing procedures can be verified by checking the results of real-time data processing in a preview window.

# FT/IR-8X

**The real advantage of the FT/IR-8X, is not just the uncompromising design and high optical throughput, but the quality of results that can be achieved with this system.**

FT/IR-8X is JASCO's most advanced FTIR spectrometer, to date with an excellent signal-to-noise ratio (55,000 : 1) and the highest resolution (0.07  $\text{cm}^{-1}$ ).

The 8X is a highly configurable optical system applicable to virtually any FTIR application, from simple Mid IR measurement to much more complex analysis in the near and far IR. Research-based measurements are easily performed using the FT/IR-8X spectrometers with options such as emission port optics, external detectors, full-vacuum, step scan and FT-Raman.



*FT/IR-8X Spectrometer*

User-exchangeable components combined with full automation make it possible to perform spectral measurement from 25,000  $\text{cm}^{-1}$  to less than 20  $\text{cm}^{-1}$  without touching the system.

## Multi Detector

User exchangeable beam splitters and windows

Expandable Wavelength Range

The standard spectrometer uses Ge/KBr beam-splitter with KRS-5 windows and a DLaTGS detector (also with KRS-5 window) for a spectral range 7,800 to 350  $\text{cm}^{-1}$ . There is a wide range of options to select part or all of the spectral range from 25,000 to 20  $\text{cm}^{-1}$ , including fully automated beam-splitter and window exchange for unattended operation. With the widest choice of optical materials, a wide spectral range can be covered using a minimum number of components including a combination of new broad-band beam splitter, window and detector materials covering the Mid-IR to Far-IR

## Nitrogen Purge and Evacuation

A multi-zone  $\text{N}_2$  purge system is included as standard to minimize the interference from environmental gases and vapors ( $\text{CO}_2$  and  $\text{H}_2\text{O}$  elimination algorithms are also included). The interferometer, sample chamber and detector areas can all be independently evacuated in a full or partial vacuum instrument (useful for fast sample loading) to completely eliminate  $\text{CO}_2$  and  $\text{H}_2\text{O}$  for the most sensitive sample measurements, and as the moving mirror does not rely on an air-bearing, the vacuum can easily be maintained.

## Emission Ports and External Light Measurement and Characterization

The FT/IR-8X has several options for optical ports with a range of window materials for measurement of external sources of light and black body devices. A collimated beam can be brought out of the instrument for measurement in external sample compartments.

## Rapid Scan and Step Scan

Rapid Scan offers spectral collection up to 40Hz. Step-scan (option for the 8X) coupled with matching high speed pv-MCT detectors offers two different spectral collection rates at either 1 millisecond (1000 Hz) or 10 nanoseconds (100MHz). Using Amplitude or Phase modulation and Time Resolved with photo-acoustic detection.

## System Features

- Gold coated optics
- High output ceramic source, Ge/KBr beam splitter and DLaTGS detector.
- HeNe timing laser
- Emission port optics for black body measurement, external light characterization etc.

- A full range of sampling accessories with IQX accessory recognition
- Vibration-proof optical bench
- Large sample compartment
- Retro-reflector (corner-cube) mirrors with auto-alignment to optimize energy throughput
- Purgeable and vacuum sample compartment and optical bench
- Detectors from photo diodes, DLaTGS, InGaAs, InSb, MCT and He-cooled Bolometers
- Range of beam splitter materials with either manual or automatic exchange
- Optional FTIR microscopy and IR Imaging for both micro and macro measurement
- Rapid scan and step-scan (microsecond or nanosecond)
- Wavenumber expansion options (25,000 to 10 cm<sup>-1</sup>)
- Vibrational Circular Dichroism(VCD) option
- FT-Raman option

## Powerful Data Analysis with Spectra Manager Suite 2.5

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Advanced Measurement Screen of Spectra Manager™

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### Real-Time Monitoring

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Target peak and functional group information can be easily checked using the zoom function.

### Thumbnail

The measured spectra can be stored as thumbnails within the thumbnail window. The thumbnails can be individually selected and viewed in Spectra view.

### Real-Time Data Processing

Before start of a sample measurement, the data processing procedures can be verified by checking the results of real-time data processing in a preview window.

# RFT-8X FT-Raman Spectrometer

**FT Raman is used for fast, non-destructive analysis of many sample types. It is used together with the FT/IR-8X FTIR spectrometer.**

## RFT-8X FT-Raman Spectrometer

The FT-Raman add on to the FT/IR-8X spectrometer offers the choice of performing analysis using infrared absorption or Raman spectroscopy in the same instrument. As the Raman measurement is made using an external accessory, switching between measurements is extremely simple. The RFT-8X can be used for both macro- and microscopic sample measurements.



*RFT-8X FT-Raman Spectrometer*

A 1064nm near-infrared excitation laser can be used with higher power without sample photo degradation. Fourier Transform spectroscopy coupled with multiple spectral accumulation compensates for low sensitivity inherent to weak Raman signals. Gold coated optics in the FT/IR-8X further enhances the sensitivity of the RFT-8X.

## System Features

- 1W 1064 DPSS laser (2 and 3W as options)
- Laser safety interlock system
- IR and Raman spectra can be measured using the same hardware
- Easy switching from macro- to micro- mode (optional)
- Optional sample mapping for micro mode
- Horizontal sample stage for simple sampling
- Temperature controlled sample stages (option)
- Different observation modes (option)

## System Overview

1. Excellent wavenumber precision and scan accumulations
2. Measurement of both IR and Raman spectra
3. Vertical sample chamber for easy sample placement
4. Sample chamber adaptable to both micro- and macro- measurement
5. Observation of measurement position using a camera (optional)
6. Spectra Manger Suite Windows software
7. Raman spectral library

# Attenuated Total Reflectance (ATR) Accessories

An ATR accessory is one of the most practical choices for sample measurement. In most cases there is very little requirement for sample preparation. The ATR Pro One and ATR Pro One View are the 'signature' single reflection monolithic diamond models with wide spectral range and high optical throughput. Versatile models include: wide range sample temperature control, polarization and environmental control.

## ATR PRO ONE Single-Reflection A

ATR Prism	Diamond (High-throughput type, Wide-band type) ZnSe, Ge
ATR/Sample Contact Area	2.5 mm diameter (ZnSe, Ge) 1.8 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (ZnSe, Ge) 700 kg/cm <sup>2</sup> (Diamond)

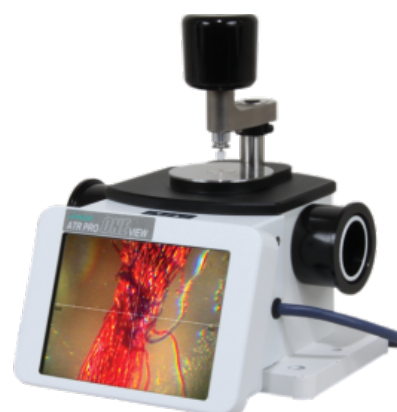
[Learn More Here](#)



## ATR PRO ONE VIEW Single-Reflection ATR with Camera Download Catalog

ATR Prism	Diamond (High-throughput type and Wide-band type). ZnSe, Ge (without image)
ATR/Sample Contact Area	2.5 mm diameter (ZnSe, Ge) 1.8 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (ZnSe, Ge) 700 kg/cm <sup>2</sup> (Diamond)
Software	Real-time image and recording in data file with Spectra Manager™

[Learn More Here](#)



**ATR PRO470-H**  
**High-Pressure Single-Reflection ATR**

ATR Prism	Diamond
ATR/Sample Contact Area	2.0 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	1,700 kg/cm <sup>2</sup> (Diamond)



**ATR PRO410-M**  
**Multi-Reflection ATR**

ATR Prism	ZnSe, Ge
ATR/Sample Contact Area	5 x 20 mm
No. of Reflections	5
Angle of incidence	45°



**ECC-450+ATR PRO450**  
**Electrochemical ATR**

ATR Prism	Diamond, ZnSe, Ge
ATR/Sample Contact Area	1.5 mm diameter
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup>



**[Learn More Here](#)**

**ATR PRO550S-S, ATR PRO570S-H**  
**Sample-Shielding Single-Reflection ATR**

ATR Prism	ZnSe, Ge, Diamond (550S-S) Diamond (570S-H)
ATR/Sample Contact Area	1.5 mm diameter (ZnSe, Ge) 2.0 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (550S-S) 1,700 kg/cm <sup>2</sup> (570S-H)

[Learn More Here](#)



**ATR PRO610P-S, ATR PRO630P-H**  
**Polarizer Single-Reflection ATR**

ATR Prism	ZnSe, Ge, Diamond (610P-S) Diamond (630P-H)
ATR/Sample Contact Area	1.5 mm diameter (ZnSe, Ge) 2.0 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (610P-S) 1,700 kg/cm <sup>2</sup> (630P-H)
Polarizer/Analyzer	Wire-grid polarizer (KRS-5)
Polarizer Rotation Angle	0 - 360°

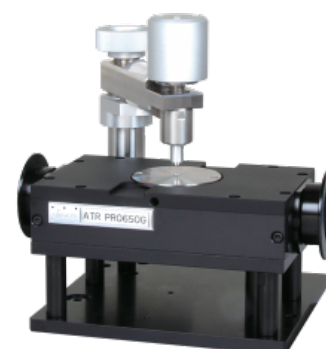
[Learn More Here](#)



**ATR PRO650G**  
**65° Incident-Type Single-Reflection ATR**

ATR Prism	Ge
ATR/Sample Contact Area	3.0 mm diameter
No. of Reflections	1
Angle of Incidence	65°
Maximum Sample Size	6 inches
* A polarizer and attenuator mesh are optional	

[Learn More Here](#)



**ATR PRO670H-S, ATR PRO690H-H**  
**Temperature Controlled Single-Reflection ATR**

ATR Prism	ZnSe, Ge, Diamond (670H-S) Diamond (690H-H)
ATR/Sample Contact Area	1.5 mm diameter (ZnSe, Ge) 2.0 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (670H-S) 1,700 kg/cm <sup>2</sup> (690H-H)
Operating Temperature	180°C (Diamond) 150°C (Ge) 120°C (ZnSe)

\* A connector panel is required when this accessory is fitted to the FT/IR-6000FV.

**[Learn More Here](#)**



**ATR PRO ONE T**  
**Large Sample Single-Reflection ATR**

ATR Prism	ZnSe, Ge, diamond (High-throughput type, Wide-band type)
ATR/Sample Contact Area	2.5 mm diameter (ZnSe, Ge) 1.8 mm diameter (Diamond)
No. of Reflections	1
Angle of Incidence	45°
Pressure	400 kg/cm <sup>2</sup> (ZnSe, Ge) 700 kg/cm <sup>2</sup> (Diamond)

**[Learn More Here](#)**



**ATR PRO PENTA**  
**Multi-Bounce ATR**

ATR Prism	Ge
No. of Reflections	14
Angle of incidence	45

**[Learn More Here](#)**



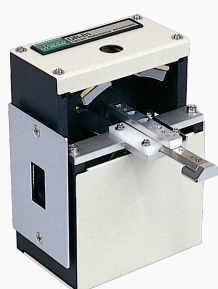
# Diffuse Reflectance

Diffuse reflectance is a useful technique for samples with a roughened surface which are not amenable to transmission or ATR measurement, such as some powders, pharmaceuticals, plastics and food products etc. The diverse range of diffuse reflectance products includes heated, vacuum and automatic sampling accessories.

## DR-81

### 5 Position Diffuse Reflectance

Sampling      5-position sample holder



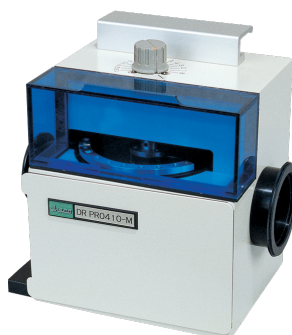
## DR PRO410-M

### 14 Position Multi-Sample Diffuse Reflectance

Sampling      7-position sample holder x 2

IQ Accessory      Available

Smart Purge      Available



\* Automatic sample switching is optional

## SMART-400i

### Smart Tech Multi-Sample Diffuse Reflectance

Sampling      7-position sample holder x 2

IQ Accessory      Available

Smart Purge      Available



\*Automatic sample switching is optional

**DR-650Ai Bi, Ci**  
**Vacuum/Heated Diffuse Reflectance**

Cell Temperature	1000°C (Ai), 800°C (Bi), 600°C (Ci)
Vacuum Level	0.13 Pa
Sample Size	6 mm in diameter
Window Material	KBr
Gas Flow	Available
Heater	Kanthal heater
Cell Cooling Method	Water-cooled
IQ Accessory	Available
* Temperature controller and related software are optional	



**NRF PRO410-N**  
**Near IR Diffuse Reflectance**


Wavelength Range	15,000 - 4,000 cm <sup>-1</sup>
Angle of Incidence	11.2°
Spot Size	10 mm in diameter
Reference Material	Diffusion plate for reference
IQ Accessory	Available
Option	Test tube holder Pellet holder Powder sample holder




# Gas Cells

## Gas Analysis


### Demountable/Small-Capacity Gas Cell

Path Length	10 cm	
Volume	About 70 mL	
Determination Limit/1 min.	Several ppm	

### Sealed Gas Cell

Path Length	8 m	
Volume	1.0 L	
Determination Limit/1 min.	Approx. 10 ppm	

### LPC-12M-G / LPC-12M-S / LPC-12M-FV Long Path Gas Cells

Path Length	12 m			
Volume	2.3 L			
Determination Limit/1 min.	Approx. 1 ppm			
		LPC-12M-G	LPC-12M-S	LPC-12M-FV

*Path length of the 8 m and 12 m gas cells may be modified.  
8 m gas cells can be installed on the FTIR-6000.*

# Grazing Angle Reflectance

Reflection Absorption Spectroscopy has the benefit of greater sensitivity – up to 1 or 2 orders of magnitude compared with transmission. When parallel polarized light is incident to a metal surface, the electric vectors in the incident and reflected light interfere to mutually strengthen and form a vertical standing wave. The interaction of this stationary wave with a thin film on the metal surface, causes an absorption that is stronger than simple transmission measurement.

## RAS PRO410-H

### 85° Incident Angle without Mirror

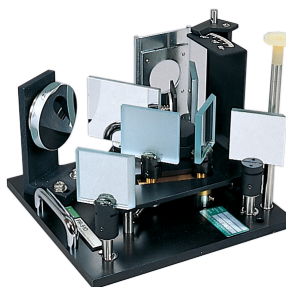
Optical System	Refractive optics
Angle of Incidence	85°
Polarizer/Analyzer	Wire-grid polarizer (KRS-5)
Polarizing Direction	Fixed at 0° to the plane of incidence
Sample Placement	Horizontal
Sample Mask	20 x 10 mm, 10 x 10 mm (Option: 10 x 5 mm)
IQ Accessory	Available
Smart Purge	Available



## PR-510i

### Variable Incident Angle

Angle of Incidence	55 - 85°
Polarizer/Analyzer	Wire-grid polarizer (KRS-5)
Sample Placement	Vertical
Sample Mask	30 x 40 mm
IQ Accessory	Available



## RAS PRO410-B

### 80° Incident Angle

Angle of Incidence	80°
Polarizer	PL-82 is required
Sample Placement	Horizontal
Sample Mask	20 x 10 mm, 10 x 10 mm
IQ Accessory	Available
Smart Purge	Available




**RAS-300/Hi**  
**75° Incident Angle**

Angle of Incidence	75°
Polarizer	Polarizing mirror (parallel polarization only)
Sample Placement	Horizontal
Sample Mask	20 x 10 mm, 10 x 10 mm
IQ Accessory	Available



# Specular Reflectance

RF-81S  
Specular Reflectance

Angle of Incidence	10°	
No. of Reflections	1	
Sample Mask	1, 3 and 5 mm in diameter	

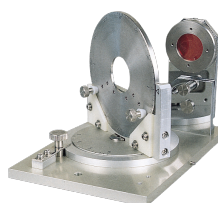
# Transmission

Transmission remains one of the most sensitive methods used in mid-IR spectroscopy. However, correct sample thickness is essential for obtaining good spectra. The wide range of sampling accessories has been designed for the comprehensive analysis of gases, liquids and solid samples. For gas analysis, pathlengths range from 5 cm up to 20 m for ppm sensitivity. Various cell and window designs are available for the measurement of aqueous and non-aqueous liquids. Films and other solids are measured using film holders, KBr pellet presses and other accessories designed for the transmission of light through a prepared sample.

## VAT-500i

### Variable-Angle Transmission Accessory

Measurement Mode	Transmittance
Sample Size	4-inch diameter, 1-mm thickness
Angle of Sample	0 - 90°
Polarizer	Wire-grid polarizer (KRS-5)
IQ Accessory	Available

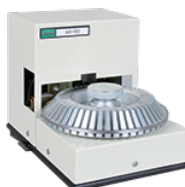


## AS-50

### Transmittance Measurement Autosampler

The AS-50 enables to perform the transmittance measurement of maximum 49 samples automatically.

Sampling	3 mm diameter pellet Film holder
No. of Samples	49




## Demountable Cell

Window	NaCl, KCl, KBr, KRS-5 CsI, CaF <sub>2</sub> , Quartz, Polyethylene
Pathlength	0.025 - 100 mm


\* Polyethylene window is used for Far-IR



### Demountable Liquid Cell


Window	NaCl, KCl, KBr, KRS-5 CsI, CaF <sub>2</sub> , Quartz	
Pathlength	0.025 - 100 mm	

### Sealed Liquid Cell

Window	NaCl, KCl, KBr, KRS-5 CsI, CaF <sub>2</sub> , Quartz, ZnSe	
Pathlength	0.025 - 100 mm	


\* Please contact us if the cell is required for an FTIR vacuum system

### Micro Sealed Liquid Cell

Window	NaCl, KCl, KBr, KRS-5	
Optical Pathlength	0.025 - 0.5 mm	
Cell Capacity	Approx. 2 µL (when using 0.025 mm)	


### Micro KBr Pellet Die

Three types of die kits are available to form micro pellets of 2, 3 and 5 mm diameter. The average quantity of sample required is 50 µg for the 3 mm pellets die. A mini press or hydraulic press is required when forming pellets. In order to avoid to rust, coated pellet die kits of 5 and 3 mm pellet die are available.

Pellet Size	5, 3 and 2 mm in diameter	
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### KBr Pellet Die with Pellet Holder

Three types of die kits are available to form pellets of 7, 10 and 20 mm diameter. The hydraulic oil press is required when forming pellets.

Pellet Size	7, 10 and 20 mm in diameter	
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### Pellet Holder

The pellet holders are used for mounting a formed pellet in the sample compartment.

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Sampling Size	Micro KBr pellet, 10 mm diameter pellet (III type) 13, 20 mm diameter pellet (IV type)
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### Agate Mortar and Pestle

An agate mortar and pestle is used to grind samples and reduce particle size when making KBr pellets. Sizes of 60, 70 and 80 mm in external diameter are available.

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Size	60, 70 and 80 mm in diameter
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### Mini-Press

The mini-press is used when forming micro pellets of 2 and 3 mm in diameter. The micro pellets can be easily made by applying hand pressure.

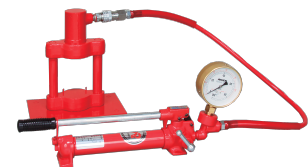


### Hydraulic Press

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The hydraulic press is used when forming pellets of samples with 5, 7, 10 and 20 mm in diameter. 100 kN and 200 kN types of presses are available.

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**PL-82**

**Polarizer**

The PL-82 linearly polarizes light in the IR region for measurements of polymer films, coatings and oriented film samples.

Polarizer	Wire grid polarizer (KRS-5)
Angle Setting Display	0 - 180°



**AVC-6000**

**Control Panel for Full Vacuum System**

The AVC-6000 is used to automatically control the vacuum and purge for the FT/IR-6000 vacuum type spectrometers.

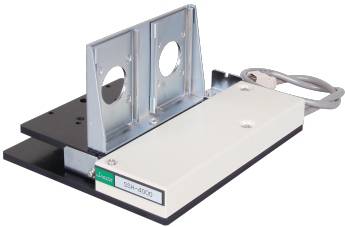


**SSH-4000**

**Sample Shuttle**

Two position software controlled sample shutter.

Number of Positions	Two
Sample Mounting	Standard film or pellet mount
Control	Spectra Manager™



# Automated pMAIRS Measurement Unit

## AM-4000

### Automated MAIRS Measurement Unit

Sample Holder	2 positions
Rotation Angle of Sample	0 - 45°
Polarizer	Wire-grid polarizer (KRS-5)
Solid-Angle Mask	Available (1 mm dia. manual adjust)
Attenuator Transmittance	4, 10 and 25%
IQ Accessory	Available

\* An MCT detector is required (order separately)



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