Excellent Sensitivity, Speed and Resolution

► Quickly and easily obtain high-quality data for any kind of sample.
► Quickly analyze data with user-friendly LabSolutions IR software.
► High-speed generation of analysis reports.

Shimadzu's technologies provide the high performance needed for your IR Analysis.

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IRTracer-100
Fourier Transform Infrared Spectrophotometer

- **Excellent Sensitivity and Reliability**
  High Sensitivity, Resolution, and Speed: Techniques to stabilize and optimize the interferometer provide high sensitivity.

- **New Generation of Workstation**
  LabSolutions IR software has been optimized for network applications, includes an extensive library of spectra, and features a high-performance search function. In addition, Macro functions provide automation and labor savings.

- **Meeting the Needs of a Wide Range of Analyses**
  Two main application programs support all analyses. A wide variety of options to meet every application is available.

This product conforms to Shimadzu’s Eco-labeled designation. *Energy savings: 34% reduction as compared to the previous model.*
Quickly and easily obtain high-quality data for any kind of sample.

New Levels of Performance and Quality Created by Excellent Sensitivity, Speed and Resolution

Remarks:
• Differential spectrum with the spectrum of the paraffin oil subtracted
• Measured with a DLATGS detector, at a resolution of 4 cm$^{-1}$, peak-to-peak, 4 cm$^{-1}$ resolution, in a neighborhood of 2,200 cm$^{-1}$, 1-minute accumulation
*1  16 cm$^{-1}$ resolution. Rapid scan program is optional.

High Sensitivity, High Resolution and High Speed

The IRTracer-100 features the highest SN ratio in its class at 60,000:1, 0.25 cm$^{-1}$ resolution, and high-speed scanning capable of 20 spectra/second.

Achieve High-Speed Analysis with a 20 Hz Rapid Scan Feature

The rapid scan function allows a maximum of 20 spectra per second to be obtained. This makes the IRTracer-100 suitable for fast reactions that occur within a few seconds and for kinetic studies occurring in less than one second. Rapid, high-sensitivity analysis with a 2,000:1 SN is available.

High-Sensitivity Measurements, with an SN Ratio of 60,000:1*1

A trace amount of silicone oil in paraffin oil were measured using the IRTracer-100 with a single reflection ATR attachment. The peak from the silicone was extremely weak (1,260 cm$^{-1}$), a mere 0.00015 absorbance, but it was measured with a high S/N ratio.

Remarks:
• Differential spectrum with the spectrum of the paraffin oil subtracted
• Measured with a DLATGS detector, at a resolution of 4 cm$^{-1}$
High Sensitivity, High Resolution and High Speed

The IRTracer-100 features the highest SN ratio in its class at 60,000:1, 0.25 cm⁻¹ resolution, and high-speed scanning capable of 20 spectra/second.

Acquire High-Resolution Spectra with a 0.25cm⁻¹ Resolution Setting

Highly accurate quantitation and identification can be achieved with 0.25cm⁻¹ resolution. For example, this resolution is suitable for the detailed analysis of each peak in a gas sample. When ammonia gas was run at 0.25cm⁻¹ resolution, peaks in the 785 – 790cm⁻¹ ranges were clearly resolved.

Achieve High-Speed Analysis with a 20 Hz Rapid Scan Feature*²

The rapid scan function allows a maximum of 20 spectra per second to be obtained. This makes the IRTracer-100 suitable for fast reactions that occur within a few seconds and for kinetic studies occurring in less than one second. Rapid, high-sensitivity analysis with a 2,000:1 SN is available.

Sample: UV light curing adhesive
Resolution: 16 cm⁻¹
Scan accumulation: 1 scan
Interval: 50 msec
Monitor: Peak at around 1,400cm⁻¹
Detector: MCT

*¹ peak-to-peak, 4 cm⁻¹ resolution, in a neighborhood of 2,200 cm⁻¹, 1-minute accumulation
*² 16 cm⁻¹ resolution. Rapid scan program is optional.
Reliable High Performance

An automatic dehumidifier and advanced dynamic alignment enable easy maintenance of the interferometer.

Built-in Automatic Dehumidifier Allows for Easy Maintenance

Beam splitters used in FTIR interferometers are susceptible to humidity. In order to maintain the long-term stability of the interferometer, the beam splitter must be protected from moisture. To address this issue, the IRTracer-100 has been engineered with an airtight interferometer that incorporates a unique internal Automatic Dehumidifier.

Three Measures Taken to Protect the Optical Element in the Interferometer

- The interferometer is sealed in an airtight housing.
- An electronic Automatic Dehumidifier continuously removes any moisture, ensuring a dry interferometer chamber.
- The beam splitter is covered with a moisture-resistant protective coat.

Principle of the Automatic Dehumidifier

The IRTracer-100 incorporates an Automatic Dehumidifier that electrolytically removes the moisture inside the interferometer using a solid polymer electrolytic membrane. Because the electric power required to operate the Automatic Dehumidifier is less than the continuous operation of the FTIR, it can reduce CO₂ emissions by approximately 400 kg/year.*

1. When porous electrodes are attached to a solid polymer electrolytic membrane and direct current is applied, moisture on the anode side (i.e., the desiccation side) dissociates into hydrogen ions and oxygen.
2. The hydrogen ions travel through the solid polymer electrolytic membrane and reach the cathode side (i.e., the moisture discharge side).
3. At the cathode, the hydrogen ions react with oxygen in the air to form (gaseous) water vapor, which is released outside the interferometer.

Anode (desiccation side) \[
H_2O \rightarrow 2H^+ + \frac{1}{2}O_2 + 2e^- \]

Cathode (moisture discharge side) \[
2H^+ + \frac{1}{2}O_2 + 2e^- \rightarrow H_2O \]

Replacing the window (KBr) at the sample compartment with an optional KRS-5 window (P/N 206-74211-46) ensures safe operation with no concern for the window plate becoming cloudy under a high humidity environment.

* Model case by SHIMADZU
Incorporation with Advanced Dynamic Alignment

Achieving reproducible optical interference in a spectrophotometer requires a robust interferometer design. The interferometer in the IRTracer-100 easily meets this requirement. The smooth moving mirror system monitored by the Advanced Dynamic Alignment (Japanese Patent No. 3613171) system allows the IRTracer-100 to provide optimum and stable quality spectra after only a short warm-up time. Sampling at over 5000 times/second the Advanced Dynamic Alignment keeps the IRTracer-100 in optimum operating condition. In addition, the Advanced Dynamic Alignment system automatically aligns the interferometer when the beam splitter is changed for NIR or FIR analysis.

Four Benefits of Advanced Dynamic Alignment

<table>
<thead>
<tr>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removes the influence of environmental variations</td>
</tr>
<tr>
<td>Allows the FTIR to be powered off when not in use* (saving electricity and reducing the environmental impact)</td>
</tr>
<tr>
<td>Shorter warm-up times and enhanced stability</td>
</tr>
<tr>
<td>Provides for a maintenance-free system</td>
</tr>
</tbody>
</table>

Scheme of Advanced Dynamic Alignment

1. The interference pattern of the He–Ne laser light is detected by the Laser Detector.
2. The quality of the produced interference is calculated.
3. The calculated interference is compared with stored patterns obtained under optimum operating conditions.
4. The difference between these interference patterns is calculated by an advanced digital signal processor.
5. The inclination of the fixed mirror is continuously adjusted to eliminate any difference and maintain optimum operating sampling conditions.

* Automatic Dehumidifier is working.
Reliable High Performance

Self-diagnostics and monitoring technology allow for quick, easy instrument management.

Five Self-Diagnostic Functions

- The IRTracer-100 executes a self-diagnosis at instrument initialization, checking the electrical, signaling, and optical systems. If the interference conditions are not optimum, they are adjusted and optimized using the Advanced Dynamic Alignment mechanism.

- The internal status monitor function offers continuous monitoring of the beam splitter type, the light source, the He–Ne laser, humidity condition, and information related to auto-start accessories.

- The hours*1 used on the ceramic source and He–Ne laser as well as the time remaining before the next periodic inspection are monitored.

- When the beam splitter is exchanged for Near IR and Far IR analysis, the IRTracer-100 automatically detects the new beam splitter. In addition, when an accessory is installed, the accessory is automatically identified and optimum measuring conditions are automatically set*2.

- Diagnostic and monitoring results are recorded in logs for reference.

*1 3-year warranty for light source and 30-month warranty for He–Ne laser  *2 Only when QuickStart accessories are installed.
Validation Program Verifies FTIR Performance

The IRTracer-100 is equipped with a validation program that complies with the European*) Japanese, Chinese, and U.S.**) Pharmacopoeias and with ASTM (American Society for Testing and Materials) specifications. The validation program checks the basic performance of the instrument using a polystyrene film, and creates reports of the results. If any failure is detected, simply use the Advanced Dynamic Alignment mechanism to adjust and optimize the IRTracer-100.

Test Specifications Complying with the European, Japanese, Chinese, and U.S. Pharmacopoeias

- Shape and intensity of a power spectrum
- The following specifications for a polystyrene spectrum are verified:
  - Resolution
  - Wavenumber accuracy
  - Wavenumber reproducibility
  - Transmittance (absorbance) reproducibility

Test Specifications for ASTM (ASTM E1421 Level Zero)

- Energy intensity test based on the power spectrum
- Noise test based on a 100% transmittance spectrum
- Reproducibility test based on a polystyrene spectrum

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*) The Indian Pharmacopoeia has been unified with the European Pharmacopoeia.

**) The United States Pharmacopoeia states that validation should be performed according to the method specified by the equipment manufacturer.
New Generation of Workstation

LabSolutions IR, a member of the LabSolutions family, has been optimized for network applications, includes an extensive library of spectra, and features a high-performance search function. In addition, Macro functions provide automation and labor savings.
LabSolutions IR easily executes FTIR operations such as scanning, data manipulation, quantitation, reporting, saving, user administration, and more. High-level administrative functions and a variety of data manipulation functions provide for an easier, more user-friendly analysis environment. In addition, numerous optional programs are available to address all modern laboratory needs.

Run Dedicated LabSolutions IR Programs or Windows Applications Easily with the Dedicated LabSolutions IR Launcher.

LabSolutions IR includes a number of dedicated programs, including Postrun, Spectrum, and Quantitation, which are easily launched using the LabSolutions IR Launcher. In addition, macro programs and Windows applications can be registered with the LabSolutions IR Launcher for quick and easy start-up.

Excellent Features of LabSolutions IR Series

**Network Features**
- High-level security and user administration functions.
- Suitable for ER/ES regulations such as FDA 21 CFR Part 11, PIC/S, and more.
- Management of FTIR as well as LC and GC data by the server on a network.

**Extensive Spectra Library and High-Performance Search Function**
- Features a library containing approximately 12,000 spectra.
- Enables high-quality searching with standard libraries.
- High-performance search methods, including Spectral, Text, Combination, and Peak searches.
- Shimadzu’s unique search algorithm provides precise search results.

**Macro Program Functions Provide Automation and Labor-Savings**
- Simply align steps to create a Macro program.
- Automated identification tests and contaminants analysis.

**Programs**
- Postrun, Spectrum, Quantitation, Photometric, Time course (option), Mapping (option)
- All of the Postrun and measurement programs have a common Main toolbar, Menu, Measurement toolbar, Tree view, and Log window. The operation of each program is also similar, providing a familiar feel no matter what task you are working.

**Reporting**
- Easy printing using the ViewPrint function and Free-layout reports.

**Data Manipulation**
- A wide variety of data manipulation functions, including Advanced ATR correction and Kubelka–Munk conversion, and quantitation functions, such as the multi-point calibration curve method and CLS method, are standard.
Reliable LabSolutions Software

In addition to LabSolutions IR, which provides basic functionality, Shimadzu also offers LabSolutions DB IR and LabSolutions CS IR to meet the requirements of ER/ES regulations.

LabSolutions DB IR
LabSolutions DB IR allows for secure data management by integrating a data management function with LabSolutions IR. Compliant with ER/ES regulations, the software is optimally configured for customers using a PC. It is recommended for facilities that do not require network connections and want to be ER/ES compliant.

LabSolutions CS IR
LabSolutions CS, which is freely accessible to the analysis network, can be connected to IR, eliminating the need for connecting a PC to the instrument. Since all the data are managed on a server, LabSolutions CS IR can be read from any personal computer on a network. With terminal service, LabSolutions IR can be controlled from a client PC without installing LabSolutions IR on it. It is recommended for facilities that have a large number of users, manage data in a database, and want to be ER/ES compliant.

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<table>
<thead>
<tr>
<th>Name</th>
<th>LabSolutions IR</th>
<th>LabSolutions DB IR</th>
<th>LabSolutions CS IR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data management method</td>
<td>Measured data files are saved and managed in folders on the PC.</td>
<td>Measured data files are saved and managed in the LabSolutions database.</td>
<td></td>
</tr>
<tr>
<td>Data references</td>
<td>The software references files on drives or in folders on the PC.</td>
<td>The software references files in the database.</td>
<td></td>
</tr>
<tr>
<td>LabSolutions database</td>
<td>Unavailable</td>
<td>Available (The database resides on a local PC)</td>
<td>Available (The database resides on a server)</td>
</tr>
<tr>
<td>User administration</td>
<td>Unavailable</td>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>Rights group administration</td>
<td>Available</td>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>Project administration</td>
<td>Unavailable</td>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>Standalone/network</td>
<td>Either can be used.</td>
<td>Only the standalone configuration can be used.</td>
<td>Only databases on the network can be used. LabSolutions IR data can be viewed using the database manager on a PC set up for viewing purposes. Note that LabSolutions IR must be installed on the PC used for viewing.</td>
</tr>
<tr>
<td>Data backup</td>
<td>Performed on a file-by-file basis using Windows Explorer.</td>
<td>Performed for each database.</td>
<td></td>
</tr>
</tbody>
</table>
Database Management Prevents Mistakes

With LabSolutions DB IR and CS IR, the analysis data are managed securely by the database. Overwriting, deletion and other mistakes typical of data file management do not occur. In addition, when postrun analysis is performed using the acquired data, postrun analysis data revision numbers are automatically assigned, preventing the accidental overwriting of raw data.

Solid Security

An audit trail to ensure the reliability of data and document e-mail transmission functions when any event occurs in the system can be set up. User accounts are managed using passwords, where password length, complexity and term of validity must satisfy specified requirements. It is also possible to set lockout functions to prevent illegal access, and set a registered user's deletion and change. In addition, a box can be selected to prevent overwriting a data file, and outputting an item to a report can also be performed.

Pertinent Information is Managed for Every Project

LabSolutions DB IR and CS IR provide a project management function enabling management suited to tasks and system operations. This function enables equipment and user management, security policy, and data processing to be set on a project by project basis, thereby improving the efficiency of data searches and management tasks.

Visualization of the Sequence of Analysis Operations

Creating a report set* provides visibility of the individual analytical operations involved in the overall analytical process. When analytical operations are visible, it is easier to check for operating errors, which helps improve the efficiency and reliability of checking processes.

* Report sets include test methods and test results for a series of samples analyzed, and also a corresponding operation log (a record of all operating events from login to logout), which is automatically extracted from the data and summarized in a single report.
Extensive Spectra Library and a High-Performance Search Function

Features a library containing approximately 12,000 spectra. Enables high-quality searching with standard libraries.

Approx. 12,000-spectra library

A wide variety of libraries, including Shimadzu’s unique libraries, reagents, polymers and more, is included standard. Searching with standard libraries provides high-quality search results without purchasing extra libraries.

Contents

- SHIMADZU Food additives library
- SHIMADZU Contaminant library
- Reagents
- Polymers
- Pharmaceutical products, agrichemicals
- Inorganic compounds

Approximately 12,000 spectra included

High-Performance Search Functions

Obtain high-quality search results with four high-performance search methods (spectral search, peak search, text search and combination search) and a library containing 12,000 spectra. Libraries created on IRIsolution and HYPER-IR and commercial libraries such as Sadtler and S.T. Japan can also be used. Simply dragging spectra into a library creates a user library. In addition, editing spectral information or deleting a spectrum is very easy.

Search functions

- Spectral search
  Shimadzu’s unique search algorithm provides accurate results.
- Peak search
  If you only have an old spectrum chart, searching can be performed with peak wavenumbers without a spectrum file.

Other Optional Libraries

- Contaminant Library for LabSolutions IR
  This is Shimadzu’s latest original library. It is an effective tool for analyzing contaminants in tap water and food. In addition to containing information on actually sampled contaminants and information about commercially available water supply maintenance parts, the library also includes X-ray fluorescence profiles (PDF files) and significantly improves the accuracy of contaminant searches. Unlike existing libraries, this contains data on mixed compounds and incorporates all the depth of knowledge and wide experience needed to make qualitative assessments.
- Thermal-Damaged Plastics Library*
  Unlike existing libraries, this library contains data of degraded plastics that have been oxidized by heating. The library demonstrates its effectiveness when the contaminants include degraded substances, as is often the case.

* The library was compiled by Shimadzu Corporation from spectra measured and acquired by the Hamamatsu Technical Support Center, Industrial Research Institute of Shizuoka Prefecture.
Automation and Labor-savings with Macro Program Functions

LabSolutions IR automates routine work, such as scanning, data manipulation, reporting, identification tests, and contaminants analysis.
Launch programs from the Launcher or your PC desktop.

Easy Macro—Just a Single Click Launches Routine Work

The “Easy Macro” function will create macros that are suitable for routine work, particularly when repetitive operations are used. The macro builder allows macros to be constructed by simply selecting and aligning operations from a list. Once constructed, the macros can be registered with the Launcher and Desktop for quick execution.
Operators who are not familiar with FTIR can easily operate the instrument.

Easy Macro Operations

- Initialization of FTIR, configuration of scan parameters, spectrum measurement
- Data manipulations, search, quantitation, printing
- Repeat measurements, displaying messages, alarm sounds, external program execution

Quick Access to Macro Function

Easy Macro—Just a Single Click Launches Routine Work

Operators who are not familiar with FTIR can easily operate the instrument.
Meeting the Needs of a Wide Range of Analyses

A wide variety of programs and accessories is available in order to meet the needs of various customers.

Customize Your Own IRTracer-100 System

You can customize your own IRTracer-100 system with a wide variety of accessories and easy-to-use software options to meet the needs of your specific application.

Meeting the Needs of a Wide Range of Analyses

Pharmaceuticals

- Raw material identification tests
- Identification of functional groups of synthetic products
- Identification of functional groups of natural products
- Analysis of contaminants

Cosmetics

- Material identification tests
- Analysis of contaminants
- Failure analysis

Food Products

- Raw material identification tests
- Packaging material identification tests
- Analysis of contaminants

Environmental

- Water analysis
- Soil analysis
- Exhaust gas analysis
- Measurement of particles in water or air
- Analysis of asbestos
- Oil in water analysis

Chemicals and Polymers

- Raw material identification tests
- Qualitative analysis of plastics and rubber
- Identification of functional groups of synthetic products
- Analysis of surface preparation agents
- Analysis and thickness measurement of thin films
- Analysis of catalysts
- Analysis of paints and coatings
- Analysis of contaminants
- Quantitative analysis
- Recycle

Electrical, Electronics, and Semiconductors

- Thickness measurement of epitaxial films
- Qualitative analysis of interstitial oxygen and substituted carbon
- Quantitative analysis of phosphorus and boron in BPGS
- Quantitative analysis of hydrogen concentration in nitride film
- Quantitative analysis of hydrogen concentration in amorphous silicon
- Detection of brominated flame retardants (RoHS)
- Analysis of thin films
- Analysis of contaminants
- Failure analysis
- Analysis of semiconductor gases

WEEE

- Material identification tests
- Analysis of contaminants
- Failure analysis

Metals

- Qualitative analysis of thin films on metal plates
- Analysis and thickness measurement of thin films
- Analysis of contaminants

Construction

- Material identification tests
- Degradation analysis of coatings

Academia

- Research & Development
  - Educational laboratories

Fourier Transform Infrared Spectrophotometer
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  - Raw material identification tests
  - Identification of functional groups of synthetic products
  - Identification of functional groups of natural products
  - Analysis of contaminants

- **Cosmetics**
  - Material identification tests
  - Analysis of contaminants
  - Failure analysis

- **Food Products**
  - Raw material identification tests
  - Packaging material identification tests
  - Analysis of contaminants

- **Environmental**
  - Water analysis
  - Soil analysis
  - Exhaust gas analysis
  - Measurement of particles in water or air
  - Analysis of asbestos
  - Oil in water analysis

- **Chemicals and Polymers**
  - Raw material identification tests
  - Qualitative analysis of plastics and rubber
  - Identification of functional groups of synthetic products
  - Analysis of surface preparation agents
  - Analysis and thickness measurement of thin films
  - Analysis of catalysts
  - Analysis of paints and coatings
  - Analysis of contaminants
  - Quantitative analysis

- **Recycle**
  - Electrical, Electronics, and Semiconductors
    - Thickness measurement of epitaxial films
    - Quantitative analysis of interstitial oxygen and substituted carbon
    - Quantitative analysis of phosphorus and boron in BPGS
    - Quantitative analysis of hydrogen concentration in nitride film
    - Quantitative analysis of hydrogen concentration in amorphous silicon
    - Detection of brominated flame retardants (RoHS)
    - Analysis of thin films
    - Analysis of contaminants
    - Failure analysis
    - Analysis of semiconductor gases
    - WEEE
  - Automobiles
    - Material identification tests
    - Analysis of contaminants
    - Failure analysis
  - Metals
    - Qualitative analysis of thin films on metal plates
    - Analysis and thickness measurement of thin films
    - Analysis of contaminants
  - Construction
    - Material identification tests
    - Degradation analysis of coatings

- **Academia**
  - Research & Development
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**Electrical, Electronics, and Semiconductors**
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**Metals**
- Qualitative analysis of thin films on metal plates
- Analysis and thickness measurement of thin films
- Analysis of contaminants

**Construction**
- Material identification tests
- Degradation analysis of coatings

**Academia**
- Research & Development
- Educational laboratories
Various Application Programs Support All Analyses

LabSolutions IR includes two main application programs—for contaminant analysis and identification tests. Even operators unfamiliar with FTIR analysis can easily use these programs and create reports in just a few seconds.

Contaminant Analysis Program

Combining Shimadzu’s own algorithms (patent pending) with that of library spectra for common contaminants, this program identifies contaminants with a high degree of accuracy. This easy-to-use program is conducive to all levels of operators. Reports are automatically created after analysis, allowing operators with little knowledge of infrared analysis to easily perform analysis.

Four Features of the Contaminant Analysis Program

- Contains spectra for over 550 inorganic substances, organic substances, and polymers that are often detected as contaminants in Shimadzu’s Analytical Applications Department.
- Incorporates algorithms that focus on spectral characteristics, rather than performing simple spectrum searches.
- Automates the process, including searching, judgment evaluation, and report creation.
- Finds major and minor components and displays their ranks.

Fourier Transform Infrared Spectrophotometer

IRTracer-100 + Miracle10

IRTracer-100 + AIM-9000

Identification Test Program

This program makes pass/fail judgments about samples in accordance with the tests specified in the Pharmacopoeia. In addition to identification tests for pharmaceutical products, this program can be used for incoming and pre-shipment inspections.

Four Features of the Identification Test Program

- Prints out the spectra for standards and samples to facilitate easy comparison.
- Detects and prints just the peaks that are specified for pass/fail judgment.
- Calculation of the differences between the peak wavenumbers for standards and samples, differences in intensity ratios between peaks, pass/fail judgments, and print out of reports.
- Contains spectra of 57 samples of Japanese Standards of Food Additives in LabSolutions IR.
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Four Features of the Contaminant Analysis Program

- Sample: Contaminant caused during manufacturing of an electronic part (approx. 1 mmø)
- Accessory: Single reflectance HATR
- MIRacle10 with ZnSe prism

### Four Features of the Identification Test Program

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prints out the spectra for standards and samples to facilitate easy comparison.</td>
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- Contains spectra of 57 samples of Japanese Standards of Food Additives in LabSolutions IR.
**EDXIR-Analysis Software (Option)**

EDXIR-Analysis software is specially designed to perform qualitative analysis using data acquired by an energy dispersive X-ray (EDX) fluorescence spectrometer and a Fourier transform infrared spectrophotometer (FTIR).

This software is used to perform an integrated analysis of data from FTIR, which is excellent at the identification and qualification of organic compounds, and from EDX, which is excellent at the elementary analysis of metals, inorganic compounds and other content. It then pursues identification results and the degree of matching. It can also be used to perform EDX or FTIR data analysis on its own.

The library used for data analysis (containing 485 data files) is original to Shimadzu, and was created through cooperation with water supply agencies and food manufacturers. Additional data can be registered to the library, as can image files and document files in PDF format. It is also effective for the linked storage of various types of data as electronic files.

### Integrated Analysis of Contaminant Data and Data Comparisons for Confirmation Tests

To perform qualitative analysis automatically, simply click “Analyze Both Data” and select the EDX/FTIR data*. This heightens the efficiency of data analysis and provides strong support for contaminant analysis.

In addition to a list of hits, the integrated data analysis results show EDX profiles and FTIR spectra found as hits from the library. If the user wishes to browse the respective data analysis results, they can be checked by clicking “Single”.

In addition, with the data comparison function, which calculates the degree of matching between the actual measured data and the data registered in the library, the software can be used for countermeasures against “silent change”** and for other confirmation tests.

Clicking the “Print” button prints the results in a fixed format and also saves them in Word format*3.

The examples here show an integrated analysis of black rubber contaminant data and a data comparison for a polyvinyl chloride (PVC) examination object and the standard product. From the integrated data analysis results, it is evident that the black rubber contaminant is acrylonitrile-butadiene rubber (NBR), which contains calcium carbonate and zinc stearate. In addition, from the data comparison, the degree of matching between the PVC examination object and the standard product is 0.8506. Lead (Pb) and acrylic were detected from the EDX and FTIR data, but not detected in the standard product. Accordingly, it is surmised that the examination object contains components different to those in the standard product.

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*1 Using the EDX profile, data are classified as inorganic, organic, and mixture. Integrated data analysis is performed by applying priority levels to each classification. (Patent pending)

*2 A term used in Japan to indicate changes to materials by suppliers without the knowledge of the manufacturers.

*3 Microsoft Word must first be installed.
Data Browsing and the Registration, Editing, Deletion of Data, Images, Document Files

By clicking “Edit” and selecting an existing library, the data, images and documents registered in the selected library can be browsed. Data can be newly registered, edited and deleted. A new library can also be created. In addition, if data for a sample were acquired by instruments other than EDX and FTIR instruments (such as a chromatograph, mass spectrometer, or surface observation system), it can be converted into PDF format and then registered, enabling linked storage to the EDX/FTIR data.

Sample Holder/Stockler for Contaminant Measurement
EDXIR-Holder (Option)

Measure the Samples Kept in the Holder with EDX and FTIR
The Holder Can Be Used as the Sample Stocker after the Measurement

Enables More Efficient Analyses

This foldable holder consists of adhesive layer with samples attached and polypropylene film designed for fluorescence X-ray. When using EDX for measurement, close the holder and place the polypropylene film directly to the irradiation side (downside). When using FTIR for measurement, open the holder and press the samples attached to the adhesive layer against the ATR prism. This enables the replacement of samples, at a minimum, saving on labor and making analysis more efficient.

Prevents Loss of Samples

Close the holder after the measurement and it can be used as a sample stocker. It is not necessary to transfer the samples to other containers, so there is no danger of losing samples.
Hardware Options

Integrated with sample compartments, the series of horizontal ATR accessories offers improved purging performance, and eliminates the concern of dust entering the IRTracer-100’s sample compartment. When an accessory is installed, the software displays its name and serial number and sets the optimum scan parameters.

**MIRacle 10**
(P/N 206-74127-9x)

This is a single-reflection ATR accessory. To measure the spectrum of a liquid, simply place it on the surface of the prism drop-wise. Measure solid samples by simply clamping them onto the surface of the prism using the provided pressure clamp. In addition, the MIRacle-10 enables easy measurement of large samples (with a large surface area) without compromising sample integrity. The incidence angle is 45°. Select from three prism options: ZnSe, Ge, and diamond/ZnSe, and whether the prism is equipped with a pressure sensor. The Ge prism is ideal for samples with a high refractive index.

**GladiATR 10**
(P/N 206-74128-9x)

This is a single-reflection ATR accessory. Because the prism is made solely of diamond, it is capable of measuring spectra down to 400 cm⁻¹. To measure the spectrum of a liquid, simply place it on the prism drop-wise. To measure the spectrum of the surface of other samples, clamp them firmly on the surface of the prism. The incidence angle is 45° and you can select whether the prism is equipped with a pressure sensor.

**HATR 10**
(P/N 206-74126-91)

This is a horizontal ATR accessory. There are flat prisms for solids and troughs for liquids. To measure the spectrum of a liquid sample, simply place it on the prism drop-wise. To measure the spectrum of the surface of film and rubber samples, clamp them firmly on the surface of the prism. The incidence angle is 45°, and the number of reflections is ten. It includes a ZnSe prism as standard; use an optional Ge prism for samples with a high refractive index.

---

ATR spectra similar to transmittance spectra are produced by ATR correction.
**DRS-8000A**
*(P/N 206-62301-91)*

Although powder samples are mixed with KBr, as with the KBr pellet method, the DRS-8000A analyzes the samples in their original state; creating pellets is not necessary. For plastic moldings, emery paper attached to the SiC sampler *(P/N 200-66750)* scrapes off part of the surface, forming a powdered sample that can be analyzed. Easily obtain diffuse reflectance spectra similar to transmittance spectra using the built-in Kubelka–Munk conversion in the LabSolutions IR software.

**SRM-8000A**
*(P/N 206-62304-91)*

Use this specular reflectance accessory, featuring a 10° incidence angle, for the analysis of thin films on a metal plate with a μm order of thickness. For mirror-like plastic samples, it measures the specular light reflected from the sample surface. Kramers–Kronig analysis, available with LabSolutions IR software, produces specular reflectance spectra similar to transmittance spectra.

**RAS-8000A**
*(P/N 206-62302-91)*

Use this high-sensitivity reflection measurement accessory, featuring incidence angles of 70° and 75°, for the analysis of thin films on a metal plate with a nm order of thickness. Using it in combination with the GPR-8000 infrared polarizer *(P/N 206-61550)* enables measurement with an even higher level of sensitivity.

**ATR-8000A**
*(P/N 206-62303-91)*

This accessory obtains spectra for the surfaces of film-like samples that are clamped firmly on the surface of a prism. Incidence angles of 30°, 45°, and 60° can be selected. The KRS-5 prism is standard.

* ATR spectra similar to transmittance spectra are produced by ATR correction.
Infrared Microscope AIM-9000

(P/N 206-32000-58 (Narrow band MCT))

The AIM-9000 incorporates a bright, optimized optical system and a high-sensitivity MCT detector. Not only enabling high-sensitivity measurement of micro samples, but the system has also been automated to ensure all steps involved in micro analysis can be performed quickly and easily.

Features of the AIM-9000

- Incorporates a bright, optimized optical system and a high-sensitivity MCT detector to enable high-sensitivity measurement.
- Enables reflection/ATR measurements on samples up to 40 mm thick.
- Comes with a digital zoom function of up to 330x magnification using the wide-view camera (optional) and the microscope camera. Enables the measurement position to be quickly determined.
- Includes an automatic contaminant recognition system that automatically determines the measurement position as a standard feature.
- Up to 60 measurement position can be recorded.
- Includes a contaminant analysis program to identify the cause of failures as a standard feature.

Note: In order to use this attachment, an external beam extraction kit (P/N 206-32570-42), an AIM connection kit (P/N 206-32607-42), and accessories for the AIM-9000 (P/N 206-32799-41) are required.

ATR Objective

(Ge prism: P/N 206-32600-41)

This objective lens is used when performing ATR measurements with the AIM-9000 infrared microscope. Using a cone-type prism, this single reflection objective features 15x magnification and a 45-degree mean incident angle. The slide-on type prism makes it easy to switch back and forth between visible observation and infrared measurement.

Mapping Program (AIMsolution)

(P/N 206-32936-41)

The mapping program measures the absorption distribution on the surface of a sample and creates imaging data when used with the Shimadzu AIM-9000 infrared microscope. It allows setting of mapping parameters such as the mapping range, the scan intervals, and the background positions, on the composite visible images. Also supports area mapping and random mapping modes. In addition to mapping in the conventional transmittance and reflectance modes, micro-ATR mapping is also available. (An optional ATR objective is required. It also requires a separate pressure sensor.) From the acquired mapping data, it is possible to extract spectra and to perform calculations for specific peaks and functional group mapping by multivariate analysis.

5-cm Gas Cell (P/N 202-32006-xx)
10-cm Gas Cell (P/N 202-32007-xx)
Long-Path Gas Cell

Gas cells are used for analysis of gas samples, and the path length is selected based on the concentration of the samples. Gas cells with short path lengths of 5 or 10 cm and long path lengths of 10 m or more are available. Please contact your Shimadzu representative for details on long-path gas cells.
Fourier Transform Infrared Spectrophotometer

Features of the AIM-9000

Long-Path Gas Cell

10-cm Gas Cell

5-cm Gas Cell

Infrared Microscope

AIM-9000

performed quickly and easily.

measurement of micro samples, but the system has also been automated to ensure all steps involved in micro analysis can be

The AIM-9000 incorporates a bright, optimized optical system and a high-sensitivity MCT detector. Not only enabling high-sensitivity

(P/N 206-32607-42), and accessories for the AIM-9000 (P/N 206-32799-41) are required.

Note: In order to use this attachment, an external beam extraction kit (P/N 206-32570-42), an AIM connection kit

your Shimadzu representative for details on long-path gas cells.

5 or 10 cm and long path lengths of 10 m or more are available. Please contact

based on the concentration of the samples. Gas cells with short path lengths of

Gas cells are used for analysis of gas samples, and the path length is selected

(ge prism: P/N 206-32600-41)

Slide-on type prism makes it easy to switch back and forth

magnification and a 45-degree mean incident angle. The

infrared microscope. Using a cone-type prism, this single reflection objective features 15×

This objective lens is used when performing ATR measurements with the AIM-9000

mapping by multivariate analysis.

From the acquired mapping data, it is possible to extract spectra and to perform calculations for specific peaks and functional group

reflectance modes, micro-ATR mapping is also available. (An optional ATR objective is required. It also requires a separate pressure sensor.)

visible images. It also supports area mapping and random mapping modes. In addition to mapping in the conventional transmittance and

Shimadzu AIM-9000 infrared microscope.

The mapping program measures the absorption distribution on the surface of a sample and creates imaging data when used with the

LabSolutions IR. In addition, the software has a built-in liquid nitrogen monitor to terminate current flow when the detector element is not being cooled, thus protecting the MCT detector. The liquid nitrogen dewar is made of glass and does not require periodic evacuation or yearly maintenance.

Note: This kit cannot be mounted at the same time as the Near IR Kit (P/N 206-74253-91). Liquid nitrogen is required when using the MCT detector.

Far IR Kit

(P/N 206-30616-41)

Bands related to inorganic compounds and organometallic complexes are typically observed in the far infrared region to 240 cm⁻¹. The Far Infrared Kit contains a CsI beam splitter that can be mounted on the IRTracer-100 for measuring spectra in this region.

Since absorption due to water is greater in the 400 cm⁻¹ to 240 cm⁻¹, the instrument should be purged with desiccated air before performing measurements. The CsI beam splitter should also be stored in a desiccator when not in use since it is highly sensitive to moisture.

Note: The IntegratIR installation kit (P/N 206-72715-93) must be purchased separately.

Near IR Kit

(P/N 206-74253-91)

Attached to the IRTracer-100, this kit enables near-infrared measurement. LabSolutions IR switches between the mid-infrared and the near-infrared.

Note: This kit cannot be mounted at the same time as the MCT Kit (P/N 206-74254-91).

NIR Integrating Sphere IntegratIR A

(P/N 208-97272-92)

Powders, tablets, liquids, fibers, plastic pellets and molded samples can be placed on the sample stage for measurement (reflectance measurement).

Pre-treatment such as KBr dilution is not required.

Samples stored in a plastic bag or glass bottle can be measured.

Applications include qualitative or identification tests in acceptance inspections and quantitative analysis of components in measured samples.

Features a built-in highly sensitive InGaAs detector.

Note: The IntegratIR installation kit (P/N 206-72715-93) must be purchased separately.

For Other Accessories

Please contact your Shimadzu representative about accessories that do not appear in this brochure.

Also note that it may not be possible to use FTIR-8000 Series accessories. Please consult your Shimadzu representative for assistance with using FTIR-8000 Series accessories.
Software Options

Fast, easy-to-use LabSolutions IR can be equipped with a variety of optional software programs and applications. LabSolutions IR incorporates data processing functions such as advanced ATR correction, degree of coincidence, differential spectra, and Kubelka–Munk conversion, quantitation functions such as the multi-point calibration curve method and the multi-regression method, as well as the spectral searching function as standard features. However, adding the following optional software products makes it possible to further increase the application range.

Rapid Scan
(P/N 206-30200-91)

The Rapid Scan option provides the capability of collecting and recording a maximum of 20 spectra/second. This is especially suitable for fast reactions kinetics, where reactions are completed in a few seconds. Spectra obtained from Rapid Scan measurements can be used to calculate peak heights and areas, which are used to determine kinetic rates.

The Rapid Scan interval is dependent on the resolution, number of scans, and mirror speed. The fastest speed under a 16cm⁻¹ resolution and a mirror speed of 40mm/s is 0.05 seconds for 1 accumulated scan. Maximum measurement time depends on scan parameters.

The 3D Processing Program (P/N 206-74563-91) is required for analysis of Rapid Scan spectra.

LabSolutions IR

Time Course Software
(P/N 206-74558-91)

The time course program is used to collect spectra in regular intervals and creates a time course dataset used to follow reactions as a function of time. Changes in peak height and peak area can be used to calculate values related to reaction kinetics. Time course information is saved and displayed in 3D (bird’s eye view) or in a contour plot. Simply modify parameters to recalculate the information.

The scan interval is dependent on resolution, number of scans, and mirror speed. The fastest speed under a 16cm⁻¹ resolution and a mirror speed of 9mm/s is 7 seconds for 1 accumulated scan. Maximum measurement time depends on scan parameters. The time course software includes a 3D Processing Program.

LabSolutions IR

Mapping Program
(P/N 206-74559-91)

The Mapping software allows mapping of absorption information on a sample surface as a function of position when using the Shimadzu AIM-8800 Infrared Microscope. The program allows setting of mapping parameters, such as the mapping range, the scan intervals, and the background positions, on the composite images. In addition, it supports area mapping, line mapping and random mapping modes.

In addition to mapping in the conventional transmittance and reflectance modes, micro-ATR mapping with an optional ATR objective is also available. From the acquired mapping data, it is possible to extract spectra and to perform calculations for functional-group mappings for specific peaks. The data can be displayed as 3D images or contour plots, or in spectral overlay mode.

This program includes a 3D Processing Program.

LabSolutions IR

Macro Platform
(P/N 206-74562-91)

The Macro Platform is required to run the customized macro programs created by Shimadzu (for a fee). If, for example, you wish to perform more advanced applications in which certain functions are used in a pre-determined order, or you wish to run an automatic measurement system in combination with an auto sample changer, please contact your Shimadzu representative for details.
The time course software includes a 3D Processing Program. The time course dataset used to follow reactions as a function of time. Changes in peak heights and peak areas can be used to calculate values related to reaction kinetics. Time course information is saved and displayed in 3D (bird’s eye view) or in a contour plot. The Rapid Scan option provides the capability of collecting and recording a maximum of 20 spectra/second. This is especially suitable for fast reactions kinetics, where reactions are completed in a few seconds.

The 3D processing program offers the following functionality:

- Changes the method of displaying data
  - Display data in bird’s eye view (3D), as an intensity distribution or using contour lines, as a spectral overlay, or rotated.
- 3D data processing
  - Isolate changes at specific wavenumbers.
  - Functions include data extraction, data points thinning, smoothing, zero-baseline, background correction, normalization, log conversion, first- or second-order derivative, and ATR correction.
- Creation of 3D data from spectra
  - Create 3D data by consecutively arranging spectra measured at fixed intervals, such as by repeated measurements.

Contaminant Library for LabSolutions IR

This unique library was created by Shimadzu especially for analyzing contaminants in tap water and food products. The library includes information about samples actually collected as contaminants and service parts commercially marketed for tap water applications. It also includes a collection of X-ray fluorescence profiles (PDF files). Consequently, it can significantly improve the precision of contaminant searches. Unlike the previous libraries, this is a mixture library that covers the extensive knowledge and experience necessary for qualitative analysis.

Thermal-Damaged Plastics Library*

Unlike the previous libraries, this library includes information about plastics that have degraded due to oxidation associated with heat. It is especially useful for analyzing contaminants, which are commonly degraded.

* Shimadzu created this library from spectra measured and acquired from the Hamamatsu Industrial Technical Assistance Center of the Industrial Research Institute of Shizuoka Prefecture.
Specifications

**Hardware**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interferometer</strong></td>
<td>Michelson interferometer (30° incident angle)</td>
</tr>
<tr>
<td></td>
<td>Equipped with Advanced Dynamic Alignment system</td>
</tr>
<tr>
<td></td>
<td>Sealed interferometer with Automatic Dehumidifier</td>
</tr>
<tr>
<td><strong>Beam splitter</strong></td>
<td>Germanium-coated KBr for Middle IR (Standard)</td>
</tr>
<tr>
<td></td>
<td>Germanium-coated CsI for Middle/Far IR (Optional)</td>
</tr>
<tr>
<td></td>
<td>Silicon-coated CaF₂ for Near IR (Optional)</td>
</tr>
<tr>
<td><strong>Light source</strong></td>
<td>High-energy ceramic for Middle/Far IR (Standard) with 3 years guaranteed</td>
</tr>
<tr>
<td></td>
<td>Tungsten lamp for Near IR (Optional)</td>
</tr>
<tr>
<td><strong>Detector</strong></td>
<td>DLATGS detector with temperature control for Middle/Far IR (Standard)</td>
</tr>
<tr>
<td></td>
<td>MCT (Hg-Cd-Te) with liquid nitrogen cooling for Middle/Near IR (Optional)</td>
</tr>
<tr>
<td></td>
<td>InGaAs for Near IR (Optional)</td>
</tr>
<tr>
<td><strong>Wavenumber range</strong></td>
<td>7,800 to 350cm⁻¹ (Standard)</td>
</tr>
<tr>
<td></td>
<td>12,500 –240cm⁻¹ (Optional, See figure for details)</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>0.25, 0.5, 1, 2, 4, 8, 16cm⁻¹ (Middle/Far IR)</td>
</tr>
<tr>
<td></td>
<td>2, 4, 8, 16cm⁻¹ (Near IR)</td>
</tr>
<tr>
<td><strong>Wavenumber accuracy</strong></td>
<td>0.01cm⁻¹</td>
</tr>
<tr>
<td><strong>Mirror speed</strong></td>
<td>4-step selection of 2.0, 2.8, 5, or 9mm/sec</td>
</tr>
<tr>
<td></td>
<td>10, 20, 30, or 40mm/sec for Rapid Scan (option)</td>
</tr>
<tr>
<td><strong>Data sampling</strong></td>
<td>He–Ne laser with 30 months guaranteed</td>
</tr>
</tbody>
</table>

**Scan range**

<table>
<thead>
<tr>
<th><strong>Light Source</strong></th>
<th><strong>Beam Splitter</strong></th>
<th><strong>Detector</strong></th>
<th><strong>Scan Range (cm⁻¹)</strong></th>
<th><strong>Necessary parts</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten</td>
<td>CaF₂</td>
<td>InGaAs</td>
<td>12,500–3,800</td>
<td>Near IR Kit (P/N 206-74253-91)</td>
</tr>
<tr>
<td>Ceramic</td>
<td>KBr</td>
<td>DLATGS</td>
<td>7,800–350</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MCT</td>
<td>5,000–720</td>
<td>MCT Kit (P/N 206-74254-91)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CsI</td>
<td>5,000–240</td>
<td>Far IR Kit (P/N 206-30069-91)</td>
</tr>
</tbody>
</table>

**Scan wavenumber with options**

The orange bar expresses the wavenumber range that can be measured with the standard configurations.

The red, yellow and brown bars express the wavenumber range that can be measured when utilizing various options.

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**Software (LabSolutions IR)**

<table>
<thead>
<tr>
<th><strong>OS</strong></th>
<th><strong>Interface</strong></th>
<th><strong>Programs</strong></th>
<th><strong>Manipulation functions</strong></th>
<th><strong>Search functions</strong></th>
<th><strong>Quantitative functions</strong></th>
<th><strong>Photometrics</strong></th>
<th><strong>Validation program</strong></th>
<th><strong>File formats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7 Professional 32/64 bit edition</td>
<td>USB 2.0, USB 3.0</td>
<td>Postrun, Spectrum, Quantitation, Photometric, Time course (option), Mapping (option)</td>
<td>Four Arithmetic Operations, Normalize, Zero Baseline Correction, 3 Point Baseline Correction, Multipoint Baseline Correction, Smoothing, Derivative, Cut, Connect, Reduce, Interpolate, Frequency Convert, X Adjust, Time-Temperature Conversion, Peak Pick, Film Thickness, Data Calculation, Purity, Deconvolution, FFT, Kubelka–Munk, ATR Correction, Kramers–Kronig, Atmosphere Correction, 3D Reprocess, 3D Extract</td>
<td>Spectrum search (based on similarity), peak search, text search, combination search, setting of search conditions, search of user library and commercial library, creation of user library</td>
<td>Multi-point calibration curve method, CLS quantitative method, PLS quantitative method (option)</td>
<td>Recalculation function for quantitative and photometric results</td>
<td>Complies with Chinese, European, US, and Japanese Pharmacopoeias and ASTM GLP/GMP support</td>
<td>Files of JCAMP-DX, ASCII, CSV, IRsolution, HYPER-IR can be loaded and saved.</td>
</tr>
</tbody>
</table>

**Computer / Printer**

- **Type** Desktop
- **Specifications** Provide a computer and printer of a type recommended by SHIMADZU. Enquire separately for detailed specifications.

**Other Specifications**

<table>
<thead>
<tr>
<th><strong>Installation site</strong></th>
<th><strong>Power requirements</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature: 15°C to 30°C; humidity regulated by air-conditioning equipment</td>
<td>100 –240 VAC, 50/60 Hz, 150 VA for operation, 8 VA for standby</td>
</tr>
<tr>
<td>Humidity: 70% max.; with no condensation</td>
<td></td>
</tr>
<tr>
<td>Provide local ventilation systems as required by applicable laws and regulations when analyzing or using organic solvents.</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions</strong> (PC and printer dimensions are examples.)</td>
<td><strong>Computer / Printer</strong></td>
</tr>
<tr>
<td>450</td>
<td>900</td>
</tr>
<tr>
<td>600</td>
<td>665</td>
</tr>
<tr>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

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**Fourier Transform Infrared Spectrophotometer**
Software (LabSolutions IR)

| OS                  | Windows 7 Professional 32/64 bit edition  
|                     | Windows 10 Pro 64 bit edition          |
| Interface           | USB 2.0, USB 3.0                        |
| Programs            | Postrun, Spectrum, Quantitation, Photometric, Time course (option), Mapping (option) |
| Manipulation functions | Four Arithmetic Operations, Normalize, Zero Baseline Correction, 3 Point Baseline Correction, Multipoint Baseline Correction, Smoothing, Derivative, Cut, Connect, Reduce, Interpolate, Frequency Convert, X Adjust, Time-Temperature Conversion, Peak Pick, Film Thickness, Data Calculation, Purity, Deconvolution, FFT, Kubelka–Munk, ATR Correction, Kramers–Kronig, Atmosphere Correction, 3D Reprocess, 3D Extract |
| Search functions    | Spectrum search (based on similarity), peak search, text search, combination search, setting of search conditions, search of user library and commercial library, creation of user library |
|                     | Library of approx. 12,000 spectra of organic compounds, polymers, pharmaceutical products, inorganic compounds, food additives, contaminants, etc. included |
| Quantitative functions | Multi-point calibration curve method  
|                     | CLS quantitative method                |
|                     | PLS quantitative method (option)       |
|                     | Photometrics                           |
|                     | Recalculation function for quantitative and photometric results |
| Printing functions  | Report template creation               |
|                     | Printing using report templates        |
|                     | Easy printing using the ViewPrint function (patent pending) |
| Validation program  | Compiles with Chinese, European, US, and Japanese Pharmacopoeias and ASTM |
| GLP/GMP support     | Tree-structured audit trail function   |
|                     | Recording of operation logs and data logs (history) |
|                     | Saving by overwriting the same filename is prohibited |
| Security functions  | Coordination with LabSolutions security functions |
|                     | User-group based privilege settings    |
| File formats        | Files of JCAMP-DX, ASCII, CSV, IRsolution, HYPER-IR can be loaded and saved. |

Computer / Printer

<table>
<thead>
<tr>
<th>Type</th>
<th>Desktop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications</td>
<td>Provide a computer and printer of a type recommended by SHIMADZU. Enquire separately for detailed specifications.</td>
</tr>
</tbody>
</table>

Other Specifications

| Installation site | Temperature: 15°C to 30°C; humidity regulated by air-conditioning equipment  
|                   | Humidity: 70% max.; with no condensation  
|                   | Provide local ventilation systems as required by applicable laws and regulations when analyzing or using organic solvents. |
| Power requirements* | 100–240 VAC, 50/60 Hz, 150 VA for operation, 8 VA for standby |

Dimensions (PC and printer dimensions are examples.)

* An additional power supply is required for the computer.