SHIMADZU
Excellence in Science

Shimadzu Analytical and Measuring Instruments

Excellence in Science

Providing people with an abundant,

comfortable, and secure lifestyle

Contributing to the happiness of society.

This is our goal and our specialty.

At Shimadzu, we provide a variety of analytical and

measuring technologies and applications

so as to achieve a global environment

where people can live comfortably, well into the future.

Contents

Evaluation Instruments for Pharmaceutical Products

Support instruments for pharmaceutical sciences research and development

Support from Drug Discovery to Quality Control

Shimadzu offers extensive support for proteomics, genomics, metabolomics and other life science research products as well as chromatograph, mass spectrometer, and properties testing instrument.
Shimadzu provides instruments for analysis and services for quality control, including IQ/OQ and supports for regulatory, to meet today's demands for safe pharmaceutical manufacture.

Field			Applications and Objectives	Shimadzu Products
Discovery			Basic drug discovery and research	MALDI-TOFMS, LCMS, GCMS, Imaging mass microscope, MultiNA
Low-Molecular Weight Pharmaceuticals	Drug Discovery and Chemistry (Synthesis and Purification)		Drug discovery and chemical research	Preparative HPLC, Particle size analyzer, Balances
			Synthesis	HPLC, LCMS
			Impurities analysis	Co-Sense, LCMS-IT-TOF, ICP
	CMC (Development, Formulation, Manufacturing QA/QC)		Analytical method development	HPLC, GC, Thermal analyzers, Balances
			Pharmaceutical formulation investigation	Thermal analyzers, Particle size analyzer, Material Testing Machine, X-Ray Inspection System
			Impurities analysis	Co-Sense, LCMS-IT-TOF, Headspace GC (GCMS)
			Elution tests	HPLC, UV
Biopharmaceuticals	Drug Discovery		Structural analysis	MALDI-TOFMS, HPLC, LCMS-IT-TOF
			Culture solution analysis	UF-Amino Station
	CMC (Development, Formulation, Manufacturing QA/QC)		Analytical method development	HPLC, Protein sequencing systems, Aggregation analysis system
Pharmacokinetics, Metabolomics, Safety			PK/TK ADME	HPLC, LCMS, Imaging mass microscope
Manufacturing			Cleaning validation	TOC, UV, HPLC, LCMS

- ■ Discovery
- ■ Pharmaceuticals (Low-molecular, Bio)
- ■ Pharmacokinetics, Metabolomics, Safety
- ■ Manufacturing

Nexera X2 →P.9
Ultra High Performance Liquid Chromatograph

LCMS-8060 →P.24
High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer

Prominence UFPLC →P.12
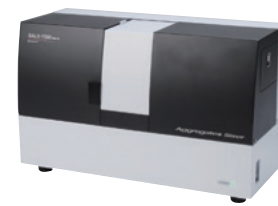Ultra Fast Preparative and Purification Liquid Chromatograph

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Aggregation Analysis System for Biopharmaceuticals

Evaluation Instruments for Foods

Test instruments for food and materials

The Science of Food...

Food products must taste good but they also require unceasing efforts to maintain safety and reliability. Inspection, analysis and evaluation instruments play a major role in this process.
Shimadzu instruments assist in satisfying the sophisticated and strict food safety requirements at all manufacturing and inspection stages.

Field	Application and Evaluation	Shimadzu Products
Food Safety Quality Control (General Foods)	Residual pesticides	HPLC, LCMS, GC, GCMS, Balances
	Veterinary drugs	HPLC, LCMS, Balances
	Mycotoxins	HPLC, LCMS, Balances
	Foreign substances and odor	FTIR, EDX, GC, GCMS, X-Ray Inspection System
	Hazardous metals	AA, EDX, ICP, HPLC, UV
	Additives	HPLC, LCMS, GC, GCMS, UV, FTIR, AA, EDX, ICP, Balances
	Production origin and product variety	MultiNA, ICP, ICP-MS
	Microbial	MultiNA, MALDI-TOFMS
	Total organic carbon	TOC
	Packaging	GC, GCMS, UV, Material Testing Machine, Balances
Food Development (Functional Foods and Supplements)	Food texture, taste	Particle size Analyzer, Thermal analyzers, Moisture analyzers
	Flavor	GC, GCMS
	Functionality	HPLC, LCMS, GC, GCMS
	Therapeutic efficacy	Brain-function imaging systems

- Food Safety and Quality Control (General Foods)
- Food Development (Functional Foods and Supplements)

LCMS-8060 →P.24
High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer

TOC-L →P.52
Total Organic Carbon Analyzer

AP Series →P.69
Analytical Balance

GCMS-TQ8050 →P.32
Gas Chromatograph Triple Quadrupole Mass Spectrometer

LABNIRS →P.46
Functional Near-Infrared Spectroscopy System for Research

EZ-X Series →P.57
Compact Tabletop Tester

Instruments for Life Science Research

Delivering new technology for life science

Toward Discovery of Novel Life Sciences

Shimadzu continually provides leading-edge instrument to support genetic and protein research. For example, Shimadzu mass spectrometers for the identification of proteins boast world-leading analytic capacity and provide a total system to support research from the pretreatment stage. Shimadzu aims to further develop current technologies to contribute to disease diagnosis and other next-generation medical treatments by identifying abnormalities in the marker proteins contained in minute samples of blood.

Field	Applications and Objectives	Shimadzu Products
Genomics	Genotyping	MultiNA, Ampdirect Plus
	Marker discovery	MultiNA, Ampdirect Plus
	Analysis of nucleic acid compounds	MALDI-TOFMS, LCMS, TMSPC, SPM
	Genetic examination of foods	MultiNA, BioSpec-nano, Ampdirect Plus
	Microbial and viral examinations	MultiNA, Ampdirect Plus
Proteomics	Protein expression analysis	MALDI-TOFMS, LCMS-IT-TOF, nano-LC, AccuSpot
	Post-translational modifications analysis	MALDI-TOFMS, LCMS-IT-TOF, Trace-level oligosaccharide rapid analysis system, nano-LC, AccuSpot, Cell-free protein synthesis reagent kit
	Structural analysis	LC-MS/MS
	N-terminal amino acid sequencing analysis	Protein sequencing systems, MALDI-TOFMS
	Marker discovery	MALDI-TOFMS, LC-MS/MS, nano-LC, AccuSpot
Metabolomics	Marker discovery	GCMS, LC-MS/MS, iMScope *TRIO*
	Metabolite analysis	GCMS, HPLC (Nexera), LCMS
Imaging	*In vitro* imaging	MALDI-TOFMS, iMScope *TRIO*, iMLayer, EPMA
	Optical brain-function imaging	LIGHTNIRS, LABNIRS

- Genomics
- Proteomics
- Metabolomics
- Imaging

LCMS-IT-TOF →P.29
High Performance Liquid Chromatograph Ion-trap Time-of-flight Mass Spectrometer

MALDI-8020 →P.36
Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer

PPSQ-51A/53A →P.45
Protein Sequencer

MultiNA →P.45
Microchip Electrophoresis System

BioSpec-nano →P.39
Life Science Spectrophotometer

iMScope *TRIO* →P.37
Imaging Mass Microscope

LIGHTNIRS →P.46
Portable functional Near-Infrared Spectroscopy System for Research

Evaluation Instruments for Renewable Energy Applications

Evaluation instruments for renewable enegy

Renewable Energy for Building a Sustainable Society

Shimadzu offers solutions that contribute to next-generation energy technologies for achieving a sustainable society. These technologies include biorefineries to produce fuel or chemical raw materials from microalgae, artificial photosynthesis to create hydrogen or organic matter from sunlight, water, and carbon dioxide using a photocatalytic reaction based on the photosynthesis system of plants, and zero carbon dioxide emission fuel cells or hydrogen electric generation.

Field	Manufacturing Process and Components	Shimadzu Products
Algal Biomass	Monitoring quantities of algae cells and generated organic matter	TOC, UV, Balances
	Analysis of generated oils/fats and hydrocarbons	GCMS, LCMS, HPLC
	Cell surface hardness and particle size distribution	SPM, SALD
	Qualitative-quantitative analysis of purified substances	GCMS, LCMS, HPLC, Balances
Photocatalysts and Artificial Photosynthesis	Evaluation of heterogeneous photocatalysts	UV, XRD, XPS, FTIR, SPM
	Evaluation of homogeneous photocatalysts	UV, LCMS, FTIR, QYM-01
	Evaluation of reaction products	GC, HPLC
	Isotopic evaluation of reaction mechanisms	GCMS
Energy Carriers (hydrogen energy)	Analysis of impurities in hydrogen	GC, GCMS
	Evaluation of synthetic or reforming catalysts	UV, XRD, XPS, FTIR, SPM
Fuel Cells (Solid PEFC)	Catalyst layers	EDX, FTIR, XPS
	Supported carbons	XRD, Particle size analyzers, Balances
	Membrane electrode assemblies (MEA)	EPMA, X-Ray Inspection System
	Electrolytes	Thermal analyzers, SPM, Micro Vickers Hardness Tester, Tensile Tester, Fatigue Tester
	Electrolyte membrane degradation components in generated water	Ion chromatograph, LCMS

- Algal Biomass
- Photocatalysts and Artificial Photosynthesis
- Fuel Cells
- Energy Carriers

UV-1900 →P.39
UV-VIS Spectrophotometers

XRD-6100 OneSight →P.49
X-Ray Diffractometer with Wide-Range and High-Speed Detector

EDX-7000 →P.47
Energy Dispersive X-ray Fluorescence Spectrometer

SPM-8100FM →P.51
High-Resolution Scanning Probe Microscope

LCMS-8060 →P.24
High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer

GCMS-QP2020 →P.31
Gas Chromatograph Mass Spectrometer

Nexis GC-2030 →P.20
Gas Chromatograph

High-Performance Liquid Chromatograph *New*

i-Series Plus

Computer-Less Laboratory Realized to Free Operators from the Laboratory

In addition to the reliability and stability afforded by the proven core capabilities of the i-Series, its remote monitoring functions which employ smart devices, and its ICM, which allows all necessary operations from setup of the samples to the start of analysis to be performed on the instrument itself, have eliminated the troublesome analysis operations that needed to be made on a computer in the laboratory, achieving a computer-less laboratory.

innovative −Realization of Advanced Laboratory

- ● ICM (Interactive Communication Mode) to free operators from the laboratory
- ● Remote monitoring regardless of operating environment
- ● Maximum reliability and stability
- · Dual temp-control with TC-Optics and flow cells unaffected by room temperature fluctuation
- · Excellent micro injection volume reproducibility of 1 µL or less
- · Ultrafast injection cycle reduces analysis times

Intuitive −Achieving Easier Operation

- ● Equipped with pretreatment functions that automatically produce dilutions, add reagents, etc.
- ● Unified graphical user interface between system and workstation
- ● Create analytical sequences on visualized vial positions: Quick batch function

intelligent −Smart Features Increase Work Efficiency

- ● Automation of a number of routine analysis procedures
- ● Migrate existing methods from either Shimadzu or non-Shimadzu systems

Nexera-i

The Nexera-i is a simple, all-in-one UHPLC system that raises the productivity of the laboratory to the maximum by reducing the time needed to develop analysis methods, and by simplifying the work needed to transfer already proven method files.
Up to 1,536 samples can set up at once, so CMC related analyses that require many samples, or a wide variety of other analyses, such as dissolution tests, pharmacokinetics, and toxicant tests can be speedily accomplished, thus reducing the time needed. Moreover, the automatic shutdown function of the i-Series has resulted in a reduction of more than 95 % (compared with Shimadzu existing systems) in the power consumption of the instrument when in the standby state, contributing to reducing the environmental impact.

Nexera-i MT i-Series Method Transfer System
This system contains two flow lines, matched to the volumes of each of UHPLC and HPLC systems. In addition to simplifying the migration of analytical test methods for customers using HPLC, this enables the smooth transfer of customer's HPLC methods to faster UHPLC methods. It enables analytical test methods established with non-Shimadzu HPLC to be migrated with excellent repeatability, significantly reducing the process of validating analytical methods. The newly developed Condition Transfer and Optimization (ACTO) function incorporated in LabSolutions allows users to transfer injection timings matched to differences in system volumes between instruments, without editing the concentration gradient programs in existing methods. Furthermore, existing HPLC methods can simply be loaded for transfer to faster Nexera-i MT methods.

Prominence-i

The Prominence-i is an all-in-one LC system that can be operated intuitively regardless of the level of the operator's experience. This feature of course builds upon its reliable and stable core features. Information such as the real-time display of the chromatogram for the ongoing analysis or the current status of the instrument can be viewed at a glance. A navigation function allows for monitoring the usage frequency of consumables and assists with replacement procedures. This reduces the time for maintenance needed for the instrument and increases the operation rate. Additionally, due to the optimum system capacity, analysis method files used on existing HPLC systems can be transferred smoothly. It is well suited as a specialized analyzer for routine tasks such as checking synthetic materials or performing quantitative tests in accordance with pharmacopoeia.

Prominence-i LT Detectorless Model
The Prominence-i series LC-2030C LT detectorless model is an integrated LC system without a UV detector or a PDA detector. This model enhances the selectivity of the detector used, while maintaining the advantages of the i-Series, including space-saving feature, operability from a touch panel, and both fast injection & excellent reproducibility at trace injection volumes.
In addition, upgrades to faster analysis are enabled by using an extension kit that provides the same pressure capacity as the Nexera-i.
It can be used as an LC-MS front-end LC for the analysis of sugars and amino acids, which do not absorb UV, for GPC analysis of polymers using a RID detector, and for fluorescence analysis of anionic surfactants in an aqueous environment.

Ultra High Performance Liquid Chromatograph

Nexera X2

Ultra High Performance Liquid Chromatograph

Maximizing the Potential of UHPLC/HPLC Analysis

The Nexera X2 is a completely new UHPLC system that not only offers maximum speed, sensitivity, resolution, stability, and reliable performance, but also features revolutionary *i*-PDeA* separation technology and an *i*-DReC** function that extends the dynamic range, so that both concentrated and trace components can be quantitated simultaneously.

Intelligence

The new SPD-M30A photodiode array detector enables complete separation of even unseparated peaks using the i-PDeA* function. This also enables peak integration that is difficult because of overlapping peaks and detection of minute peaks hidden in the main component peak.
We can propose various new applications by combining *i*-PDeA* with *i*-DReC**, a new analysis technique that dramatically expands the dynamic range.

Sensitivity

The SPD-M30A features a newly designed detector cell as well as other optical units. The capillary cell (option) has an optical path length of 85 mm and enhances the intensity of the signal. It achieves one of the world's lowest noise levels, less than 0.4×10^{-5} AU, thus facilitating even higher-sensitivity analysis.

Resolution

Thanks to the SPD-M30A's low-dispersion cell (SR-Cell), the Nexera X2 has been reborn as a low-dispersion system. This achieves outstanding spectral resolution and improves the reliability of data provided by *i*-PDeA*.

Stability

The SPD-M30A is mounted with a new temperature control function, TC-Optics (Temperature Controlled Optics). This reduces the time taken for the system to stabilize until analysis can be started after the instrument is started up, and stabilizes the baseline against minute fluctuations in room temperature during analysis.
* Intelligent Peak Deconvolution Analysis, patent pending
** Intelligent Dynamic Range Extension Calculator, patent pending

Ultra High Performance Liquid Chromatograph

Method Scouting System

Achieves Method Development Combining Comprehensiveness and Reliability

Four Times the Previous Number of Conditions Can Be Examined

The number of columns that can be used has been increased from six to twelve, and further two gradient patterns have been added. This provides a highly comprehensive system covering four times the previous number of conditions that can be examined for method development. The system significantly reduces the development process from method searches to optimization and evaluations of robustness, including the separation of target components and impurities, and purity checks for chiral compounds.

#### Displays the Optimal Separation Condition Parameters and Chromatograms

Combining with the Multi-Data Report function* from LabSolutions DB/CS enables the automatic output of the optimal analytical conditions, in order of score, based on the customer's judgment standards.
In addition, each chromatogram can be browsed, making it easy to visually check for the optimal analytical conditions. This significantly reduces the time and effort required for everything from the examination of analytical conditions to the confirmation of results.
* Supported with LabSolutions DB/CS Ver. 6.72 SP1 or later.

Compatible with the i-Series

In addition to the Nexera X2 series, the method scouting system is compatible with the i-Series and the Nexera UC supercritical fluid chromatograph. A special kit is used for an upgrade of a customer's system to the method scouting system, which can be done simply and inexpensively.
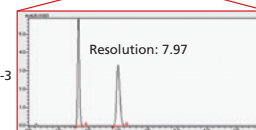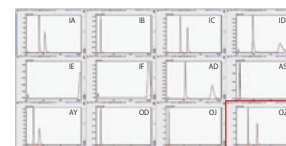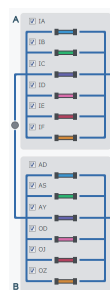
Capable of consecutive screening with 12 columns

CHIRALCEL OZ-3 — Resolution: 7.97
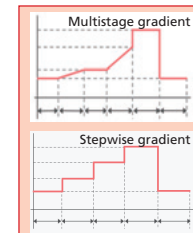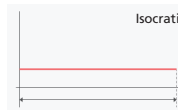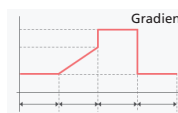
Multistage gradients and stepwise gradients added

9

Supercritical Fluid Extraction/Chromatograph System

Nexera UC

Unified Chromatography

Nexera UC On-Line SFE-SFC-MS System

SFC
LC
GC
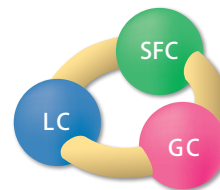
Unified Chromatography Offering Another Possibility or the Only Possibility

The Nexera UC online SFE-SFC system is a revolutionary new system that combines supercritical fluid extraction (SFE) with supercritical fluid chromatography (SFC). Automating the process of extracting and analyzing target components from solid samples means pretreatment times can be shortened and more accurate data can be obtained.

Directly Analyze Target Components in Complex Samples Automatically

Conventional sample preparation (QuEChERS method) required many steps involving adding reagents and separating by centrifuge, which took 35 minutes before analysis could start. In contrast, the Nexera UC does not require any complicated operations and analysis can be started in only five minutes. In addition, it can simultaneously analyze a wide range of pesticide components, including those normally analyzed using GC or GC/MS/MS systems and those normally analyzed using LC or LC/MS/MS systems, and with a wide range of polarities, from hydrophobic to hydrophilic.

Nexera UC …Only **5 minutes** of operations required before analysis   **5 min**

Homogenize → Add absorbent* → Mix → Transfer to extraction vessel → Extraction and Analysis by SFE-SFC-MS

* "Miyazaki Hydro-Protect" Patented in Japan No. 3645552

Supercritical Fluid Extraction/Chromatograph System
Nexera UC SFE Pretreatment System

This system allows the pretreatment of samples using supercritical fluid. An extraction operation that changes the types of modifiers (up to four types, including eluate from a trap column, etc.) and concentrations to mix with supercritical carbon dioxide can be performed on each sample. After being held in the trap column, the extracted material is eluted and then collected in a vial using a fraction collector. In addition to analysis by SFC, the system is ideal for measurements using other analytical systems such as GCMS and NMR.

Major component units (without rack changers)	CBM-20A, LC-20ADXR, DGU-20A3R, CTO-20A, SFE-30A, LC-30ADSF, SFC-30A, FRC-10A, LabSolutions LC, and others

Supercritical Fluid Chromatograph/Ultra High Performance Liquid Chromatograph
Nexera UC/s UHPLC/SFC Switching System

With this system, simply adding a supercritical carbon dioxide solvent delivery unit and a back pressure control valve unit to a standard UHPLC system enables automatic switching between UHPLC and SFC for a single sample, and measurements in the respective separation modes. Using this system allows users both to perform conventional LC analysis as per usual, and to examine conditions for analysis with SFC, which has a different separation mode than LC, for samples that are hard to separate with LC. Both the examination of separation conditions and high-speed reverse phase analysis can be performed with a single system, so the degree of convenience and productivity are significantly increased.

Major component units	CBM-20A, LC-30AD × 2 units, DGU-20A5R × 2 units, SIL-30AC, CTO-20AC × 2 units, LC-30ADSF, SPD-M20A, SFC-30A, LabSolutions LC, and others

Comprehensive Two-Dimensional Liquid Chromatograph

Nexera-e

New Separation Method for Complex Samples
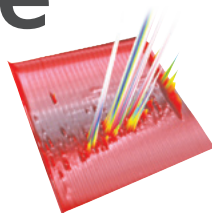
By combining two independent separation modes orthogonally, the comprehensive 2D-LC analysis provided by the Nexera-e offers another new possibility for liquid chromatography.

It provides exceptionally high separation not possible with conventional HPLC systems, so that target components can be accurately detected in complex samples, such as impurities in pharmaceuticals, enzyme digested substances from proteins, natural substances including food extracts, or synthetic polymers.

Achieves High Separation Not Possible with Conventional 1D LC

The Nexera-e includes a LC-30AD solvent delivery unit that offers the highest pressure capacity and delivery stability levels in the world,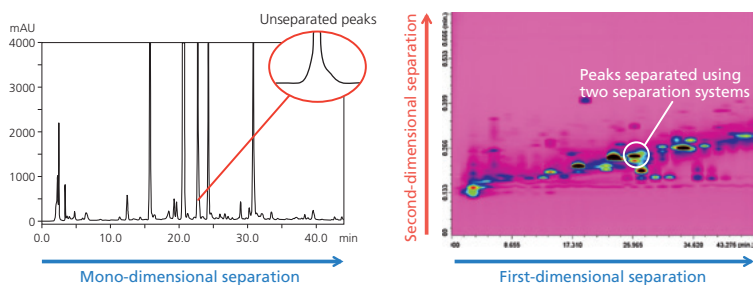* which makes it possible to select from a wide range of separation parameters for both first and second dimensions. Consequently, it can achieve comprehensive analysis of each sample component, which was difficult with a mono-dimensional separation system.

* As of November 2012, according to a Shimadzu survey

Whereas a mono-dimensional separation system can result in overlapping peaks for some components, as shown to the left, using two-dimensional separation processes can separate peaks as shown on the right.

Also, the 1D LC resulted in identifying 74 peaks, but with the Nexera-e system, over 200 peaks were detected in the same amount of analysis time.

Comparison of Separation of Hot Water Extract of Radix Puerariae (kudzu) by Nexera-e and Conventional 1D LC

Ultra-High Speed LCMS System for Multiplex Analysis

Nexera MX

Innovation in Multiplex Analysis

In analyses using LCMS, the Nexera MX system increases the sample processing capacity by up to approximately two times.

In a typical analysis, after injection of a sample, the analysis time until the injection of the next sample is not entirely spent on data acquisition. Instead, a variety of processes need to be performed, such as column rinsing, equilibration at initial mobile phase concentrations, and the next sample injection by the autosampler during the analysis. Therefore, demands have increased for LCMS systems that shorten the time described above spent for processes other than data acquisition in order to improve analytical throughput.

Thanks to Shimadzu's proprietary Nexera MX Dual Stream Technology (MX-DST), the Nexera MX makes alternate use of two analysis systems to inject samples into the LCMS, so the LCMS data acquisition time can be increased to the utmost.

Nexera MX Dual Stream Technology (MX-DST)

The MX-DST incorporates a special flow line structure and instrument control system, and performs overlap control of sample injection by using two analysis systems (streams) alternately.

By doing this, after one system completes data acquisition, the other system starts data acquisition immediately without interruption, making it possible to use nearly the whole time of LCMS operation for data acquisition.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems
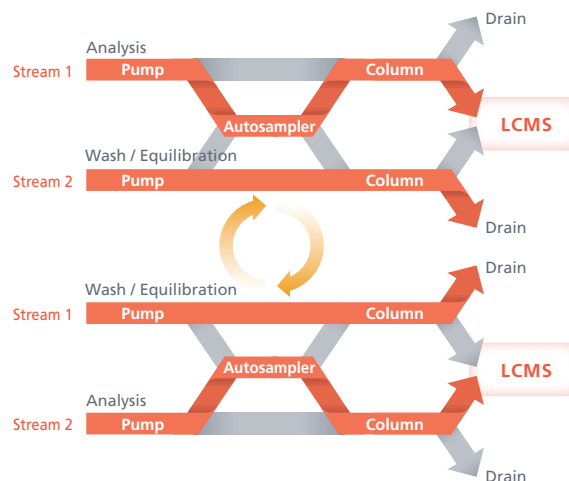
Ultra Fast Preparative and Purification Liquid Chromatograph

Prominence UFPLC

Beyond High-Purity Purification

Using the Prominence UFPLC system, all preparative processes can be performed online, from fractionation to concentration, purification, and recovery, which can significantly reduce the time required for preparative purification. In addition, using Shimadzu's unique trap concentration and purification technology, trace components included in synthesized substances can be recovered at high concentrations and with high purity. Due to the high volatility of the organic solvents used to recover target components, the solvents can be evaporated and components dried in less than one tenth the time of previous systems.

Recover High-Purity Liquid by Eliminating Solvent Components

In some cases, separation of drug components can be improved by adding a component that forms target components and counter ions, such as trifluoroacetate (TFA), to the mobile phase. However, these components remain in the fractionated liquids as impurities along with the target components, or form salts, and decompose the library compounds, which can affect subsequent test processes.

In addition to removing mobile phase-derived components from fractionated liquids, the Prominence UFPLC system can also use a rinse solution to rinse away counter ions, so that target components can be recovered as a high-purity free base.

Untreated Sample   Treated Freebase Form
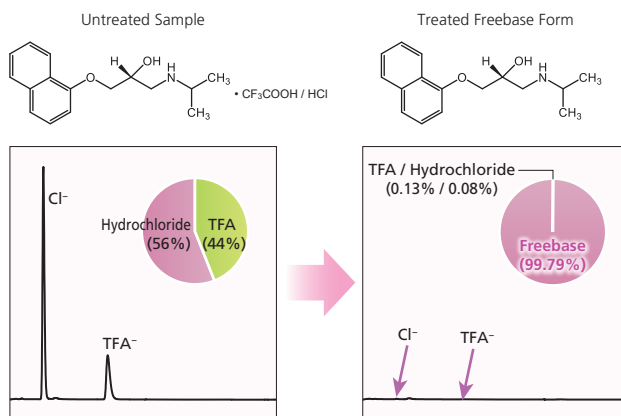
Prominence Preparative System
LC-20AP Gradient Analysis/Preparative System

In a preparative system, scaling up from the analysis scale to the preparative scale is an important element in achieving greater fractionation accuracy and efficiency. The LC-20AP preparative solvent delivery unit offers excellent basic performance across a wide range from the analytical to large-volume preparative scale, which permits effective scaling up. The system is a powerful tool for testing purity by analyzing fractions. The LC-20AP also contributes to energy savings. This is a preparative system that supports a wide range of applications from fractionating natural substances to impurity analysis. The extensive product range permits configuration of a variety of systems to match the preparative scale.

Major component units	CBM-20A, LC-20AP × 2, FCV-230AL, SIL-10AP, manual injector, column holder, SPD-M20A, FRC-10A, LabSolutions LC, etc.

Prominence Preparative System
Recycling Semi-Preparative System

Recycling preparative purification is a method that repeatedly reintroduces the sample eluted from the column back into the column to improve separation. It can be applied to the preparative purification of a wide range of compounds. The LC-6AD recycling semi-preparative system and LC-20AP recycling preparative system support recycling preparative purification across a wide range of synthetic scales, from semi-preparative scale to large-volume fractionation at the laboratory scale. The dedicated Recycle-Assist software offers an intuitive operation environment to support all types of recycling preparative work procedures.

Major component units (Fully automatic LC-6AD)	CBM-20A, LC-6AD, FCV-12AH, SIL-10AP, column holder SLIM, SPD-20A, FRC-10A, Recycle-Assist, etc.

Ultra High Performance Liquid Chromatograph for Online Dissolution Testing
Nexera FV

New

The Nexera FV automates the entire process from dispensing effluent from the dissolution tester, analysis, analysis of the results, all the way to outputting the reports. Since it is equipped with the fraction analysis mode that accommodates high-speed sampling at 5-minute intervals, it is capable of handling formulations that dissolve quickly. Moreover, in cases where the sampling interval is long, such as with sustained-release drug products, a high-speed analysis of the effluent within this timeframe can be performed by selecting the direct analysis mode. This can greatly reduce the amount of work required for dissolution testing. Since the system configuration is based on the Nexera X2, which is renowned for its speed, sensitivity, and stability, highly reliable dissolution test results can be rapidly obtained. It can also be used as a regular UHPLC system, so high-speed analyses can be performed at the testing site, resulting in an increase of the system operation rate.

Major component units	CBM-20A, LC-30AD, low-volume LPGE unit, DGU-20A5R, SIL-30ACFV, CTO-20AC, SPD-20A UFLC, LabSolutions LC, etc.

High-Performance Liquid Chromatograph
Prominence Bioinert LC System

This is a bioinert-specification HPLC system that offers superb resistance to corrosion due to mobile phases containing halogen ions, such as sodium chloride that is used for the analysis and fractionation of biopolymers. As the sample does not contact any metal materials, this system is ideal for the analysis of components that may undergo a change in activity due to contact with metals. Using the range of high-sensitivity detectors that are well established for general HPLC permits the analysis of trace impurities. The system can be operated at ambient temperatures from 4°C, which supports the analysis of enzymes and physiologically active substances that can be deactivated by temperature.

Major component units	CBM-20A, LC-20Ai, DGU-20A5R, SIL-10Ai, CTO-20AC, FCV-10AL$_{VP}$, SPD-20A, FRC-10A, LabSolutions LC, etc.

Online Enzymatic Digestion HPLC for Protein Analysis
Perfinity iDP

The Perfinity iDP (Integrated Digestion Platform) is a new platform for protein analysis. This platform completely automates the flow of operations from the enzymatic digestion of proteins through to reverse phase HPLC column separation and LC/MS detection. Adoption of a highly efficient trypsin column greatly reduces the digestion time to a mere one to four minutes, and on-line automatic analysis achieves high reproducibility and reliability. Dedicated software completely supports selection of methods and flow of operations from setup through to sample analysis. On-line interfacing to a mass spectrometer also expands the applicability of this platform.

Note: Perfinity and Perfinity iDP are registered trademarks of Perfinity Biosciences, Inc.

Major component units	CBM-20A, LC-20ADXR × 2, LC-20AD, DGU-20A5R, SIL-20ACHT UFLC, CTO-20AC, SPD-20A, LabSolutions LC, Perfinity iDP Startup Kit, etc.

LC/MS High-Speed Amino Acid Analysis System
UF-Amino Station

The batch analysis of amino acids (38 components), which are components of living organisms, conventionally requires at least two hours, but this system performs it in a mere nine minutes. By adopting a liquid chromatograph mass spectrometer, highly reliable analyses are provided, even for samples containing complicated matrices. In addition, prelabel derivatization reactions are automated, which reduces the labor involved in pretreatment, and improves analysis reliability. The special AmiNavi™ software supports continuous operability from analysis preparations to the confirmation of quantitative results.

Note: AmiNavi is a registered trademark of Ajinomoto Co., Inc.

Major component units	CBM-20Alite, LC-20AT, DGU-20A5R, CTO-20AC, FCV-32AH, SPD-20A UFLC, SIL-20ACPT, UF-Amino Station start-up kit, LCMS-2020, LabSolutions LCMS, etc.

Liliquid Chromatographs

Prominence Application System
Amino Acid Analysis System

Post-column fluorescence detection with OPA (ortho-phthalaldehyde) as a derivatizing reagent provides better sensitivity for the analysis of amino acids than the traditional ninhydrin method.
N-acetylcysteine, an odorless solid, is used as a thiol agent (Japanese Patent No. 1567849). This method is easier to use than the conventional mercaptoethanol method, and provides the highly sensitive detection of amino acids such as proline.

Prominence Application System
Reducing Sugar Analysis System

Selectively detects reducing sugars with high sensitivity, using Shimadzu's unique post-column fluorescence detection technology (patented), which uses arginine as a reaction reagent. This system is ideal for analyzing reagents with high impurity levels or, by changing the reagent, analyzing non-reducing sugars.

Instruments Included in the Example Shown	CBM-20Alite, LC-20AB, LC-20AD, DGU-20A5, SIL-20AC, CTO-20AC, CRB-6A, RF-20Axs, LCsolution, and others.

Prominence Application System
Organic Acid Analysis System

This organic acid analysis system relies on Shimadzu's unique pH-buffered post-column method with electric conductivity detection to offer superior selectivity and sensitivity. The system uses ion exclusion chromatography to separate organic acids, then consecutively adds pH buffering reagent to the column eluate to keep the pH at a near-neutral level and the organic acids in a dissociation state. Electric conductivity is then used for detection. By combining ion exclusion chromatography, this method is suitable for the analysis of organic acids in samples containing large amounts of contaminant components (mainly lower fatty acids).

Major component units	CBM-20A, LC-20AD × 2, DGU-20A3R, SIL-20AC, CTO-20AC, CDD-10AVP, LabSolutions LC, etc.

Ion Chromatograph
Prominence HIC-NS/HIC-SP

A simple and high-performance ion chromatograph that utilizes non-suppressor technology. It is provided with a highly sensitive conductivity detector controlled by a built-in microprocessor and features temperature control in two stages. It can be upgraded from a simple system to a fully automated system just by adding the necessary components. Suited for the analysis of environmental pollutants.

Major component units	CBM-20A, LC-20ADSP, DGU-20A3R, SIL-10Ai, CTO-20AC(NS), CDD-10AVP(NS), SPD-20A(SP), HIC-20A Super(SP), LabSolutions LC and others.

Prominence Application System
Anionic Surfactant Analysis System

This anionic surfactant analysis system is based on the Japanese ministerial ordinance regarding water quality standards. The fluorescence detector (RF-20Axs) achieves an unprecedented sensitivity, with a water Raman S/N ratio of at least 2,000. With grouping and group calibration functions, the system can perform quantitative analysis by totaling the peak area values for multiple isomers with differing alkyl chains. If an MS detector is used in the system, more abundant qualitative information can be obtained on a variety of surfactants.

Major component units	CBM-20A, LC-20AD, DGU-20A3R, SIL-20AC, CTO-20AC, RF-20A, LabSolutions LC, and others

Note: For systems using an MS detector, contact your Shimadzu representative separately.

Prominence Application System
Iminoctadine Analysis System

This analysis system utilizes the post-column fluorescence derivatization detection technique with ninhydrin as the reaction reagent. Iminoctadine reacts with ninhydrin under alkali conditions to produce a fluorescent derivative, the fluorescence from which is detected. The fluorescence detector (RF-20Axs) achieves an unprecedented sensitivity, with a water Raman S/N ratio of at least 2,000. This enables high-sensitivity analysis with good selectivity for iminoctadine acetate in food products and tap water.

Major component units	CBM-20A, LC-20AD × 3 units, DGU-20A5R, SIL-20AC, CTO-20AC, RF-20A, CRB-6A, LabSolutions LC, and others

Prominence Application System
Cyanic Analysis System

This high-sensitivity analysis system for cyanide ions and cyanogen chloride uses the ion chromatography—post-column absorbance detection method (4-pyridine carboxylic acid-pyrazolone method), based on the Japanese ministerial ordinance regarding water quality standards. It enables high-sensitivity simultaneous analysis of cyan and cyanogen chloride by their chemical form. The system adopts a column oven with a cooling function to achieve thermal recycling, in which the reaction heat from the second stage is reused for the first stage reaction. It is highly sensitive, with a detection limit (S/N ratio = 3) of 0.0001 mg/L (CN value). It can easily measure not only the standard value (0.01 mg/L) but even 1/10th of that concentration. Thanks to Shimadzu's proprietary high performance columns, analysis can be performed in 10 minutes or less per sample.

Major component units	CBM-20A, LC-20AD × 3 units, DGU-20A5R, SIL-20AC, inert kit, CTO-20AC, SPD-20AV, CRB-6A, LabSolutions LC, and others

Prominence Application System
Bromate Analysis System

This bromate analysis system uses the ion chromatography—post-column absorbance detection method (tribromide ion method), based on the Japanese ministerial ordinance regarding water quality standards. It is capable of high-sensitivity detection at the μg/L level or less, using Shimadzu's renowned post-column reaction technique and a high-sensitivity UV-VIS detector. For the post-column unit, a piping parts kit specifically for the tribromide ion method is available, in which a reaction reagent mixing device (Japanese Patent No. 4082309) is adopted in order to efficiently mix high-concentration reaction solutions. The system enables simultaneous quantitation of halogen oxides. Iodic acid ions and chlorous acid ions are simultaneously quantitated as halogen oxides.

Major component units	BM-20A, LC-20AD × 2 units, LC-20Ai, DGU-20A5R, SIL-20AC, inert kit, CTO-20A, SPD-20A, LabSolutions LC, and others

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

15

Prominence Application System
Prominence GPC System

By combining the superior solvent delivery and sample injection performance of the Prominence series with a temperature-controlled detector, this system achieves rapid baseline stabilization and outstanding reproducibility of analytical results, which results in providing highly reliable data.
Convenient features, such as an overlapping injection function and automated analysis workflow, help increase productivity for routine GPC measurements. The system is also able to recycle mobile phase from intervals where no components are eluted,* which minimizes any environmental impact.
* Using a solvent recycle valve (optional).

Major component units	CBM-20A, LC-20AD, DGU-20A3R, SIL-10AHT, CTO-20A, RID-20A, LabSolutions LC, LabSolutions GPC software, etc.

High-Sensitivity Impurity Quantification System
Co-Sense for Impurities

By combining online trap concentration technology with two-dimensional separation, the Co-Sense for Impurities system achieves reliable separation of trace compounds, as well as high sensitivity analysis with excellent repeatability, using absorbance or other conventional detectors. The system is capable of approximately 10 to 20 times higher sensitivity in comparison to conventional HPLC. In addition, analysis operations, and system rinsing and other maintenance operations are simple, thanks to the special control software adopting a graphical user interface. In comparison to conventional LC-MS, Co-Sense for Impurities provides more stable sensitivity, and reduced running costs at and subsequent to system introduction, thereby demonstrating its power in the routine analysis of trace compounds for quality control.

Major component units	CBM-20A, LC-20AD × 2, LC-20AB, LC-20AP, DGU-20A5, SIL-20ACHT, CTO-20AC, SPD-20A, SPD-20A UFLC, LabSolutions LC, etc.

Prominence Application System
Aldehyde Analysis System

A known method for measuring aldehydes in air is to derivatize the aldehydes in the captured air sample with 2,4-dinitrophenylhydrazine (2,4-DNPH), and to then analyze them by HPLC.
This system allows users to perform an analysis of aldehydes and ketones (2,4-DNPH derivatives) indoors and in air.

Major component units	CBM-20A, LC-20AB, DGU-20A3R, SIL-20AC, CTO-20AC, SPD-20A, LabSolutions LC, and others

Prominence Application System
Carbamate Pesticide Analysis System

Post-column fluorescence detection system that analyzes n-methyl carbamate pesticides in agricultural products. Shimadzu's unique reaction unit provides highly sensitive and highly precise analysis.

Instruments Included in the Example Shown	CBM-20A, LC-20AB, LC-20AD × 2 units, DGU-20A5, SIL-20AC, CTO-20AC, CRB-6A, RF-20AXS, LCsolution, and others.

Nexera Solvent Delivery Unit
LC-30AD

This solvent delivery unit achieves solvent delivery at a globally unprecedented 130 MPa. The LC-30AD provides excellent retention time repeatability thanks to stable solvent delivery on par with conventional analysis, with a flowrate precision of ±0.06%, even under ultra-high pressures. In addition, system capacity has been reduced thanks to a high efficiency, low capacity mixer (20 µL), based on micro reactor technology. If the optional reservoir switching valve is attached, the equipment can perform automatic mobile phase switching in method analysis and column rinsing.

Prominence UFLCxr
Solvent Delivery Unit
LC-20ADxr

Retains the excellent basic functions developed in the LC-20AD, with modifications of the pressure sensor, drain valve, and plunger seal added to expand the maximum allowed pressure to 66 MPa for extra-resolution applications under such high pressure.

Pump type	Parallel-type double plunger
Flow-rate range	0.0001 to 3 mL/min (1.0 to 66 MPa) 3.0001 to 5 mL/min (1.0 to 44 MPa)

Prominence Series
Solvent Delivery Unit
LC-20AD/20AB/20AT/20Ai

LC-20AD

The LC-20AD is an isocratic solvent delivery unit. The automatic pulsation compensation mechanism and high-speed microplunger drive combine to achieve pulse-less liquid feed. Pumping performance in the microflow range below 50 µL/min is enhanced.
The LC-20AB is a binary high-pressure gradient solvent delivery unit incorporating two pumps. The LC-20AT is a solvent delivery unit that maintains high performance while improving the ease of maintenance. The LC-20Ai is a solvent delivery unit for inert LC.

Pump type	20AD	Parallel double microplunger
	20AB	Parallel double microplunger (2 sets)
	20AT/20Ai	Serial double microplunger
Flow rate range	20AD/20AB	0.0001 to 10,0000 mL/min
	20AT	0.001 to 10,000 mL/min
	20Ai	0.001 to 10.00 mL/min

Prominence nano
Solvent Delivery Unit
LC-20ADnano

The LC-20ADnano employs a new Reflux Flow Control system to offer stable solvent delivery and low solvent consumption, without splitting waste solvent after the two solvents are mixed in concentration gradient analysis.

Pump type	Reflux flow control
Flow rate range	1 to 5 nL/min (controlled independently) 0.01 to 5 µL/min (using Nano-Assist) 0.1 to 5 µL/min (using CBM-20A and LCsolution)

Preparative System for
High Performance Liquid Chromatography
LC-20AP

This is a large volume laboratory preparative solvent delivery unit capable of solvent delivery at up to 150 mL/min. With a pressure resistance of 42 MPa, the LC-20AP can perform high resolution separation preparative purification of large quantities of compounds in a single step. In terms of solvent delivery performance in the analysis flowrate region, the system performs on par with analysis solvent delivery units with a flowrate accuracy of ±1% or less. The system is capable of high efficiency overall workflow, which is required for preparative purification, including examination of preparative conditions and preparative compound purity checks.

Pump type	Parallel-type double plunger
Flow rate range	0.01 to 150.00 mL/min

Solvent Delivery Unit for
Semi-Preparative HPLC
LC-20AR

This solvent delivery unit is capable of flow rates for applications ranging from high-precision analysis to semi-preparative HPLC. It can provide a high retention time reproducibility from a low flow rate range to semi-preparative flow rate range (0.01 and 20 mL/min), leading to reliable results when scaling up or confirming purity. By using a recycling kit, it can also be used for recycling semi-preparative applications.

Pump type	Parallel-type double plunger
Flow rate range	0.001 to 20.00 mL/min

Nexera Multiplate Autosampler
SIL-30ACMP

Building on the basic performance of the SIL-30AC, with its low carryover and excellent injection repeatability, the SIL-30ACMP multiplate-compatible autosampler can be loaded with 6 plates in 3 sample racks, enabling the continuous analysis of up to 2,304 samples (when 384-well plates are used), or 324 samples in 1.5 mL vials. Furthermore, since different plates can be loaded in the 3 sample racks, the system is flexible enough to simultaneously analyze multiple unknown samples using microplates, and control samples in 1.5 mL sample vials.

Injection method	Total volume injection, variable injection volume
Injection volume settings range	0.1 µL to 50 µL

Nexera Autosampler
SIL-30AC

This autosampler features a globally unprecedented 130 MPa pressure resistance. In addition to strengthened pressure resistance, the equipment achieves improved basic performance, including low carryover of 0.0015% (rinseless) or less. It is also equipped with 4-solvent multi rinse functionality, and provides high reliability data in high sensitivity analyses thanks to carryover suppression across a full range of applications. Furthermore, with automatic pretreatment functionality, it is also capable of prelabel derivatization and the addition of internal standard substances.

Prominence Series Autosampler
SIL-20A(C)/20A(C)HT/20A(C)XR

A direct injection type autosampler that permits high-speed, multisample processing. Near-zero sample carryover is realized, which makes the SIL-20A/20AC ideal for high-sensitivity LC-MSMS analysis. Connecting the optional rack changer allows continuous analysis by replacing up to 12 MTP/DWP.

Injection method	Direct sample injection
Injection volume	0.1 to 100 µL (standard), 1 to 2,000 µL (option)
Sample temperature control	SIL-20A: none SIL-20AC: 4 to 40°C

Nexera Column Oven
CTO-30A

This is a compact block-heating type column oven that permits analysis to 150°C. The intelligent heat balance mechanism achieves uniform temperature control at ±0.05°C accuracy. High-temperature analysis at 150°C permits reverse-phase analysis without organic solvents to reduce the burden on the environment. A post-column cooler or high-pressure flow line switching valve can be installed to restrict baseline noise during high-temperature analysis.

Temperature control system	Block heating system
Temperature control range	(Room temperature + 5°C) to 150°C

Prominence Series Column Oven
CTO-20A/20AC

The CTO-20A/CTO-20AC are forced air circulation column ovens. A high-performance thermistor accurately regulates the temperature in the oven. Complex temperature programs can be set, including linear or stepwise heating and cooling. Optional sub-units can be contained in the unit, including manual injectors, a gradient mixer, and high-pressure flow line switching valves.

Heating and cooling type	Forced Air Circulation
Temperature-control range	CTO-20A: (room temperature + 10°C) to 85°C CTO-20AC: (room temperature − 10°C) to 85°C

Prominence Series System Controller
CBM-20A/20Alite

The CBM-20A/20Alite is a communication bus module offering data buffering functions. It permits remote control and Web control, by acting as the interface between the PC and each unit. The CBM-20Alite is a card-type controller to be installed inside the Prominence modules.

Controlled units	CBM-20A: 8 (expandable to 12) CBM-20Alite: 5
Inputs and outputs	CBM-20A: 4 inputs/4 outputs CBM-20Alite: 2 inputs/2 outputs

Prominence Series UV-VIS Detector
SPD-20A/20AV

These general-purpose UV-VIS detectors offer enhanced sensitivity and stability. Low noise, improved light-source compensation, and a temperature-controlled cell installed as standard achieve high sensitivity and stability. Stray light correction ensures an extremely broad linearity range.

Light source	SPD-20A: D2 lamp SPD-20AV: D2 lamp, W lamp
Measuring wavelength range	SPD-20A: 190 to 700 nm SPD-20AV: 190 to 900 nm

Photodiode Array Detector
SPD-M30A

The SPD-M30A adopts a newly designed capillary cell (SR-Cell). This suppresses peak dispersion within the cell, thus allowing an ultra-low dispersion system required for high separation in UHPLC to be built.
Also, the high-end photodiode array detector supports high-sensitivity analysis thanks to the SR-Cell that features improved signal level and the world lowest noise level of 0.4×10^{-5} AU or below. Moreover, use of outstanding stray light compensation technology and temperature control of the polychromator ensure reliable analysis.

Light source	D2 lamp
Measuring wavelength range	190 to 700 nm

Prominence Series Photodiode Array Detector
SPD-M20A

The SPD-M20A photodiode array detector (PDA) achieves high sensitivity that rivals a conventional absorbance detector. Linearity and stability are enhanced by comprehensive light-source compensation, stray light correction functions and temperature-controlled cells provided as standard.

Light source	D2 lamp, W lamp
Measuring wavelength range	190 to 800 nm

Prominence Series Spectrofluorometric Detectors
RF-20A/20AxS

RF-20A

The RF-20A and RF-20AxS offer world-leading levels of sensitivity thanks to a newly designed optical system. Fast sampling at 100 Hz supports UFLC. These detectors offer superb ease-of-maintenance, thanks to cell and lamp replacement at the front panel (that requires no positional adjustment), 2000-hour extra-long lamp life, and the VP functions. RF-20AxS is the only detector in the world that offers a temperature-controlled cell with cooling functions. It offers excellent peak area reproducibility with respect to room temperature fluctuations and further enhances the reliability of the analysis data.

Refractive Index Detector
RID-20A

The RID-20A eliminates any influence caused by fluctuations in the temperature of the laboratory by employing dual temperature control for the optical systems, and establishes a superior stability of baseline. Additionally, its function to automatically check the lighting time and light intensity of the lamp enables compliance with the strict management standards of the pharmaceutical industry. Provides support for the validation procedures of the overall analysis system.

Range	Time of analysis: 0.01×10^{-6} to 500×10^{-6} RIU Time of fractionation: 1.0×10^{-6} to 5000×10^{-6} RIU
Maximum operating flow rate	20 mL/min (Optionally, 150 mL/min)

Evaporative Light Scattering Detector - Low Temperature
ELSD-LTⅡ

The unique nebulizer and evaporation tube permit low-temperature operation. It is a powerful tool for the gradient analysis of compounds that cannot be analyzed by an absorbance detector.

Stable, low-temperature evaporation of the mobile phase achieves high sensitivity and stability.

Detects almost all compounds in the sample.

Superb solvent elimination under gradient elution and rapid separation conditions.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

New **Gas Chromatograph**

Nexis GC-2030

The Next Industry Standard

Nexis GC-2030, Shimadzu's high-end gas chromatograph, is a new-generation gas chromatograph that combines improved operability and easier maintenance with the world's highest levels* of performance for sensitivity and reproducibility.

A color touch-panel interface with clear, intuitive graphics enables all users to monitor the instrument status and set parameters with ease. In addition, Nexis GC-2030 offers excellent usability with tool-free inlet maintenance and column installation and a built-in oven light. It also provides a variety of functions to ensure compliance with GLP/GMP and a self-diagnosis function.

* As of May 2017, according to a Shimadzu survey

Column temperature	Max. 450°C (Room temperature + 2°C)
Carrier gas control	Constant linear speed control, constant flow rate control, constant pressure control possiblePressure: Max. 970kPa, Flow-rate: 1,300mL/min
Sample injector	Split/splitless, direct, on-column, programmable temperature vaporizer
Detectors	FID, TCD, BID, FTD, FPD, ECD
Display	Color-touch panel

Tool-free Column Installation

ClickTek connectors*[2] make tool free column installation a snap. The click sensation felt when finished attaching the column provides a more reliable connection and ensures a better seal under all operating conditions.
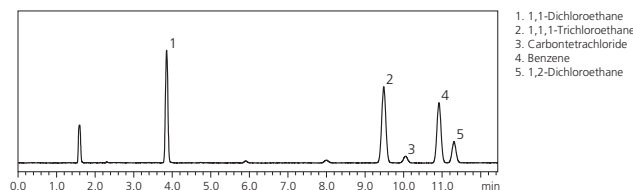
*2 Optional
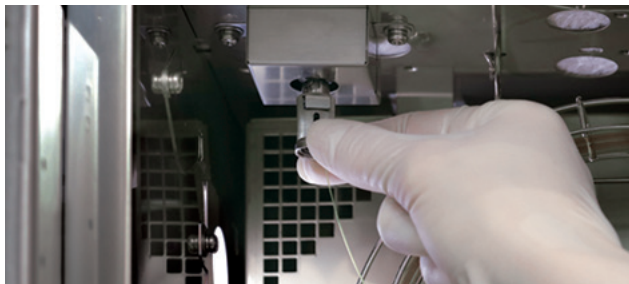
ClickTek Connector

High-Sensitivity Detectors Support a Wide Variety of Analyses

The jet and collector structure on the flame ionization detector (FID-2030) has been optimized to provide improved performance. Noise levels were also decreased by improving the stability of the signal processor and flow controller. This results in the world's most*[1] sensitive FID. This makes the Nexis GC-2030 the best choice to measure residual solvents in pharmaceuticals.

1. 1,1-Dichloroethane
2. 1,1,1-Trichloroethane
3. Carbontetrachloride
4. Benzene
5. 1,2-Dichloroethane

Analysis of Trace Residual Solvents in Pharmaceuticals using Head Space GC, Class 1 Standard Solution

One Touch Inlet Maintenance

The injection port can be opened or closed without tools by simply sliding the ClickTek lever. Replace the insert, slide the lever and feel the click for a leak-free install every time.

ClickTek Nut

GC Systems Customized for Specific Needs

The Nexis GC-2030 provides powerful support for configuring custom GC systems tailored to user needs. These systems are adjusted and tested at the factory for the given application before shipment, so they are ready to use for measurements as soon as they are delivered. That means no time is required for developing methods after the system arrives. Two TCD detectors and one FID detector can be installed at the same time. An optional valve box can be added to control up to eight valves from the original four.

Examples of System GC Configurations

Gasoline analysis system

Natural gas analysis system

Inorganic gas analysis system

Hydrocarbon analysis system

Refinery gas analysis system

Public utility natural gas analysis system
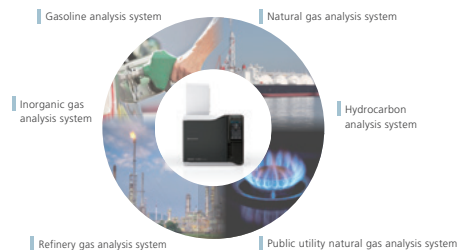
Energy Saving Capillary Gas Chromatograph
GC-2025

Shimadzu's new-generation GC-2025 capillary gas chromatograph minimizes environmental impact by reducing power and carrier gas consumption while retaining the performance capabilities required for capillary analysis.
The GC-2025 incorporates a digital flow controller that controls both the carrier and detector gases and a newly designed energy-saving column oven that features small volume and less heating loss, realizing a dramatic improvement in operability.
The compact GC-2025 is the gas chromatograph for environmentally friendly, high value performance.

Column temperature	(Room temperature + 10°C) to 400°C
Carrier gas control	Digital setting of pressure, flow rate and split ratio by electronic flow controller (AFC) Constant control of column average linear velocity
Sample injector	Split/splitless injection unit (SPL)
Detectors	FID (Hydrogen flame ionization detector)
Minimum detected quantity	2.0 pgC/s (dodecane)
Display	30 characters × 16 lines, permits chromatogram display

Gas Chromatograph for versatile applications
GC-2014 Series

The GC-2014 offers good expandability by mounting multiple injection units and detectors, and accommodating both packed columns and capillary columns. A multipurpose, space-saving GC that features today's leading-edge technologies, the GC-2014 delivers high performance, including excellent reproducibility and a highly sensitive detection level, while the electronic flow controller and clear menu text make operation a breeze.

Column temperature	(Room temperature + 10°C) to 400°C
Carrier gas control	Digital setting by electronic flow controller (AFC)
Sample injector	Dual for packed, single for packed, split/splitless, direct injection
Detectors	FID, TCD, ECD, FPD, FTD
Display	240 × 320 dot graphics display (30 characters × 16 lines)

Auto Injector/Auto Sampler for GC/GC-MS
AOC-20i (Plus)/AOC-20s (Plus)

The AOC-20i (Plus) Auto Injector can inject samples into a variety of injection ports, including split/splitless, direct (WBI), cool on column (OCI), or programmed temperature vaporization (PTV). In addition, ever-decreasing detection limits demand increased flexibility for different injection techniques, including large volume injection (LVI), solvent flush, and solvent flush with a second solvent. The AOC-20s (Plus) provides sample transport to the AOC-20i (Plus) Auto Injector using 1.5 ml and 4.0 ml vials.
The AOC-20i (Plus)/AOC-20s (Plus) is a powerful automation tool for GC laboratories that allows the users to take full advantage of the GC system's capabilities.

GC Application System
Headspace Analysis System

Nexis GC-2030 HS-20 Trap   Nexis GC-2030 HS-10

The headspace sampler holds vials in an oven to heat the sample for a certain period of time. A set amount of gaseous phase is sampled and introduced to the GC or GC-MS.
The system can handle both liquid and solid samples, and is used for the analyses such as of residual solvents in pharmaceuticals, trace amounts of volatile organic compounds (VOCs) in waste water, and alcohols in blood.

Headspace Sampler HS-20 Series
With the HS-20 and HS-20 LT, introduction by means of sample loop is possible, whereas with the HS-20 Trap, both sample loop introduction and trap concentration introduction are possible. Since the oven is capable of a maximum temperature of 300 C, high boiling point compounds can be analyzed.
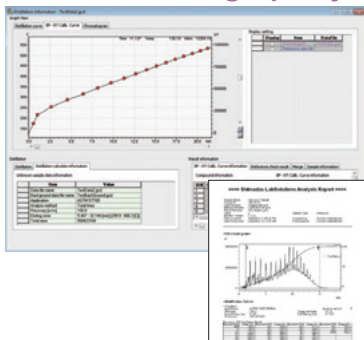
Headspace Sampler HS-10
In terms of cost performance, this model is truly superior, since it offers functions of sample stirring and of overlapped heating of multiple vials, while also providing the full range of functions necessary for headspace analyses.

	HS-20 Series	HS-10
Applicable models	Nexis GC-2030, GC-2010 Plus/2010, GC-2014	
Sample injection method	Sulfinert sample loop 1 mL (provided standard) 0.2 mL, 3 mL (optionally provided) or trap (HS-20 Trap)	1 mL (provided standard) inactivated sample loop 0.5 mL, 2 mL (optionally available)
Number of vials	90	20
Vial stirring	5-stage	3-stage

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

GC Application System
## Distillation Gas Chromatograph System

The boiling point distribution of petroleum fractions can be measured by simple operation from LabSolutions menus.
This system supports various distillation GC standards such as ASTM and JIS.
• Analysis by total area method, internal standard method and external standard method
• Various conversion and calculation functions from distillation characteristics (ASTM D86, D1160 conversion, flash point calculations, NOACK calculations, Reid vapor pressure calculations, etc.)
• Multiple distillation characteristic result comparison, statistical calculation functions

System configuration examples	Nexis GC-2030 AF (with WBI or OCI) or GC-2014AF + LabSolutions + Simulated Distillation GC Analysis Software (Select injection unit and column according to the target sample.)

GC Application System
PONA Analysis System
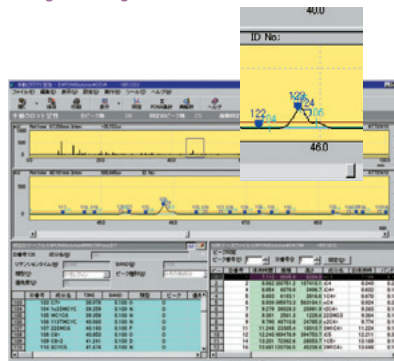
Works with GCsolution to measure peak area%, weight%, volume% by carbon number or by type. Identification results can be observed while viewing the chromatogram on the monitor and easily manuplated by mouse operations.

Applicable samples	Naphtha, gasoline
Items calculable from quantitation results	Mol%, mean molecular weight, density, carbon number, hydrogen content, oxygen content, octane number, vapor pressure, distillation characteristics

Chromatopac Data Processor for Chromatography
## C-R7A plus/C-R8A

C-R7A plus

C-R8A

The C-R7A plus provides multi-windows, a hard disk, and Chromatopac BASIC in a compact, laptop-type body, as well as a high-speed parallel printer, which uses AF (anti-fade) paper, compatible with long-run storage.
The C-R8A is equipped with an SD card drive as standard.
This compact, highly cost-efficient data processor is network-compatible and CE mark-compatible. It is also equipped with GLP and GMP support functions.

Data Management Tool for Chromatopac Data Processor
PACsolution
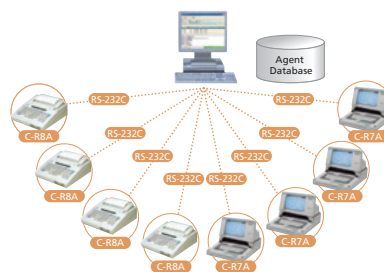
With Chromatopac alone, there are limits on procedures for postruns, comparisons with past data or the creation of reports, and data management. Using PACsolution not only heightens the efficiency of procedures such as for collecting analytical data on a PC, manual peak integration, and pasting analytical data into Excel or Word, but also heightens the efficiency of analytical data searches, and strengthens security. It also supports networking with other analytical instruments.

Applicable models	C-R7A series, C-R8A
PC	A PC running Windows 7 with a 2 GHz CPU or faster and 2 GB of RAM or more is recommended.
Number of connected instruments	Up to 8 Chromatopac units can be connected to one PC.
Connection range	Up to 15 m between the Chromatopac unit and the PC

Analysis Data System
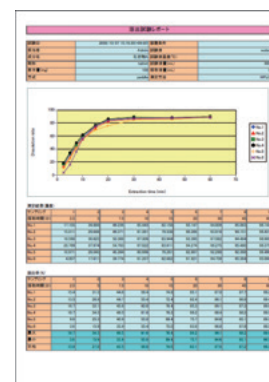# LabSolutions CS/DB
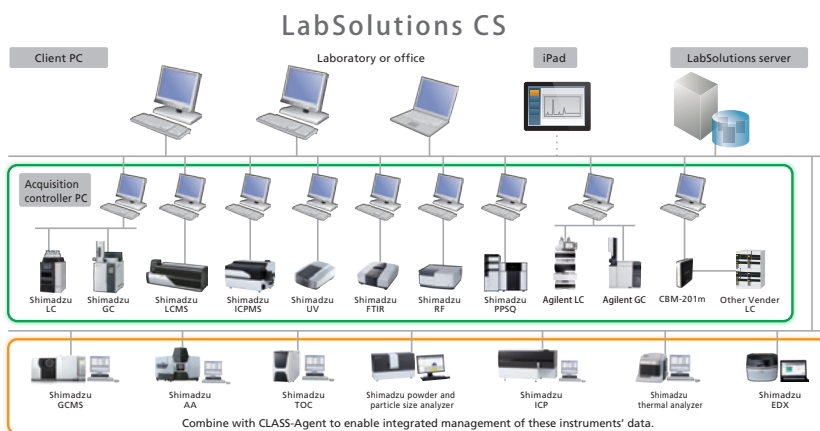
LabSolutions CS

LabSolutions DB is a product that integrates the analysis data management functions of LabSolutions LC/GC, and provides for compliance with regulations such as the Japanese Ministry of Health, Labour and Welfare's ER/ES guidelines. This product's configuration is ideal for those who wish to manage all their data on one PC.

With LabSolutions CS, all analysis data is managed in a database on the server computer, so the data can be loaded using any computer on the network. Additionally, even PCs that are not connected to instruments (client PCs), can be used to stipulate that analysis is to be performed, or be used for monitoring or controlling the instruments. Furthermore, the direct control of non-Shimadzu LC/GC systems can also be performed.

Also, since the system is compatible with Windows terminal services, the functions of the client PC can be run on the server, thus eliminating the need for the LabSolutions software to be installed on the client PCs. Moreover, the system is compatible with XenApp by the Citrix Systems, Inc., thus assuring a high level of server management.

LabSolutions
Multi-Data Report

Multi-Data Report is an optional product that can be used together with LabSolutions CS/DB in order to create comprehensive reports that bring together all of the analysis data acquired from a multiple number of instruments.

From the standpoint of data integrity, its use can be effective, since the reports can be used for audit trails and digital signatures. Reports combining data from a variety of different instruments connected to the system, including HPLC or GC, MS, FTIR, UV, or electronic balance can be created.

## Integrated Workstation
LabSolutions LC/GC
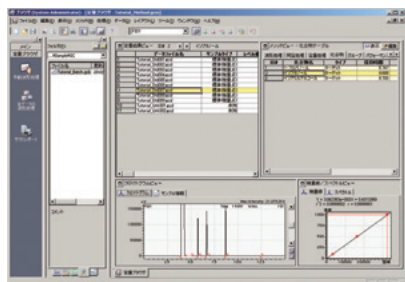
This next-generation workstation integrates GC and LC control, and provides users with stronger network functions. It features a Quantitation Browser that allows you to verify multiple data acquisition results and has substantial functions for automating processes from startup right through to shutdown, which results in improved operator ease and analytical productivity.

It is also provided with a PDF output function as well, which helps conserve paper.

Nexis GC-2030, GC-2014 and GC-2025[Note] can be controlled.

- Windows 7, LabSolutions LC/GC and CLASS-Agent Manager are pre-installed.
- PONAsolution and MDGCsolution are not supported so use GCsolution.

Note: GC-2025 control is supported from Ver. 5.51 or later and Ver. 6.10 or later.

## Analysis Data Management Tool
CLASS-Agent
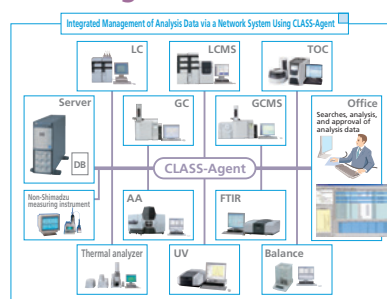
With many analytical instruments networked, the CLASS-Agent performs integrated data management using a database.

Target data from the database can be searched for quickly. It also provides easy connection with Excel and other software, as well as LIMS and other computer systems.

In addition, it can accommodate digital signatures and the management of digital records in compliance with FDA 21 CFR Part 11.

Applicable models	Support for a number of analytical instruments including chromatographs, electronic balances, spectrophotometers (Contact your Shimadzu representative for further details.)
Controllable data	Raw data such as chromatograms and spectra, metadata such as measurement schedules and data analysis methods, PDFs and other printing images, files

Analysis Information and Data Management System
LIMSsolution
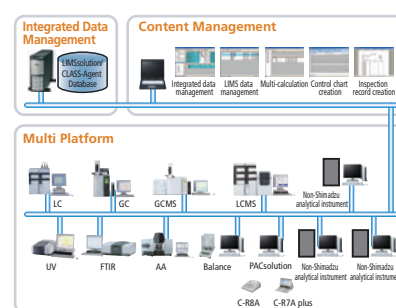
This system is used to manage the vast quantity of information from diverse analytical and measuring instruments in analytical laboratories. It is equipped with functions to fully automate analytical procedures and to heighten their efficiency. This includes connection with production control systems, test registration, creation of analysis instructions, creation of batch files, analysis and measurement, collection of analysis and measurement results, calculations for each analysis and test; judgments based on upper and lower limits, and creation of summary tables, inspection records, and control charts.

Server PC	A PC running Windows Server 2012 R2 with a 2 GHz CPU or faster and 8 GB of RAM or more is recommended.
Database	Oracle 11g or SQL Server 2014
Client PC	A PC running Windows 7 with a 2 GHz CPU or faster and 2 GB of RAM or more is recommended.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Liquid Chromatograph-Mass Spectrometers

Quadrupole Time-of-Flight Liquid Chromatograph Mass Spectrometer *New*

LCMS-9030

Effortless Performance

The LCMS-9030 quadrupole time-of-flight (Q-TOF) mass spectrometer integrates the world's fastest and most sensitive quadrupole technology with unique TOF architecture. A product of Shimadzu's engineering DNA, the LCMS-9030 enhances the most important features of Q-TOF instrumentation - mass accuracy, sensitivity, and speed - to address qualitative and quantitative challenges with genuine confidence and ease.

▶▶ New TOF Technologies

UFaccumulation™
Ion accumulation in the collision cell, synchronized perfectly with short cycles of data acquisition, maximizes sensitivity.
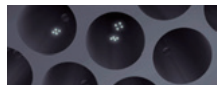
UFgrating™
Shimadzu's world-class manufacturing capability has enabled the ion acceleration electrode to be made with substantial mechanical strength. This grating is able to withstand the high voltages needed for ultrafast ion pulsing.
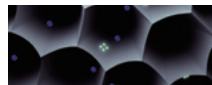
Funnel MCP
Lossless microchannel plate design maximizes sensitivity.
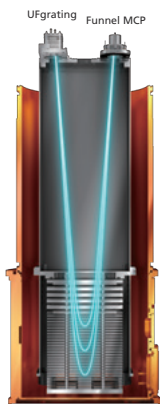
Conventional MCP › Funnel MCP

UF-FlightTube™
Mass accuracy needs mass stability. Shimadzu's temperature-controlled UF-FlightTube requires less frequent calibration, enabling you to run more samples.

iRef TOF™
A computationally ideal electrostatic field has become a reality. Meticulously manufactured plate electrodes are stacked to create a reflectron which turns ions with no compromise in resolution or sensitivity.

UFgrating Funnel MCP

iRef TOF

TOF mass range	m/z 10 to 40,000
Resolution (TOF)	30,000 FWHM
Mass accuracy	<1 ppm at m/z 622.5662
Maximum acquisition rate	100 Hz

High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer
LCMS-8060

The LCMS-8060 features an optimized ion guide and new technologies incorporated in the ion transport optical system. As a result, the ion sampling efficiency and ion focusing capability are significantly increased, to achieve improved sensitivity, approx. 3 times better than that of the LCMS-8050. Inheriting the high-speed performance of the LCMS-8050, this flagship model in the UFMS series features both the world's highest level of sensitivity and the world's highest throughput.
It is capable of detecting ultra trace components in complex matrices, which have been difficult to detect to date, both quickly and with high sensitivity. This will contribute to further improvements in data quality in all types of trace quantitative analysis applications, such as for biological samples, which requires the highest level of sensitivity.

Mass range	m/z 2 to 2,000
Resolution	R < 0.7 u (FWHM)
Scan speed	Max. 30,000 u/sec
Positive-negative ion polarity switching time	5 msec
MRM measurement speed	Max. 555 channels/sec

Note: LC units are not included with this product.

High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer
LCMS-8050

Thanks to a heated ESI probe and the UFsweeper III collision cell, the LCMS-8050 achieves a level of sensitivity 30 times that of the LCMS-8030.
The UF Technology, the ultrafast measurement technology built into the LCMS-2020 has further evolved, so measurements can now be performed even faster, without sacrificing data quality. At the same time, more compounds can now be measured in simultaneous qualitative and quantitative analysis.
The system can be used in a wide range of fields for a variety of applications, such as quantitative analysis which requires high sensitivity, multicomponent simultaneous analysis, and screening.

Mass range	m/z 2 to 2,000
Resolution	R < 0.7 u (FWHM)
Scan speed	Max. 30,000 u/sec
Positive-negative ion polarity switching time	5 msec
MRM measurement speed	Max. 555 ch/sec

Note: LC units are not included with this product.

High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer
LCMS-8045

UFMS
ULTRA FAST MASS SPECTROMETRY

Equipped with a heated ESI probe, the LCMS-8045 has the highest sensitivity in its class. The heated ESI probe, high-temperature heating block, desolvation line (DL) and drying gas, all act to promote desolvation and prevent contamination due to the penetration of liquid droplets into the MS unit. This improves the robustness, so reliable and high-accuracy data can be obtained over the long term. The LCMS-8045 also achieves the world's fastest scan speed (30,000 u/sec) and polarity switching speed (5 msec). These enable ultra-high-speed, high-sensitivity analysis. The excellent cost performance of this system is demonstrated in food safety, environmental analysis, and other routine quantitative analyses. In addition, it can be upgraded to the LCMS-8060.

Mass range	m/z 2 to 2,000
Resolution	R < 0.7 u (FWHM)
Scan speed	Max. 30,000 u/sec
Positive-negative ion polarity switching time	5 msec
MRM measurement speed	Max. 555 channels/sec

Note: LC units are not included with this product.

High Performance Liquid Chromatograph Mass Spectrometer
LCMS-8045/8050 Upgrade Kit

LCMS-8060
LCMS-8050
LCMS-8045
LCMS-8045 → LCMS-8060
UFsweeper III Collision Cell *NEW*
LCMS-8045/8050 → LCMS-8060
NEW DL (Desolvation Line)
NEW UF-Qarray
UF-Lens

Installation of the ion sampling technology, ion optical system, and vacuum system, newly developed for the LCMS-8060, allows the LCMS-8045/8050 to achieve comparable performance to the LCMS-8060.
After upgrading, the system will have the same level of performance as the LCMS-8060, excluding its external appearance.
This is recommended for customers who want higher sensitivity in the LCMS-8045/8050 they are using.

Note: Changing the external appearance to that of the LCMS-8060 is not included.
The UFsweeper III collision cell is included in the LCMS-8045 upgrade kit.
Contact your Shimadzu representative for further details.

High Performance Liquid Chromatograph Triple Quadrupole Mass Spectrometer
LCMS-8040
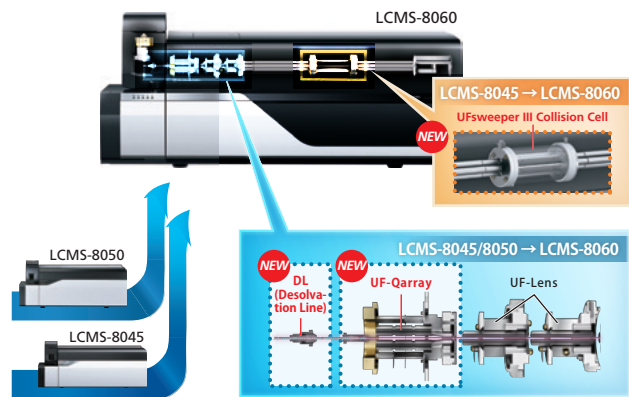
UFMS
ULTRA FAST MASS SPECTROMETRY

The LCMS-8040 was designed to provide significantly higher sensitivity while maintaining the high speed offered by the LCMS-8030. Ultrafast MRM transition speeds, up to 555 MRMs per second (dwell times of 1 msec and pause times of 1 msec) are achieved. In addition, the LCMS-8040 features the world's fastest* polarity switching at 15 msec and high speed scanning rate of 15,000 u/sec. By incorporating newly improved ion optics UF-Lens™ and UFsweeper™ II collision cell technology, the LCMS-8040 provides higher multiple reaction monitoring (MRM) sensitivity. This higher sensitivity expands the potential range of LC/MS/MS applications.
* Per survey result as of May 2012

Mass range	m/z 10 to 2000
Resolution	R < 0.7 FWHM
Scan speed	Max 15000 u/sec
Positive-negative ionization switching time	15 msec
MRM measurement speed	Max 555 ch/sec

Note: Product does not include LC Units.

Option for LCMS-8060/8050
LDTD Ion Source

New

The LDTD* ion source provides for ultra high speed analysis. After a sample is dispensed and dried on a specialized plate (96 holes), the sample is volatilized by laser irradiation and ionized with the corona discharge of atmospheric pressure chemical ionization (APCI). This system makes possible ultra high speed analyses that take only 4 seconds per well, without using chromatography. It is expected to be widely used for pharmacokinetic screening in the pharmaceutical industry, where the demand for high-throughput multi-analyte analysis is high, and for screening inspections in the forensic medicine, clinical, and foodstuffs fields, which require rapid analysis using simplified sample preparation. When combined with an LCMS-8060/8050, highly reliable, ultra high speed analyses become a reality.
* LDTD: Laser Diode Thermal Desorption
Note: LC and LCMS units and a PC are not included with this product.

Chromatography Systems
Mass Spectrometry Systems
Spectroscopy Systems
Life Science Systems
X-ray and Surface Analysis Systems
Environmental Measurement Systems
Material Testing and Non-Destructive Inspection Systems
Physical Properties Measurement Systems

## Multi-analyte Quantitation Support Software
LabSolutions Insight

This software performs the data analysis of the multi-analyte quantitation for the LCMS-8060/8050/8045/8040 and GCMS-TQ/QP series, and produces a coordinated display of the quantitation results, ordered according to the individual compounds targeted or the individual measurement data. Here, direct revision of peaks and re-quantitation can be performed. Using color-coded flags, operators can display only the results they wish to check from those for multiple analytes. This function improves the visibility of quantitative results. With the QC chart function, operators can check on fluctuations in retention times between sample data sets for each compound, which makes it easy to assess the condition of standard samples and the instruments. Adding a license allows multi-analyte data to be analyzed from a client PC connected to a network. Measurement, data analysis, and confirmations can be performed respectively on separate PCs, which dramatically improves productivity.

LC/MS/MS Screening Software
LabSolutions Insight Library Screening *New*
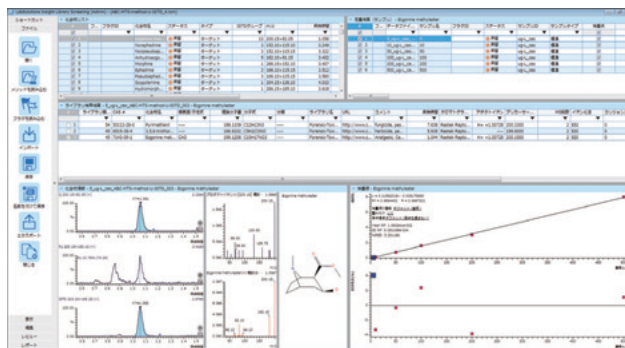
This optional software for LabSolutions Insight uses the MTS* method to search for MS, MS/MS spectra of known compounds in the library, and spectra of the actual sample, and then displays both the qualitative results and the quantitation results. In the search results window, structural formulas and spectra are displayed, making it easy to determine whether are not the compound of interest has been identified. Library searches for MRM can also be performed in addition to searches for MS/MS spectra, which is a useful feature for confirming compounds. Moreover, the search results can be printed at the same time as the quantitation results. Since all of the functions of LabSolutions Insight can also be used, qualification and quantitation can be performed simultaneously.

* MTS: Multi-Targeted Screening

Analysis software for LCMS-8060/8050/8045/8040
# LabSolutions Connect *New*

Triple quadrupole mass spectrometers are used for the quantitative analysis of compounds in a great variety of industrial fields, and the number of compounds being targeted for analyses is on the increase. For this reason, there are increasing demands for making analytical work faster and easier with (1) Optimized MRM transitions, which is important for multi-component quantitative analysis using LC/MS/MS, and (2) Automated optimization of interface parameters necessary for achieving highly sensitive analysis. With LabSolutions Connect, it is possible to select either the Standard mode, in which optimization of MRM transitions and collision energy (CE) is mainly performed, or the Advanced mode, which has increased sensitivity as its purpose. A vast amount of optimization results is managed in a database, and as necessary, analytical parameters are called up from the database, to be reflected in, and to be used to create analytical method files/batch files. Additionally, quantitative analysis of the analytical data can be carried out in this software, thus creating a seamless workflow.

Note: LabSolutions LCMS and LabSolutions Insight are required separately.

Software Platform for Glycan Quantification and Qualification by LCMS-8060/8050
Erexim Application Suite
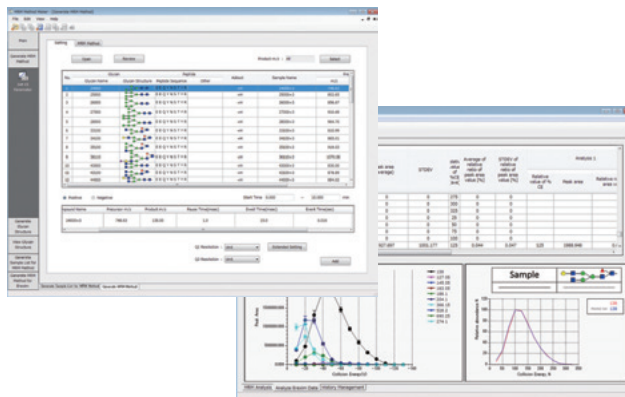
Erexim (Energy-resolved oxonium ion monitoring) is highly innovative, patented technology that enables you to understand the structure and relative amounts of each glycans without decomposing glycopeptide. (Developed in collaboration with RIKEN) This product consists of the following three software applications.
(1) Profile Database Manager, which provides for the registering/editing of basic data, such as that for glycan structures.
(2) MRM Method Maker, for easily creating methods
(3) Data Analyzer, which automatically creates graphs of analytical data
By using this software, the entire process from creating glycan structures to the setting of MRM transitions can be performed graphically.

For LCMS-8060/8050/8045/8040/8030/2020

Trap-Free 2D LCMS System

1st dimension HPLC
(Non-volatile mobile phase)

mAU (×10)
270nm, 4nm (1.00)   PDA chromatogram

UV chromatogram
Sample spiked
Blank

1:TIC 1:265.1   Mass chromatogram

265.1   Mass spectrum
Molecular Formula = $C_{11}H_{12}N_4O_2S$
Monoisotopic Mass = 264.0681 Da

2nd dimension LCMS
(Volatile mobile phase)
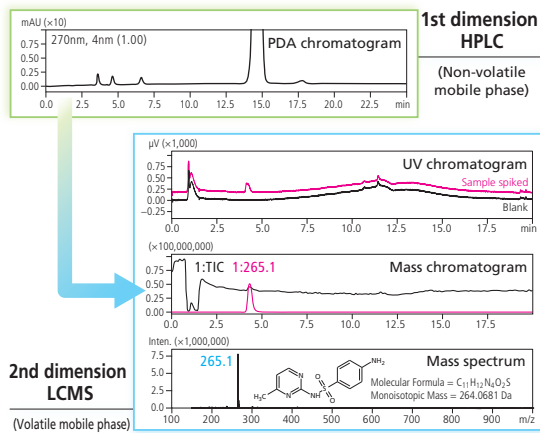
This convenient support tool enables online switching from a nonvolatile mobile phase to a volatile mobile phase. Simply enter the retention time for an impurity peak observed in the 1st dimension UV chromatogram. The optimal valve sequence is then constructed, and only the impurities of interest are introduced into the MS unit, so there are no concerns about misidentification. This significantly reduces the time and effort needed to examine conditions for volatile mobile phases, which can contribute to heightening the efficiency of identifying impurities.

Note: This system consists of an LC unit, mass spectrometer, and a start kit.

For LCMS-8060/8050/8045/8040/8030

LC/MS/MS Method Packages
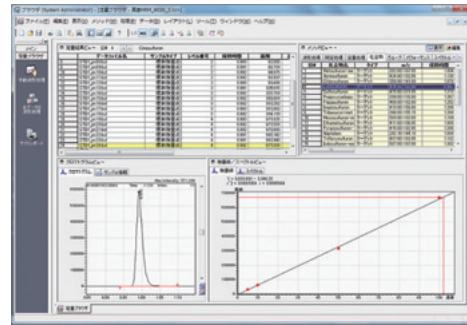
The MRM conditions must be optimized before performing quantitation by MRM. However, this imposes a greater burden on the operator as the number of compounds subjected to simultaneous analysis increases. Shimadzu offers the following method packages to reduce the operator's workload:

Residual Pesticides	836 components
Veterinary Drugs	42 compounds
Water Quality Analysis	76 compounds
Rapid Toxicology Screening	161 compounds
Primary Metabolites	55 + 97 compounds
Lipid Mediators	158 compounds
Cell Culture Profiling	95 components
D/L Amino Acids	22 amino acids
Mycotoxins	27 mycotoxins
Short Chain Fatty Acids	22 components
Forensic Toxicology Database	more than 2,500 compounds
Aminoglycoside Antibiotics	13 aminoglycosides

For LCMS-8060/8050/8045/8040/8030

LC/MS/MS MRM Library for Phospholipid Profiling

LCMS-8060

In order to identify phospholipids, it is important to determine the phospholipid class, such as choline and ethanolamine, as well as to estimate the fatty acid composition of their skeletal structures.
The MRM library contains examined MRM transitions, which eliminates the troublesome process of examining MRM conditions and LC methods, significantly shortening the time needed for method development. As a result, it achieves a smooth analysis process. Further, by using the method parameter list included in the product, new methods for only the components of interest can be created. The library includes phospholipid classification methods (422 components) for analyzing main phospholipids in biological samples containing C14 to C22, fatty acids, as well as fatty acid composition determination methods (867 components). These two types of methods enable batch analysis for determining a variety of phospholipids contained in biological samples.

For LCMS-8060/8050/8045/8040/8030

LC/MS/MS MRM Library for Metabolic Enzymes in Yeast

LCMS-8060

Analyzing a large number of proteins require considering a massive number of MRM conditions. However, the amount of time required for method development can be reduced significantly using this MRM library, which includes a collection of MRM transitions that have already been considered. In addition, the method parameter list included in the library can be used to create new methods specifically for measuring only the desired components. With the MRM library, analytical processes can be performed smoothly without the need for complicated operations involved in selecting parameters or methods. This product includes MRM transitions for all 498 peptides trypsin-digested from 228 enzymes relevant to the primary metabolites of budding yeast. It is applicable for analyzing all enzymes related to primary metabolic pathways.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

High-Performance Liquid Chromatograph Mass Spectrometer
LCMS-2020

UFMS
ULTRA FAST MASS SPECTROMETRY

LCMS-2020 is optimized for the Prominence UFLC/UFLCxR Ultra Fast Liquid Chromatograph. Novel patent-pending technologies offer significantly enhanced scan speed and positive-negative ion polarity switching time, which are essential for UFLC, and simultaneously boost sensitivity. The instrument combines the excellent compound selectivity that is a feature of the mass spectrometer with significantly enhanced total productivity – from method development to analysis.
The LCMS-2020 plays a useful role in a range of fields, including the synthesis of compounds in the pharmaceutical and chemical industries.

Mass range	m/z 10 to m/z 2,000
Sensitivity	ESI: reserpine 1 pg, S/N > 150 (RMS) APCI: reserpine 1 pg, S/N > 100 (RMS)
Resolution	R=2 M
Scan speed	Max 15,000 u/sec
Positive-negative ion polarity switching time	15 msec

Note: This Product does not include LC units.

Workstation for LCMS-8080/8040/8030/2020
LabSolutions LCMS
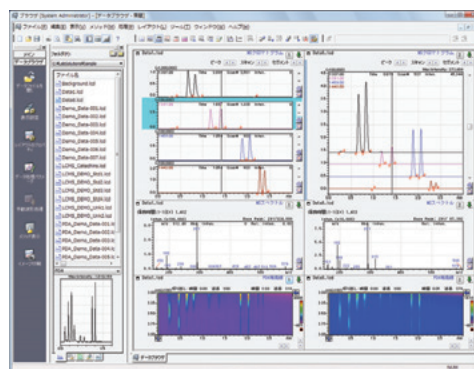
LabSolutions LCMS Workstation Ver. 5, which controls the LCMS-2020 and performs data processing, also supports control of the Nexera. It has been enhanced with a Quant Browser function to perform multi-sample quantitation, and a Data Browser to perform qualitative processing of multiple data. The Data Browser performs peak detection and other analysis of multiple data, and also presents chromatograms and spectral comparisons in a single window. Furthermore, through coordination of LC and MS data, it demonstrates its effectiveness in impurity identification and compound checks. In addition, the already popular report functions are expanded to enable printing in a variety of output formats.
Note: This is not applicable with LCMS-2010 series, LCMS-QP8000 series or LCMS-IT-TOF.

Open Access Software for LC and LCMS
Open Solution Analytical

Supports LC and LCMS analysis in an open access environment. After logging in on the sample registration window, registration of samples and the analyses can be performed in one window. Moreover, data can be displayed using the Open Solution data browser simply by clicking the link in the e-mail that is sent after the analysis is complete. Once the data browser has been set up on the server PC, all members of a research team can view the data without installing software on their PC. In the data browser, peaks can be added or deleted for the chromatogram using simple operations. Also, since structural formulas and the like can be easily pasted into the window when creating reports, the degree of perfection for such reports is enhanced. When a multiple number of mobile phases and columns are being used, the cleaning of the flow path is executed automatically, so the system can be operated with great stability.

Note) This software is not compatible with the LCMS-2010 series, the LCMS-QP8000 series, or the LCMS-IT-TOF.

Open-Access Software for LC and LCMS
Open Solution Purification

Sample Registration

Data Browser

This provides support for optimizing and automating the process of scaling up analytical conditions required for compound purification by LCMS to preparative applications. It automatically generates optimized preparative LC gradient parameters based on decision criteria specified in advance in the software. If there is a problem for preparative LC, such as impurities located in proximity to the retention times of target compounds, samples are color-coded accordingly in the window for sample registration (green if "OK," yellow if caution is required, or red if unsuitable), to ensure that preparative purification can be performed efficiently. Preparative LC results can be accessed immediately via the Data Browser and is displayed associated with the sample, so that results can be judged at a glance. In fractionation results, the fraction corresponding to a specified region in the chromatogram is highlighted blue, so that it is easy to quickly determine the correspondence between fractions and peaks.

Note) Only supported by the LCMS-2020.

High Performance Liquid Chromatograph
Ion-trap Time-of-flight Mass Spectrometer

## LCMS-IT-TOF

UFMS
ULTRA FAST MASS SPECTROMETRY

This unique, tandem mass spectrometer combines an ion trap with a time-of-flight (TOF) mass spectrometer. The ion trap offers MS^n capacity (MS/MS, MS/MS/MS, MS/MS/MS/MS, …) and the TOF provides high-resolution, highly accurate MS analysis capacity. Together, they offer the diverse analysis information required for effective structure analysis.

Mass range MS	m/z 50 to 5,000
Mass range MS^n	m/z 50 to 3,000
Resolution	R > 10,000 at m/z 1,000 (FWHM)
Precursor resolution	R > 1,000 at m/z 1,000

For LCMS-IT-TOF

Glycolipid Library

MS Spectrum

MS/MS Spectrum Precursor m/z 970.72

MS/MS/MS Spectrum Precursor m/z 646.61
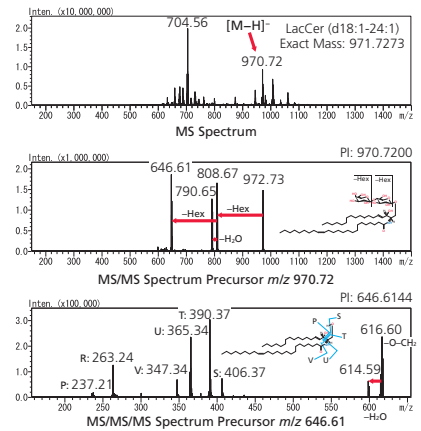
Glycolipids is a general term for compounds in which sugar chains are bound to lipids. They are a focus of interest as a target for research in a variety of fields including drug discovery and cosmetics development.

The glycolipid library includes data for a total of 309 types of glycolipids such as gangliosides, ceramides and acidic glycolipids. It contains accurate mass information and spectra up to MS^4 obtained by LCMS-IT-TOF after extraction and purification from actual samples. A number of glycolipids for which standard substances are not commercially available are also included. Using the glycolipid library makes it possible to specify not only the sugar chain structure of glycolipids existing at trace quantities in biological samples, but also the lipid structures.

Software for LCMS-IT-TOF

Formula Predictor
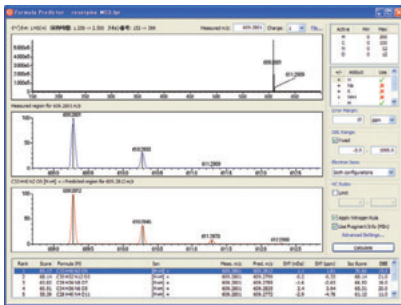
This is LCMSsolution optional software for LCMS-IT-TOF. The software offers more than formula predictions from calculated exact masses. It enhances the reliability of the results by narrowing down the number of candidates by comparing the candidate isotope patterns with measured ion isotope patterns, and uses functions (patent-pending) to narrow down the number of candidates by determining whether MS^{n-1} candidates for univalent and multivalent ions contain the MS^n predicted structure.

Metabolite Structural Analysis
Software for LCMS-IT-TOF
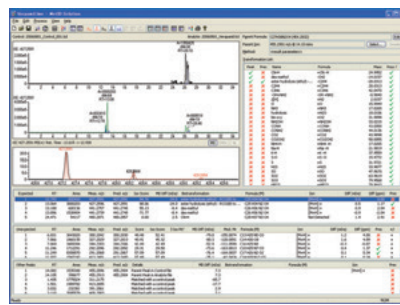
MetID Solution

This is LCMSsolution optional software for LCMS-IT-TOF. MetID Solution compares the pre-metabolized control sample and post-metabolized target sample data to identify metabolites. Unique multivariate analysis functions are applied to metabolites not expected in the metabolic pathway to acquire comprehensive metabolite candidate information.

Open Access Software
for LCMS-IT-TOF

Open Solution ComponentID
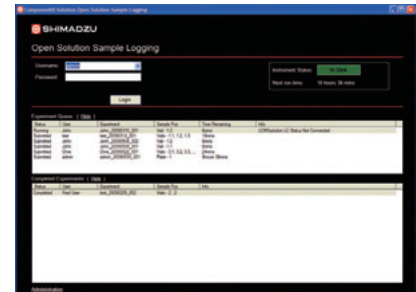
Open Solution ComponentID is a software tool developed to meet the demand for open access to precision mass measurements using LCMS-IT-TOF, without the need to rely on expert operators. Analysis can be performed in just 3 steps. After measurements are completed, an estimated composition report is automatically sent to the email address of the logged-in user.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Supporting Micro Flowrate Range
**Liquid Chromatograph Mass Spectrometer System**

New

Nexera Mikros

Robustness and Operability Combined with High Sensitivity

While continuing to provide the same robustness and operability that our liquid chromatograph mass spectrometry (LC/MS) systems are known for, the Nexera Mikros is a micro LC/MS system that achieves a degree of sensitivity that is more than 10 times that of previous models. Moreover, thanks to features such as the UF-Link mechanism, which provides for the one-touch connection of analytical columns to the mass spectrometer, almost anyone can simply and securely perform high sensitivity analyses. Such things enhance usability. This system provides a solution for the issues faced by previous LC/MS or nano LC/MS, such as sensitivity, robustness, ease-of-use, and throughput.

More Than 10 Times Higher Sensitivity Compared to Previous LC/MS Systems

Thanks to the new control system of the solvent delivery pump, the stabilized feeding in the micro flowrate range has been possible. Additionally, the ionization interface with optimized position and angle when injecting samples into the mass spectrometer. Together, these features make it possible to achieve more than 10 times the sensitivity of previous LC/MS systems.
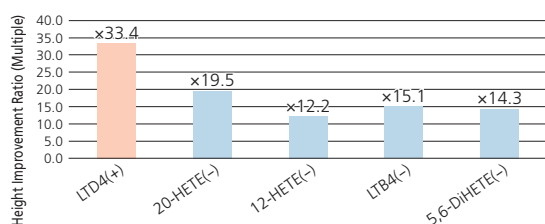
Intensity improvement ratio relative to previous products for 5 lipid mediator components
(LC flowrate 400 μL/min. vs 2 μL/min.)

Robustness Remains the Same

The ionization interface is optimized for analyzing in the micro flowrate range, so it prevents unwanted droplets from entering the mass spectrometer and contaminating the interior. Superior robustness is assured thanks to its contamination-proof design.

Anyone Can Easily and Reliably Perform Analysis

With micro-LC/MS analysis, minute gaps at the portion where tubing is connected can cause diffusion of the sample and lead to a loss in sensitivity. The newly developed "UF-Link" mechanism provides for one-touch, secure connection of analytical columns to the ionization interface of the mass spectrometer. Anyone can easily perform high sensitivity analyses with a minimum sensitivity loss.

Place the column in the UF-Link mechanism in the oven.

Lower the lever, and the connection is complete.

**Probe Electrospray Ionization Mass Spectrometer** *New*

DPiMS-2020

Before performing measurements using a mass spectrometer, solvents and columns need to be prepared and the approximate concentration of the sample needs to be considered. However, when performing measurements using the DPiMS-2020, the only thing that needs to be done as preparation is to place a small amount of the chemical, foodstuff, or biological sample on the plate. Simply select the probe control and mass spectrometric conditions on the window of the dedicated software PESI MS Solution and click the button to start measurement. Measurement results can be acquired in approximately two minutes. Analysis of the results is performed using LabSolutions LCMS, the analytical data processing system.

Features of PESI (Probe Electrospray Ionization Method)

- MS analysis can be started quickly, with a minimal amount of pretreatment.
- Enables monitoring of changes over time, such as for synthesis reaction and deterioration.
- Since only the tiny amount that contacts the probe is ionized, it offers great resistance to contamination of the MS section.

PESI (Probe Electro Spray Ionization)-MS
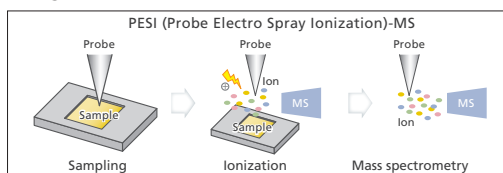
Analysis of Surfactant Mixtures

By measuring samples containing mixtures of multiple surfactants, changes in the spectral patterns can be easily confirmed. With shampoos and the like, measurements can often be performed simply by adding the sample directly to the plate, so analytical results can be obtained quite easily.
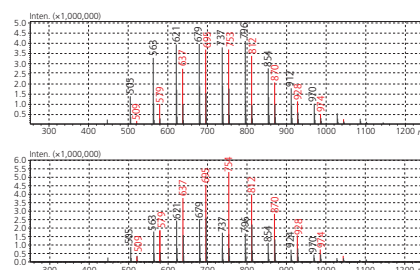
Sample: PPG Diol:PPG Triol Upper 1:1 Lower 1:2.5
Solvent: 50% IPA aq. (0.05% formic acid)

Automatic LCMS Pretreatment System

CLAM-2000

Revolutionize Your Workflow by Automating Pretreatment

- Manual pretreatment unnecessary
- Simple operations via a touch panel
- Improved data accuracy and repeatability (accuracy management functions)

The CLAM-2000 samples blood, urine and other biological samples directly from collection tubes, and performs everything automatically, from deproteinizing and other pretreatment to LCMS analysis.

This leads to a revolution in workflow for routine processes in the monitoring of pharmaceutical agents and metabolites in biological samples, and research into drug intoxication.
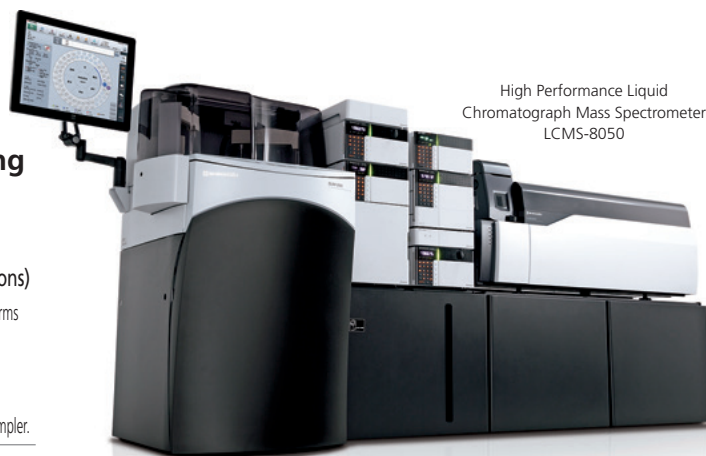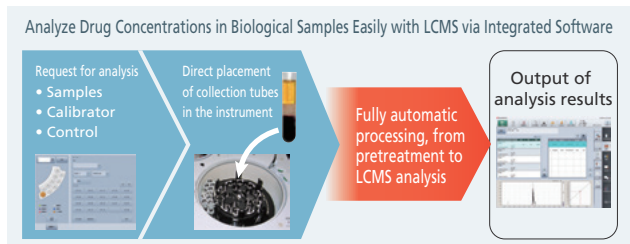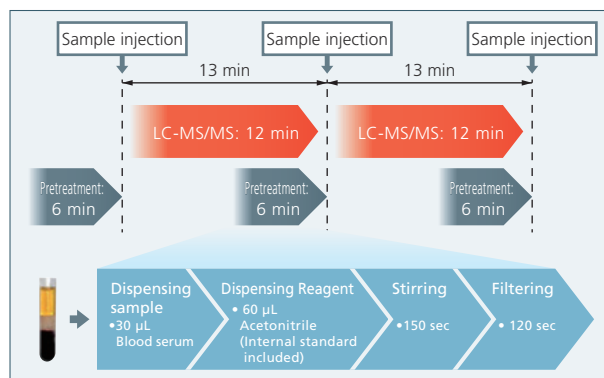
It can be connected to the LCMS-8060/8050/8040 system that incorporates the Shimadzu SIL-30AC autosampler.

High Performance Liquid Chromatograph Mass Spectrometer LCMS-8050

Pretreatment method	Liquid volume treated	Max. 350 µL
	Pretreatment processes	Sample and reagent dispensing, mixing, suction filtration, and heating *Up to 20 processes
	Pretreatment method	Each sample processed successively in parallel
	Number of placeable vials	Filter vial: 60, Sample vial: 60, Reagent vial: 20

Note 1: LC and LCMS units are not included with this product.
Note 2: For Research Use Only. Not for use in diagnostic procedures.

Automatic LCMS Pretreatment System CLAM-2000

Analyze Drug Concentrations in Biological Samples Easily with LCMS via Integrated Software

Request for analysis
- Samples
- Calibrator
- Control

Direct placement of collection tubes in the instrument

Fully automatic processing, from pretreatment to LCMS analysis

Output of analysis results

Sample injection — 13 min — Sample injection — 13 min — Sample injection

LC-MS/MS: 12 min   LC-MS/MS: 12 min

Pretreatment: 6 min   Pretreatment: 6 min   Pretreatment: 6 min

| Dispensing sample •30 µL Blood serum | Dispensing Reagent • 60 µL Acetonitrile (Internal standard included) | Stirring •150 sec | Filtering • 120 sec |

Gas Chromatograph Mass Spectrometer

GCMS-QP2020

Smart Solutions Expand Laboratory Capabilities

UFMS
ULTRA FAST MASS SPECTROMETRY

The GCMS-QP2020 is a high-end model that features a new turbomolecular pump with heightened exhaust efficiency. It achieves the highest sensitivity levels using all carrier gases and analytical conditions.
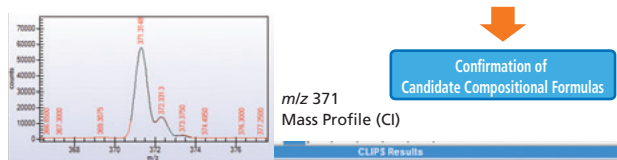
In addition to mass spectra, three different types of valuable information can be used in combination to support high accuracy qualitative analysis.

Smart SIM and multi-analyte quantitation support software dramatically improve productivity for everything from creating methods to data acquisition and analysis.

All the Information Required for Qualitative Analysis Is Easily Acquired

Qualitative analysis is supported by three types of valuable information: retention indices, molecular weights from the CI method, and accurate mass information,* in addition to mass spectra obtained from the EI method. The Quick-CI function can switch between EI and CI modes without stopping the MS unit. In combination with information from composition estimates, even higher level qualitative analysis can be performed.

* Accurate mass refers to the accurate mass calculated mathematically by MassWorks. MassWorks is a trademark of Cerno Bioscience.

(×10,000,000)

EI data
CI data

Example of Analysis of Additives in Polymer

Confirmation of Fragments

EI 129
57 112 147 241 259

Confirmation of Molecular Weights

CI M+H⁺ 371
129 147 241 259

m/z 371
Mass Profile (CI)

Confirmation of Candidate Compositional Formulas

Composition Estimation Using MassWorks Software

Gas Chromatograph Triple Quadrupole Mass Spectrometer
GCMS-TQ8050

Triple Quadrupole Gas Chromatograph Mass Spectrometer
GCMS-TQ8040

A new detector with better amplification performance maximizes the benefits of the OFF-AXIS Ion Optics, which offers both high ion transmission performance and outstanding noise elimination performance. These state-of-the-art technologies enable the system to reliably detect ultra-trace quantities of ions, down to the femtogram level, achieving the world's highest sensitivity levels. In addition, The contamination-resistant ion source and the new detector with over five times longer service life ensure reliable, long-term analysis.
A new turbomolecular pump with higher evacuation performance achieves a superior vacuum state in the MS unit. This results in higher sensitivity and stability and helps improve analysis accuracy for ultra-trace concentration levels.

Although the chemical substances in multifarious samples can be effectively analyzed even in trace amounts using GC-MS/MS, it requires the setting of a great variety of parameters and the creation of an appropriate method. Through implementation of a new firmware protocol and by including a method creation program, the GCMS-TQ8040 offers superior productivity and operability while inheriting all of the sensitivity, selectivity, and high speed performance of previous models. Complicated method creation tasks have been automated, allowing simultaneous high-sensitivity analysis of multi-analytes, which greatly enhances productivity.

Gas Chromatograph Mass Spectrometer
GCMS-QP2010 SE

Workstation for GC-MS
GCMS Insight Software Package

GCMSsolution Ver.4   LabSolutions Insight

The GCMS-QP2010 SE is a high cost-performance model featuring both a variety of functions and ease of operation.
In addition to high level performance, the user friendly design ensures that anyone can quickly and easily acquire highly reliable data, with ease of operation and maintenance in every situation.

Mass range	m/z 1.5 to 1,000
Measurable FWHM	0.5 to 2.0 u
EI scan S/N	1 pg octafluoronaphthalene m/z 272 S/N ≥ 600 (helium gas)
High-speed scan rate	10,000 u/sec

GCMS Insight is workstation software for GC-MS and GC-MS/MS systems, combining GCMSsolution and LabSolutions Insight into a single package. This software dramatically improves the efficiency of the analysis process, thanks to a user interface that can be operated intuitively even by novices; automatic method creation and data analysis functions that make multi-analyte and multicomponent analysis easier; and reliable qualitative analysis functions using retention indices.
In GC-MS analysis, a number of GC and MS parameters need to be optimized during data acquisition. The GCMSsolution automatic method creation function (Smart MRM/SIM), and automatic adjustment function for retention times (AART) make it possible to create optimal analytical methods automatically.
Furthermore, during data analysis, it is necessary to identify unknown components contained in samples, and to quantitatively determine over several hundreds of components quickly. LabSolutions Insight displays the chromatograms for each sample in sequence, making it easy to confirm peak detection results and whether criteria are exceeded. In addition, it displays quantitative results for each sample as a group. Thanks to the flagging function, peaks that deviate from the criteria are color-coded, making them instantly visually discernable. This dramatically reduces the number of peaks that need checking, so the process of quantitation can proceed efficiently.

Database for GC-MS and GC-MS/MS
Smart Database Series
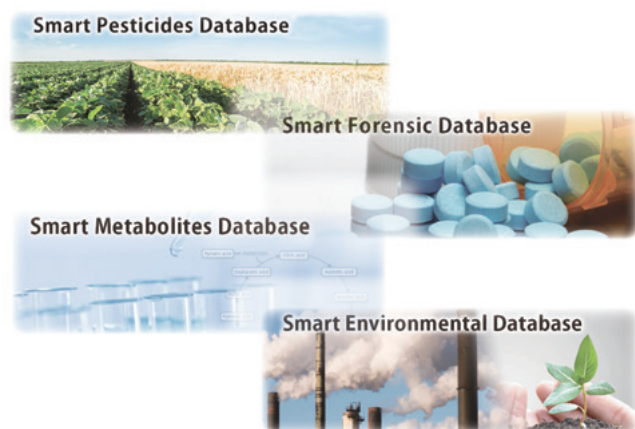
A great deal of effort is required to create MRM methods, including the optimization of transitions and collision energies, and the configuration of retention times using standard samples. With the Smart Database, compound information, transitions, and collision energies are preregistered. Methods configured with the optimal measurement times can be created automatically using the automatic adjustment of retention time (AART) and Smart MRM functions.

Description	No. of compounds registered
For residual pesticide analysis Smart Pesticides Database	MRM: 530 SIM: 530
For forensic toxicological substance analysis Smart Forensic Database	MRM: 486
For metabolite analysis Smart Metabolites Database	Scan: 651 MRM: 525
For environmental analysis Smart Environmental Database	MRM: 527

Note: Smart Forensic Database and Smart Environmental Database are for the GCMS-TQ series. They cannot be used with the GCMS-QP series.

Database for GC-MS and GC-MS/MS
Quick-DB Series

Quick-DB is a screening database that enables easy quantitation without using standard samples.
The database contains not only optimized MRM transitions and other analytical conditions, but also data analysis conditions including retention indices and calibration curve information acquired using the internal standard method.
Thanks to the automatic method creation function (Smart MRM/SIM), it allows analytical methods to be created easily, and quantitative values to be calculated without using standard samples.

Description	No. of compounds registered
Quick-DB Residual Pesticides Database	MRM: 491 Scan/SIM: 474
Quick-DB Forensic Forensic Toxicology Database	MRM: 68

Note: Quick-DB Forensic is for the GCMS-TQ series. They cannot be used with the GCMS-QP series.

GC and GC-MS Application System
Headspace Analysis System

The headspace sampler holds samples at a fixed temperature, and introduces the volatile components that diffuse into the gaseous phase into GC or GC-MS. It is used for qualitative and quantitative analysis of odor components of foods, aroma components of chemicals, and toxic volatile components in environmental water.

System configuration	GCMS-QP2020 + GCMSsolution + HS-20 series
Sample vial	20 mL or 10 mL (no adaptor required)
Number of samples	90
Sample temperature	300 °C max.

• Systems can also be configured with the GCMS-TQ series, QP series, GC-2030, GC-2010 Plus, GC-2014, or GC-2025.

Thermal Desorption System
TD-30 Series *New*

GCMS-TQ8040 + TD-30R

Thermal desorption systems heat samples in a sample tube and then concentrate the thermally desorbed gases before injection into a GC or GC-MS system. They are commonly used to measure volatile organic compounds (VOCs) in the atmosphere or measure trace components that are generated from plastic or other samples.
It is now possible to target a wide variety of components, from low boiling point to high boiling point. The lineup includes the TD-30, which can hold a maximum of 60 samples, and the TD-30R, which can hold 120 samples and supports re-acquisition and the addition of internal standard substances.

System configuration example	GCMS-TQ8040 + GCMSsolution + TD-30/30R
Number of samples	TD-30: 60, TD-30R: 120
Tube desorption temperature	Room temperature +15 °C to 430 °C (Accuracy ±1 °C)
Trap method	Cold trap (cooled with Peltier element)

• A system can be constructed with the GCMS-TQ series and GCMS-QP series. Contact your Shimadzu representative for further details.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Screening System for Phthalate Esters

Py-Screener

This system is designed for screening for phthalate esters in polymers. The use of phthalate esters is restricted in toys and food packaging and so on. They are expected to be regulated as restricted substances under the RoHS (II) Directive.
The system supports a series of procedures from sample preparation to data acquisition, analysis, and maintenance. It consists of special software, special standard samples, and a sampling toolkit. It provides an environment in which even novices can operate it easily.

System configuration example	GCMS-QP2020 + GCMSsolution + LabSolutions Insight + Py-Screener + EGA/PY-3030D Multi-Shot Pyrolyzer (Frontier Laboratories)

GC-MS Application System

Off-Flavor Analvzer

This analysis system can reliably identify the substances responsible for off-flavor problems.
To resolve off-flavor issues, the substances causing the odor must be identified. In order to accurately identify them however, expertise and experience are required to know what components are responsible for the off-flavor problems, to discriminate the quality of their odors and to use odor thresholds for those discriminations.
The system provides a database of the major odor-causing substances, as well as sensory information (odor qualities and odor thresholds), for use in combination with GC-MS.
It provides the total solution needed for off-flavor analysis.

System configuration example	GCMS-QP2020, GCMS-QP2010 Ultra, GCMS-TQ series multifunctional autosampler (AOC-6000 or AOC-5000 Plus) Sniffing port: OP275 Pro (GL Sciences) Multimode inlet: OPTIC-4

GC-MS Application System

AOC-6000 Multifunctional Autosampler System

The AOC-6000 supports three sample injection methods, either liquid sample injection, headspace (HS) injection, or solid phase micro extraction (SPME). Consequently, it can be used for analyzing samples in wide range of formats.
Furthermore, it can automatically switch between sample injection methods, so that a combination of different sample injection methods can be used within a single sequence of operations.

System configuration	GCMS-TQ8040 + GCMSsolution + AOC-6000
Sample capacity	98 × 2 mL/tray 32 × 10 mL/20 mL tray (Up to 2 trays can be loaded)
Syringe heating temperature	35 to 150 °C (1 °C steps)

GC-MS Application System

OPTIC-4 Multifunction Sample Injection System

The OPTIC-4 is a GC injection inlet that supports all GC-MS sample injection modes, including large-volume injection, injection port derivatization, thermal desorption, and difficult matrix introduction (DMI). It can be combined with the AOC-5000 Plus for automatic insert replacement to further enhance productivity for multi-sample analysis.

System configuration	GCMS-TQ8030 + GCMSsolution + OPTIC-4 + AOC-5000 Plus
Injection modes	Split/Splitless, large-volume, injection port derivatization, thermal desorption, thermal extraction, and difficult matrix introduction (DMI) injection modes
Max. operating temperature	600°C (35°C GC oven temperature)
Heating rate	1 to 60°C/sec
ressure range	7 to 700 kPa
Total flow range	5 to 500 mL/min (helium)

GC and GC-MS Application System
Pyrolysis System

This system performs pyrolysis for polymer compounds at 500 °C or higher, and analyze the pyrolysates obtained via GC and GC-MS. Since these pyrolysates reflect the structure of the original polymer compounds, they can be used to identify the polymers, and for higher-order structural analysis. Search software using a pyrolysis library also assists in the identification process.

System configuration example	GCMS-QP2020 + GCMSsolution + EGA/PY-3030D Multi-Shot Pyrolyzer (Frontier Laboratories)

• A system can be constructed with the GCMS-TQ series, QP series, and GC-2030/2010 Plus. Contact your Shimadzu representative for further details.

Multi-Dimensional GC/GC-MS System
MDGC/GCMS-2010 Series

This system performs separation using two columns that have different characteristics. It has a mechanism in which the components that are insufficiently separated in the first column they pass through are introduced ("heart-cut") to a second, different column. This enables analysis with a level of separation that cannot be attained in conventional single-column analysis. This is effective for the analysis of samples containing a very large number of compounds, such as petroleum products and perfumes.

Applicable detectors	GC-MS, FID, FPD, TCD, ECD, FTD
Sample injector	AOC-20i, HS-20, TD-20, AOC-5000 Plus

• A GC+GC-MS system can be used as an independent GC or GC-MS system.
• The analytical conditions can be configured easily using the dedicated MDGCsolution software.

Gas Chromatograph-Mass Spectrometer
Differential split flow turbo molecular pump system
Comprehensive GC-MS (GC×GC-MS) System

The Comprehensive GC/MS (GC×GCMSq) technique employs a modulator to link two capillary columns of complementary orthogonal phases. The technique requires a GC-MS system capable of very fast data collection to fully capture the very narrow, fast eluting compounds. Sensitivity is also an important requirement for many Comprehensive GC×GC applications. The GCMS-TQ series, QP series were developed with this multi-dimensional technique in mind. Its best-in-class data collection speeds and superior sensitivity make it the top choice for Comprehensive Chromatography.

35

Matrix-Assisted
**Laser Desorption/Ionization Time-of-Flight Mass Spectrometer**

New

MALDI-8020

Compact Design, Uncompromising Performance

The MALDI-8020 is a compact, desktop-type linear mode MALDI-TOF instrument that can be placed on a laboratory table. It provides all of the functionality of its predecessor, AXIMA Assurance.

Designed to have a small footprint, so it can fit even into narrow spaces (width of main unit 60 cm), and to be lightweight (weight of main unit 86 kg), it nonetheless achieves superior resolution and sensitivity. Moreover, longevity has been enhanced due to adoption of a solid-state laser, and it is equipped with TrueClean, an automatic ion source cleaning function. As a result, downtime is reduced to a minimum and maintenance costs can be reduced. It is readily capable of delivering the performance needed for measurements for QC and profiling applications that target peptides, proteins, polymers, oligonucleic acids, etc.
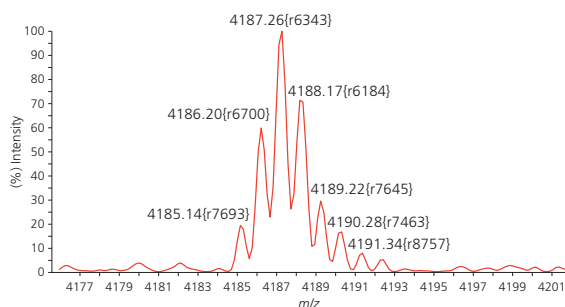
Measurement example of peptide with molecular weight 4.2 kDa showing a mass resolution (FWHM) of 5,000 or more

Sample Plate Can Be Chosen Depending on Application

A different type of plate can be selected depending on the flow of the experiment. The FlexiMass-DS is a disposable type that can be used as is. Freeing the analyst from the task of plate washing, it also reduces the risk of carryover, and supports a simple routine work process. The FlexiMass-SR is made of stainless steel and can be reused. It is ideal for situations where the cost of the disposables used for sample pretreatment are a concern, or when more long-term use is desired.

Mass range	*m/z* 1 to 500,000
Mass resolution	> 5,000 FWHM
Sensitivity	> 250 amol
Mass accuracy	< 20 ppm (internal standard), < 150 ppm (external standard)
Laser	Solid-state laser (355 nm) Pulse rate: 50, 100, 200 Hz (variable)

Matrix-Assisted Laser Desorption/Ionization
Time-Of-Flight Mass Spectrometer

MALDI-7090

This high performance flagship model achieves high speed measurement (MS, MS/MS) at up to 2 kHz, and high MS/MS resolution (10,000) via ASDF*. Thanks to truly high energy CID-MS/MS, this system maximizes structural data for a variety of samples including biologically active substances and industrial materials.
In addition, this system can flexibly accommodate a wide range of needs with its unique functionality, including a laser beam diameter-changing mechanism suited to imaging mass analysis; a sample loader with a 10 plate capacity, providing strong support for LC-MALDI; and multi-user compatibility.

Mass range	Linear mode	1 to 500,000 Da
	Reflectron mode	1 to 70,000 Da
Mass resolution	Linear mode	6,000
	Reflectron mode	25,000
	MS/MS	10,000
MS/MS function		CID/PSD
Mass accuracy	Reflectron mode	2 ppm (internal standard)

AXIMA Performance - a highly flexible
research-grade mass spectrometer

AXIMA Performance

A high-performance MALDI-TOF mass spectrometer utilizing state-of-the-art high-energy MS/MS, delivering unparalleled flexibility, in a robust and reliable research-grade system.

True high-energy MS/MS - CID with a laboratory frame collision energy of 20 KeV
Optimal precursour ion selection resolution using revolutionary gating technology
Outstanding sensitivity - uncompromised design, to ensure no MS/MS signal is discarded
Low sample consumption - allowing many more MS/MS experiments to be performed on the same sample spot
LC-MALDI software allowing confident identification of off-line separated complex mixtures via automated MS/MS

Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer

AXIMA Confidence / AXIMA Assurance

AXIMA Assurance

This high-sensitivity, high-throughput mass spectrometer provides strong support for proteomics research. The AXIMA Confidence achieves a mass resolution of 15,000, and is capable of high-sensitivity analysis thanks to high performance laser beam focusing. It is equipped with Shimadzu's proprietary (patented) curved-field reflectron (*CFR), so it can obtain PSD MS/MS spectra seamlessly from the low molecular weight region to the high molecular weight region, with a single measurement. AXIMA Assurance is the sister instrument to the AXIMA Confidence, and is exclusively for linear mode.

		AXIMA Confidence	AXIMA Assurance
Mass range	Linear mode	1 to 500,000 Da	1 to 500,000 Da
	Reflectron mode	1 to 80,000 Da	–
Mass resolution	Linear mode	5,000	5,000
	Reflectron mode	15,000	–
MS/MS function		Available (PSD)	–

* CFR: Curved Field Reflectron

AXIMA Application System

AXIMA for Microorganism Identification System

This system combines the AXIMA mass spectrometer, which is optimal for microbial identification, with microbial identification software. When microbes are analyzed directly with MALDI-TOFMS, a peak pattern (mass spectrum) is obtained, indicating the molecular weights of characteristic microbial proteins. By comparing the results to a database constructed using approximately 40,000 mass spectra, more than 1,900 different types of microbes can be identified. The microbes can be analyzed directly, without the need for gram staining, morphological determinations and other pretreatment required by conventional microbial identification methods (biochemical, culturing, and PCR). As a result, a microbial identification that would have taken several hours with conventional methods can be accomplished with this system in about 2 minutes, enabling high throughput analysis at a top speed of 1,000 samples per day. In addition, since pretreatment reagents are not required, running costs are reduced to about half that for existing methods.
Note: This system is not intended for use in clinical diagnoses. Use it only for research purposes.

Imaging Mass Microscope

iMScope TRIO

– Mass Microscopes Change "Observation" to "Analysis" –

This new type of analysis instrument combines morphological observation using a microscope with structural analysis using a mass spectrometer.
Microscopes allow observation of morphological images in great detail, whereas mass spectrometers produce images showing the distribution of the measured molecules. Overlaying the images obtained based on these two different principles and analyzing the resulting imaging mass spectrometer images increases the speed and accuracy of research.
Usage for LC-MS is also possible (optional).

Ionization method	MALDI or LDI
Laser irradiation field size	Min. 5 µm or less in diameter, adjustable in 11 steps
Analysis speed	Six pixels per second (Ionization time 50 ms, mass range 500 to 1000 with single MS)
Microscope observation modes	Bright field observation in epi-illumination/trans-illumination modes, and epi-fluorescence observation

Visualization of Lipid Distribution of Mouse Cerebellum

Optical Image
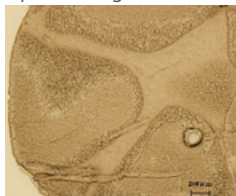
MS Imaging
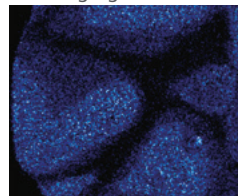
SM(d18:1/18:0)+K   (m/z 769.5)
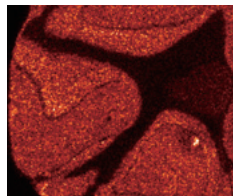
PC(16:0/16:0)+K   (m/z 772.5)
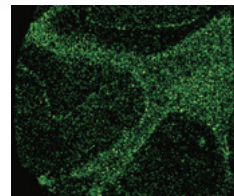
PC(18:0/18:1)+K   (m/z 826.5)
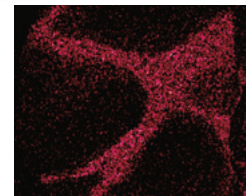
GalCer(d18:1/24:1)+K   (m/z 848.5)

Note: Sales area: All areas excluding North America

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Inductively Coupled Plasma Mass Spectrometer

ICPMS-2030

With its newly developed collision cell and optimized internal structure, the ICPMS-2030 provides superior sensitivity. At the same time, thanks to the adoption of its proprietary mini-torch unit and provision of an Eco mode, the quantity of argon gas needed for analyses has been greatly reduced to the industry's lowest levels. As a result, low running costs are assured.

The Development Assistant function of the software automatically sets the optimal analysis conditions for quantitative analysis. Then, after measurements are complete, the Diagnosis Assistant function automatically checks the validity of the necessary data. While reducing the burden on the user, the efficiency of analyses is enhanced and the reliability of the data can be increased. It complies with FDA 21 CFR Part 11.

Plasma ion source	Sample spray chamber	Cyclone chamber (electronically cooled)
	Plasma torch	Mini torch
	Nebulizer	Coaxial
High-frequency power supply unit		27 MHz, max. 1.4 kW
Mass spectrometer unit	Mass spectrometer	Quadrupole mass spectrometer
	Mass number range	5 to 260
	Collision cell	Octopole collision cell

System Design Enhances Both Sensitivity and Ease of Maintenance

A newly developed collision cell and optimized internal structure suppress the spectral interference and increase the penetration efficiency of atomic ions. Consequently, a very high level of sensitivity has been achieved, allowing for measurements at not only the ppt level, but even at the sub-ppt level.* When analyzing trace amounts of toxic elements, highly reliable quantitative results are provided.

Additionally, the sample injection unit and the interface through which ionized atoms pass can be easily removed and installed for easy maintenance, so highly stable analyses can be performed over a long time.
* The detection limit varies depending on the element.

Proprietary Assistant Functions Achieve Highly Reliable Quantitative Analysis and a Reduction in the Analysis Time

With previous ICP-MS analyses, isobaric ions, oxide ions, etc., needed to be ascertained in order to select the optimal mass numbers for elements targeted for measurement. In addition, a variety of other processes, such as deciding on sample concentrations for a calibration curve, required a great deal of time and skill.

However, when using the Development Assistant function, all the user needs to do is to select the element targeted for analysis and the appropriate analysis conditions will be set automatically. Moreover, when performing routine analyses using the same conditions, the highly effective Diagnosis Assistant function evaluates the validity of the analysis results by automatically checking for spectral interference. If any problems are found, it indicates the information of problem.

Mini-Torch Unit and Eco Mode Reduce Argon Gas Consumption and Running Costs

The quantity of argon gas that is consumed has been greatly reduced as a result of the adoption of our proprietary mini-torch unit. Additionally, the system is equipped with an Eco mode, which automatically reduces the gas consumption during standby. This results in an approximately 50 % reduction in the quantity of argon gas consumed, compared with previous systems. Since we guarantee that argon gas of a purity of 99.95 % can be used, the use of highly pure argon gas having a purity of 99.999 % or higher, which has been generally used, is unnecessary. As a result, highly sensitive analyses can be performed using less expensive industrial-use argon gas having a purity of 99.99 %.

This can contribute significantly toward cost reduction, which is an issue faced by many analytical laboratories.

Accelerating Reliable Performance

Creating Analytical Method Using Development Assistant

Prepare sample (pretreat sample)

Qualitatively analyze all elements

Select target measurement elements

The Development Assistant function automatically sets the optimal mass numbers and internal standard elements for the target measurement elements, and suggests a calibration scheme.

Method completed in **2 minutes**

2 min
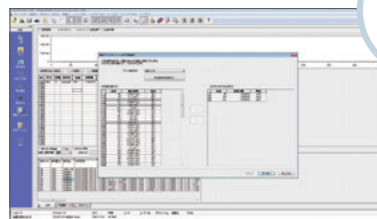
Checking Data Using Diagnosis Assistant

Check measurement results (all samples)

Diagnosis Assistant automatically checks for any spectral interference based on data for all elements and all mass numbers measured from all samples.
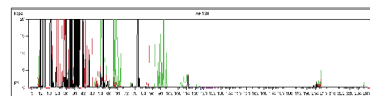
All Element and Mass Data

If a problem occurs, it indicates the type of problem and the sample where the problem occurred.

Checking process completed in **3 minutes**

3 min
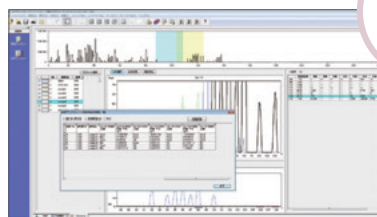
UV-VIS Spectrophotometer *New*

UV-1900

Navigate Your Way

The UV-1900 is a double-beam UV-Vis Spectrophotometer using Shimadzu's original LO-RAY-LIGH™ diffraction grating technology. In addition to its high optical performance, the UV-1900 features high resolution, low stray light, high reproducibility, and an ultra-fast scan function. It also has an easy-to-use interface on a color touch-screen display. The UV-1900 is designed to meet the needs of both high performance and usability. The UV-1900 is a double-beam UV-Vis Spectrophotometer using Shimadzu's original LO-RAY-LIGH™ diffraction grating technology. In addition to its high optical performance, the UV-1900 features high resolution, low stray light, high reproducibility, and an ultra-fast scan function. It also has an easy-to-use interface on a color touch-screen display. The UV-1900 is designed to meet the needs of both high performance and usability.

Easy to Operate, Obtain Answers Easily and Rapidly

The UV-1900 on-screen user interface includes large, easy-to-see icons deployed on a black background, so the instrument settings are evident at a glance. In addition, the large, easy-to-see icons improve intuitive understanding, which enables users to quickly become familiar with the operations. Furthermore, the user interface is designed to minimize transitions between windows, so users do not get confused during the operations.

Advanced Regulatory Compliance

· Validation functions enable checks in accordance with Pharmacopeia (JP, USP, and EP) to be performed easily
· In combination with LabSolutions™ DB/CS, comply with FDA 21 CFR Part 11 and PIC/S GMP guidelines

High Performance to Meet Diverse Needs

· Performance at the highest level in its class, provides advanced function than UV-1800
· Ultra-fast scan performance, capable of obtaining high-accuracy spectra in just a few seconds

Wavelength range	190 to 1,100 nm
Spectral bandwidth	1 nm
Photometric system	Double beam optics
Scanning speed	2 to 29,000 nm/min
Software	Photometric mode, spectrum mode, quantitation mode, kinetics mode, time scan mode, DNA/protein quantitation function, instrument validation function

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UV-VIS Spectrophotometer

UV-1280

In addition to spectral measurements and quantitative analyses, photometrics, DNA/protein quantitation, and high-level multi-component quantitation can also be performed. This means that it is fully equipped with all of the measurement functions required of a UV-VIS spectrophotometer, thus making it an "All-in-One UV" instrument.
By configuring the D2/WI lamp with a monitor double beam system, more than sufficient stability can be obtained despite its small size.
Equipped as standard with instrument validation, which facilitates maintenance inspections for the instrument.
Data can be stored on USB flash drive. Management/analysis can also be performed using a PC.

Wavelength range	190 to 1,100 nm
Spectral bandwidth	5 nm
Photometric mode	Monitor double beam
Stray light	0.05 % max.
Data storage	USB flash drive
Installed software	Photometric, spectrum, quantitation, kinetics, time scan, multi-component quantitation, DNA/protein quantitation, instrument validation

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Spectrophotometer for Life Science

BioSpec-nano
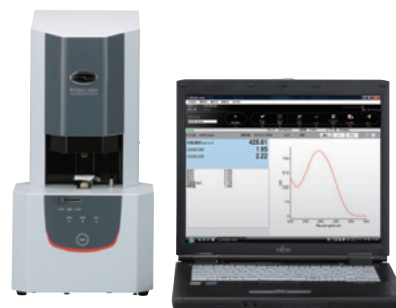
Capable of performing quantitation and purity checking of nucleic acids, quantitation of proteins, and photometric measurements (OD values displayed and printed for specified wavelengths, up to 8 wavelengths). Simply drop 1 to 2 µL of the sample onto the measurement window and press the instrument's Start button (or click the Start Measurement button in the software window), and all steps in the process, from setting the optical path length, measurement, up until the task of wiping off the sample from the measurement window, are all carried out automatically. Troublesome work of moving arm up and down and wiping the sample from the measurement window now unnecessary. Moreover, when using the specialized software, all it takes to perform a measurement, output a report, export data, or carry out other common tasks is to click buttons on the toolbar.

Optical path length	0.2 mm, 0.7 mm (switched manually)
Sample volume	Optical path length 0.2 mm: 1 µL or more, Optical path length 0.7 mm: 2 µL or more
Quantitation range (OD, calculated as density of double stranded DNA)	Optical path length 0.2 mm: 1 to 75 OD, 50 to 3,700 ng/µL Optical path length 0.7 mm: 0.3 to 21 OD, 15 to 1,000 ng/µL
Wavelength range	220 to 800 nm
Wavelength accuracy	±1 nm

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

UV-VIS Spectrophotometers
UV-2600/2700
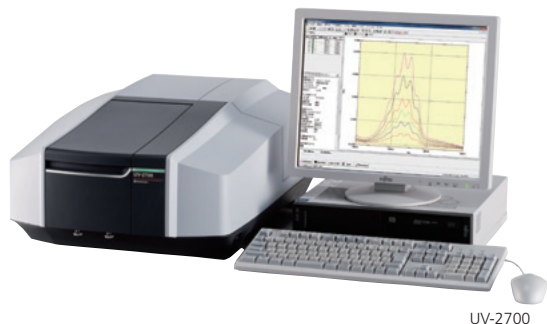
UV-2700

The UV-2600 is a single monochromator type that provides high cost efficiency, while the UV-2700 is a double monochromator type. These compact UV-Vis spectrophotometers feature miniaturized optical systems, a width of only 450 mm, and the smallest installation space requirements in their class. Low stray light has been achieved by adopting a Lo-Ray-Ligh grade diffraction grating, enabling high-level absorbance measurements up to 8-Abs with the UV-2700. In addition, with the UV-2600, the measurement range can be extended from 220 nm to 1,400 nm by installing the ISR-2600Plus Integrating Sphere Attachment. Newly-developed validation software is provided as standard.

Measurement wavelength range	185 to 900 nm (220 nm to 1,400 nm with the UV-2600 when the ISR-2600Plus is used)
Spectral bandwidth	0.1 to 5 nm
Stray light	UV-2600: 0.005% max. UV-2700: 0.00002% max.

UV-VIS-NIR Spectrophotometers
SolidSpec-3700/3700DUV

This system is equipped with an integrating sphere as standard. It uses three built-in detectors, a photomultiplier tube (for the UV and visible region), an InGaAs detector (for the near-infrared region), and a cooled PbS detector (for the near-infrared region), and achieves the world's highest level of sensitivity in the near-infrared region. The SolidSpec-3700DUV is designed for the deep ultraviolet region.

Measurement wavelength range	3700: 240 to 2,600 nm (190 to 3,300 nm)* 3700DUV: 175 to 2,600 nm (165 to 3,300 nm)*
Noise	0.0002 Abs max. (500 nm), 0.00005 Abs max. (1,500 nm) RMS value at 1 second response
Spectral bandwidth	0.1 to 32 nm
Stray light	0.00008 % max. (220 nm, NaI)*
Monochromator	2 × 2 grating type double monochromator

* When an optional direct detection unit is used

UV-VIS-NIR Spectrophotometer
UV-3600 Plus

Not only is the main spectrophotometer unit equipped with 3 detectors – photomultiplier tube (PMT), InGaAs, and PbS detectors, but the multi-purpose large-sample compartment and the integrating sphere attachment have also been equipped with these three detectors. Thanks to the InGaAs detector, which covers the range of wavelengths in the region of the switchover between PMT and Pbs detectors, where with existing instruments there was a drop in sensitivity, superior sensitivity has been achieved over the entire measurement wavelength range. Highly accurate absolute reflectance measurement is possible with an ASR series absolute reflectance measurement attachment, which assures the precision of measurements. Additionally, a thermoelectrically temperature-controlled cell holder or supermicro cell holder can be installed to accommodate a broader range of applications.

Measurement wavelength range	185 to 3,300 nm
Stray light	0.00008 % max. (220 nm, NaI) 0.00005 % max. (340 nm, NaNO$_2$)
Monochromator	2 × 2 grating type double monochromator

Spectrofluorophotometer
RF-6000

Achieves S/N ratios over 1000 (RMS) or over 350 (peak-to-peak), measures long wavelengths up to 900 nm, and scans at ultra fast 60,000 nm/min. Xenon lamp life has also been extended to 2000 hours. Instrument performance can be diagnosed easily using the validation function. Standard functionality such as high-speed 3D measurement, automatic spectral correction, and quantum yield/quantum efficiency measurement functions allow it to be used for a wide variety of applications. LabSolutions RF ensures that the extensive available functionality can be operated easily. When linked with the LabSolutions Network System, compliance with Part 11 can be achieved, adding to safety and ease of mind.

Light source/Lamp life	150 W xenon lamp with 2000 hr life
Measurement wavelength range	200 to 900 nm and 0 order
Resolution	1.0 nm
Sensitivity	The Raman peak S/N ratio for distilled water is over 350 (P-P), 1,000 or more (RMS)
Wavelength scan speed	Max. 60,000 nm/min

Fourier Transform Infrared Spectrophotometer *New*

IRSpirit

Despite their small footprint, smaller than an A3 size sheet of paper, these models have been engineered with a wide sample compartment that accommodates existing accessories from Shimadzu and other manufacturers. This capability makes them the smallest (installation footprint) and lightest FTIR spectrophotometers in the world that can be used with optional products from other manufacturers. They also include a program, IR Pilot, with 23 application-specific workflows that can be utilized without involving any complicated parameter setup process. Customers can select from either the IRSpirit-T model, which offers sensitivity equivalent to standard Shimadzu models, or the reasonably priced IRSpirit-L model.

Space-Efficient with High Expandability

Despite its compact size, the sample compartment width is the same as on higher-end models, allowing it to easily accommodate both Shimadzu and third-party accessories.
Samples can be measured with the unit positioned horizontally or vertically for sites with only a narrow space available. The start switch is accessible and the humidity indicator is visible from both directions. That means this single system can be used for a wide variety of applications.

200 mm

With the widest sample compartment in its class, it easily accommodates Shimadzu and third-party accessories.

Dedicated IR Pilot Program

The newly developed dedicated program (IR Pilot) features 23 standard application workflows within four programs: identification test, contaminant analysis, quantitative analysis and film thickness calculation, which can be conducted without setting parameters. By simply selecting the analysis purpose and accessory, analysis can be performed, which makes it easy for operators with minimal FTIR experience to obtain results.
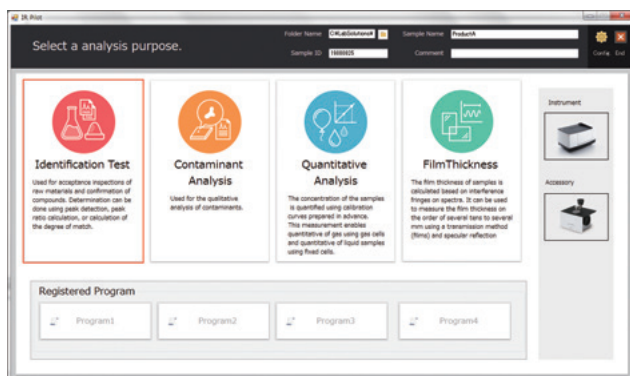
IRSpirit, Ready to Run

High Reliability Ensures the System Can Be Introduced with Confidence

IRSpirit offers the highest S/N ratio (30,000:1*) in its class using the technology inherited from the high-end model. Furthermore, the robust optics are designed to ensure the system can be used reliably even under harsh temperature and humidity conditions.
*: DLATGS detector with KBr window.
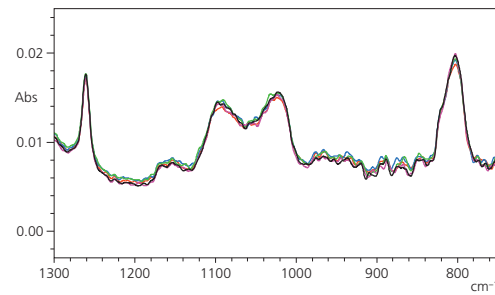
DLATGS Detector with Temperature Control
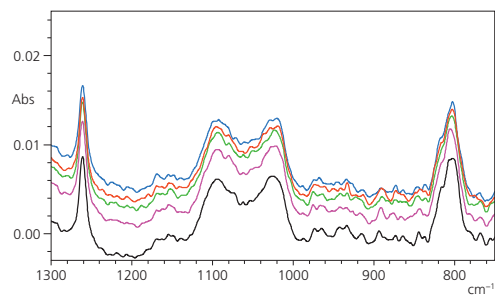
DLATGS Detector without Temperature Control

ATR Spectrum of Silicone Oil Content in Paraffin Oil (measurement repeated five times)

Interferometer	Michelson interferometer (30° incident angle) Equipped with Dynamic Alignment system Sealed interferometer with desiccant
Optical system	Single-beam optics
Beam splitter	Germanium-coated KBr
Light source	High-energy ceramic
Detector	IRSpirit-T model: DLATGS detector with temperature control IRSpirit-L model: LiTaO$_3$ detector
Resolution	0.9, 2, 4, 8, 16 cm^{-1}
Sample compartment	Equipped with automatic accessory recognition mechanism 200(W) × 140(D) × 100(H) mm Center focus

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

AIM-9000 Infrared Microscope

New

Automatic Micro Analysis System

Finally, the Era of Automatic Failure Analysis

Three Steps to
Pursuing Causes

Observe > Measure > Analyze

Observe — Look for the Item to Be Measured

**Quickly Determine the Measurement Position
—Wide-Field Camera and Microscope Camera—**

Shimadzu's proprietary wide-field camera and microscope camera help observe samples efficiently. In addition to observing a large area up to 10 × 13 mm, the wide-field camera also supports variable digital zooming. Furthermore, by sharing positional information with the microscope camera, it achieves a digital zoom function capable of zooming to a magnification of about 330× for observing extremely small areas as small as 30 × 40 μm.

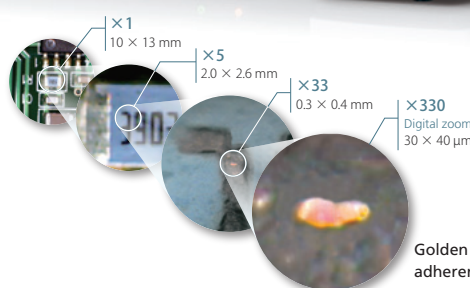### Measure — Determine Where to Measure, and Measure Automatically

**Automatically Determine Measurement Positions
—Automatic Contaminant Recognition System—**

A function that automatically recognizes contaminants is included standard. The analyst simply clicks one button and the software automatically recognizes the contaminant. It even determines the optimal aperture size and angle in only one second. The automatically determined measurement positions can either be measured without editing or the analyst can add or delete measurement positions. Sample images are stored into the measured spectra automatically.

Analyze — Identify the Cause of Failures

**Automatic Identification of Contaminants
—Contaminant Analysis Program—**

The contaminant analysis program, the functionality for automatically qualifying contaminants, is included as a standard feature in LabSolutions IR software. Measured spectra using AIMsolution can be loaded directly into LabSolutions IR and analyzed. The contaminant analysis program identifies measured contaminants with high precision.

×1
10 × 13 mm

×5
2.0 × 2.6 mm

×33
0.3 × 0.4 mm

×330
Digital zoom
30 × 40 μm

Golden contamination
adherent on metal plate

Measurement mode	Transmission, reflection, ATR
Optical system	15× Cassegrain objective mirrors 15× Cassegrain condenser mirrors (with automatic adjustment mechanism)
MCT detector	Wavenumber range: 5,000 to 700 cm^{-1} (narrow band) 5,000 to 650 cm^{-1} (middle band) Liquid nitrogen monitoring function: With a liquid nitrogen sensor
TGS detector (Option)	Wavenumber range: 4,600 to 400 cm^{-1} Automatically switches between detectors, if equipped with multiple detectors
Supports for observation and measurements	Auto focus, automatic adjustment function for lower Cassegrain, automatic ATR measurement (with purchase of pressure sensor)

Fourier Transform Infrared Spectrophotometer

IRTracer-100

This system achieves excellent sensitivity with an S/N ratio of 60,000:1, high resolution at 0.25 cm^{-1}, and high-speed scanning capable of 20 spectra/second. The performance of medium and higher end models is supported by high reliability including advanced dynamic alignment and an interferometer with a dehumidifier. This is compatible with applications active in a variety of circumstances, with a library of approximately 12,000 spectra and data analysis programs for contaminant analysis, and time course and rapid scan programs for reaction tracking.

Interferometer	Michelson interferometer (30° incident angle) Equipped with Advanced Dynamic Alignment system Sealed interferometer with automatic dehumidifier
Wavenumber range	7,800 to 350 cm^{-1} (standard), 12,500 to 240 cm^{-1} (optional)
Resolution	0.25, 0.5, 1, 2, 4, 8, 16 cm^{-1}
S/N ratio	60,000:1 or higher
Mirror speed	Standard: 2, 2.8, 5, 9 mm/sec Optional: 10, 20, 30, 40 mm/sec (rapid scan)

Fourier Transform Infrared Spectrophotometer

IRAffinity-1S
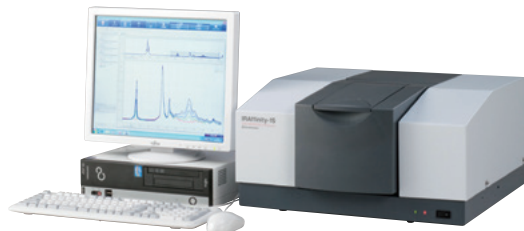
This compact FTIR spectrophotometer is designed in a stylish enclosure. A dynamic alignment mechanism ensures that the optimum interference state is maintained at all times, and easy maintenance is enabled by a built-in auto-drier. Highly functional software designed with the emphasis on operation ease enables data processing and analysis to be executed with ease.

S/N ratio	30,000: 1
Interferometer	Michelson interferometer featuring dynamic alignment
Resolution	0.5 cm^{-1}, 1 cm^{-1}, 2 cm^{-1}, 4 cm^{-1}, 8 cm^{-1}, 16 cm^{-1}
Wavenumber range	7,800 to 350 cm^{-1}

Atomic Absorption Spectrophotometer
AA-7000 Series

AA-7000 Full System

AA-7000 Series instruments are highly advanced atomic absorption spectrophotometers. The optical double-beam system enhances sensitivity and stability to achieve a top-class minimum limit of detection. Two types of background correction methods (D2, SR) are available. Dual Atomizer System offers automatic flame/furnace switching. AA-7000 has the smallest installation footprint in the class and are first instruments in the world fitted with a vibration sensor to improve safety. The system can be expanded to suit the requirements and can be configured to achieve the sensitivity required.

Measurement wavelength range	185 to 900 nm
Background correction method	D2 or SR method selectable
Accuracy management	QA/QC functions
Photometric mode	Optical double-beam photometric system
Atomizer	Dual atomizer (automatic flame/furnace switching)
Hollow-cathode lamp	Six lamps, automatic setup

Atomic Absorption Spectrophotometer
AA-6200

The AA-6200 is a completely PC-controlled Atomic Absorption Spectrophotometer featuring easy-to-use Windows XP software with the Wizard function, double-beam optics, and D2 background correction. The AA-6200 uses the least linear bench space of any Atomic Absorption Spectrophotometer in the world.

Measurement wavelength range	190 to 900 nm
Background correction method	D2-Lamp method
Atomizer	Flame only
Hollow-cathode lamp	Two lamps, automatic setup

Optical Emission Spectrometer
PDA-8000

This instrument is capable of high sensitivity quantitative analysis of iron and steel, copper, aluminum alloys and other solid metals, as well as impurities and other elements, thanks to a high resolution monochromator and discharge energy stabilized excitation unit. Excellent operability is achieved with software that enhances instrument monitoring and maintenance support functionality. In addition, this is an energy saving model that significantly reduces energy consumption.

Optical Emission Spectrometer
PDA-7000 Series

PDA-7000

Emission spectrometry enables rapid and accurate simultaneous determination of many elements in metals. This technique has been adopted as a standard method for metals analysis. The Shimadzu PDA series is a high-performance optical emission spectrometer, utilizing the PDA (Pulse Distribution Analysis) method as standard, which enhances the accuracy and reliability of analyses. The PDA method, combined with excellent hardware quality, makes the PDA series suitable for any application in metals analysis. It enhances analysis productivity in quality control and process control in the ferrous and non-ferrous metals industries.

Focal length	600 mm
Grating	2,400 grooves/mm
Reciprocal dispersion	1st order : 0.69 nm/mm 2nd order : 0.34 nm/mm
Effective wavelength range	121-589 nm

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Multitype ICP Emission Spectrometer

ICPE-9800 Series

Due to their high detection sensitivity down to ppb levels, ability to analyze a broad 5 to 6-digit range of concentrations, and ability to measure multiple elements simultaneously, ICP emission spectrometers are used in a broad range of fields, such as environmental testing, pharmaceuticals, foods, chemicals, and metals.

The next-generation ICPE-9800 series offers the superior accuracy necessary to simultaneously and quickly analyze multiple elements regardless of their concentration levels and they also feature user-friendly software that makes analysis easy.

Reduces Gas Consumption Costs

Eco Mode

The Eco mode can be used to reduce the argon gas consumption rate and high-frequency wave output during standby to about half the level used during measurements.

Mini-Torch System

By using a mini-torch, the system consumes about half the argon of the previous model.

Vacuum Spectrometer

Due to the vacuum spectrometer used, there is no need to continue purging the spectrometer with high-purity argon or nitrogen gas, as is required with standard purged type spectrometers.

Supports Using Argon Gas with 99.95 % Purity

The system is guaranteed for use with 99.95 % purity argon gas,

BEST for all laboratories

which means less expensive industrial grade argon gas (99.99 %) can be used.

Without the need for expensive high-purity (minimum 99.999 %) argon gas required for conventional ICP systems, the ICPE-9800 can significantly reduce costs.

Simplified Data Analysis Process

The ICPEsolution software included in the system makes full use of the ICPE-9800's multitype performance so that problems with measurement samples can be evaluated from various angles.

An assistant function automates the evaluation process so that accurate measurements can be obtained easily.

Light source	Axial view (ICPE-9810) or axial and radial view (ICPE-9820), mini-torch
Spectrometer / detector	Echelle semiconductor detector (CCD)
Measurement wavelength range	167 to 800 nm
High-frequency power supply	27 MHz, 1.6 kW max.

Twin Sequential ICP Emission Spectrometer

ICPS-8100

An ICP Emission Spectrometer boasting high speed and high resolution.

The twin sequential monochromators enhance the speed to yield semi-quantitative values in approximately three minutes for the qualitative analysis of 72 elements. The analysis of metal, rare earths, and soils require high wavelength resolution. ICPS-8100 achieves unparalleled ultra-high resolution of 0.0045 nm. Batch analysis from ppb to percent levels offers easy analysis from principal components to trace elements.

No. 1 monochromator, No. 2 monochromator	Focal distance 1 m
Measurement wavelength range	160 to 850 nm
Resolution	0.0045 nm
High frequency power supply	27.12 MHz 1.8 kW max.

Sequential Plasma Emission Spectrometer

ICPS-7510

This sequential ICP emission spectrometer covers a wide wavelength range with high resolution. In the standard design, plasma observations can be selected in either the radial or the axial direction. Analysis conditions can be registered for each analysis group with control from a computer.

Optical system	1 m, Czerny-Turner mounting, double grating
No. of diffraction grating grooves and measurement wavelength range	3600 grooves/mm for 160 to 458 nm 1800 grooves/mm for 458 to 850 nm
High-frequency power supply unit	27.12 MHz, max. 1.8 kW

Protein Sequencer

PPSQ-51A/53A

Simpler and More Reliable Determination of Amino Acid Sequences
Enhanced Functions for FDA 21 CFR Part 11 Compliance

The PPSQ is an instrument for determining the amino acid sequences of proteins and peptides, which combines an Edman reaction section with a high performance liquid chromatograph (HPLC).

There are 2 types: the PPSQ-51A, which is equipped with one reactor, and the PPSQ-53A, which is equipped with three reactors. On the PPSQ-53A, the continuous analysis of the amino acid sequences of multiple samples can be performed one after another. In the Edman reaction section, amino acids are cleaved in order from the N-terminal of a protein by repeatedly performing Edman degradation, and are derivatized. As a result, stable PTH-amino acids are produced. The PTH-amino acids are injected online into the HPLC, and analysis is performed. The HPLC data is saved on the PC, and data processing software is used to process the chromatograms. Then, amino acid sequence estimation software is used to identify the amino acids and estimate the sequences.

PPSQ-53A Gradient System

Isocratic System

- Isocratic elution ensures that highly reproducible retention times can be acquired.
- Analyses can be carried out easily using simple procedures.
- Operates with a low running cost.

Gradient System *New*

- Gradient elution enables detection of trace amounts of PTH-amino acids.
- Advantageous for analysis of amino acid sequences in trace samples.
- Thanks to inclusion of the solvent delivery pump capable of superior feeding in the micro flowrate range, stable retention times can be obtained.

MCE-202 Microchip Electrophoresis System for DNA/RNA Analysis
MultiNA

This system is used to analyze the size of DNA/RNA samples, with convenient analytical operability. It achieves analysis costs on par with agarose gel electrophoresis, and can perform fully automatic analyses of up to 108 samples. Using optimized reagent kits (four types for DNA analysis and one type for RNA analysis), the system achieves a high resolution and high sensitivity. It can significantly improve the workflow for mutation checks in genome editing, and genotype determination.

Detection method	Fluorescence detection using a fluorescence intercalator
Maximum number of samples	108
Size range	25 to 500 bp (DNA-500 kit) 100 to 1,000 bp (DNA-1000 kit) 100 to 2,500 bp (DNA-2500 kit) 100 to 12,000 bp (DNA-12000 kit) 28S rRNA (5.0 knt) or below (RNA kit)
Analysis processing speed	Analysis results obtained and displayed in as short as approx. 80 seconds

Note: The MultiNA, and BioSpec-nano have not been approved or certified as a medical device under the Japanese Pharmaceutical Affairs Law.
Therefore, they cannot be used for treatment or diagnostic purposes and procedures.

Cell Culture Media Analysis Platform
C2MAP System *New*

The C2MAP system™ measures component changes in a culture supernatant as culturing progresses using LC/MS/MS. It can be used in a wide range of applications, from basic research of cell cultures including pluripotent stem cells (iPS cells and ES cells), mesenchymal stem cells, and antibody-producing cells, to scaling up culture volumes, and actual process development.

Automated Process from Pretreatment for the Culture Supernatant Analysis to Measurement
Seamless analysis and management can be performed for from the pretreatment unit to the LC/MS/MS measurement.

Supports a Wide Range of Measurement Compounds and Culture Supernatant Samples
A total of 95 components can be simultaneously analyzed at high speed, including major basal culture media components for animal cells, and secreted metabolites.

Easy Confirmation of Component Variations in Culture Media
Temporal changes in the components obtained can be displayed as trend graphs. The results under multiple experimental conditions can be overlaid in the display, enabling comparative analysis.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Portable functional Near-Infrared Spectroscopy System for Research

LIGHTNIRS

Two kinds of head holders that fit the whole head closely are adopted, enabling the optimal measurement regions to be selected to suit the conditions for measurement.
The measurement methods are equivalent to LABNIRS, and the data analysis software is compatible with LABNIRS data.
It enables multipurpose measurements related to a variety of cognition issues, motion, somatic sensation, and vision.

Portability Expands Range of Research Applications

- It is portable, enabling measurements under closer to daily life conditions.
- The LIGHTNIRS and PC are connected wirelessly, so measurements can be performed more freely and over a wider range than before.
- Multiple PCs can be synchronized, for the simultaneous measurement of up to four subjects.
- The system is compatible with data from LABNIRS and FOIRE, Shimadzu's existing high performance multi-channel measurement instruments.

Realtime Monitoring Process Functions

Trend graphs are added for each task or channel, and mapping information is simultaneously integrated during measurements.

Realtime channel addition

Realtime map integration

Measured item	Variations from the initial values of oxygenated hemoglobin (Oxy-Hb), deoxygenated hemoglobin (Deoxy-Hb), and total hemoglobin (Total-Hb)
Number of measurement channels	8 pairs (max. 22 channels)

Functional Near-Infrared Spectroscopy System for Research

LABNIRS

Measurement using up to 40 sets, 142 channels (previously 16 sets, 52 channels) is achieved, and measurement of the brain over a wider range, higher-density measurement (2× conventional spatial resolution) and faster measurement (5× faster than conventional measurement) are now possible.
By measuring the oxygen state of the brain's surface using safe IR rays, the active regions of high-order brain functions, such as vision, hearing and motion, and the active state of these regions can be observed in real time.

Measurement items	Variation from initial values of oxygenated hemoglobin (Oxy-Hb), de-oxygenated hemoglobin (Deoxy-Hb), and total hemoglobin (Total-Hb)
Number of measured channels	LABNIRS 4 sets (10 channels) to 40 sets (142 channels)

High Performance

- Next-generation optical brain-function measurements start with multi-channel and high density
- High-speed sampling
- Reliability of 3 wavelengths and photomultiplier tube achieve superb sensitivity

Easy Operation

- Intuitive user interface
- Measurement and analysis by simple button clicks

Outstanding Scalability

- Comprehensive options provide powerful measurement support
- Increase the number of channels according to the aim of the experiments

Energy Dispersive X-ray
Fluorescence Spectrometer

EDX-7000/8000/8100

High Sensitivity
– Lower Limit of Detection Improved 1.5 to 5 Times! –

Profile Comparison for Lead (Pb) in Copper Alloy

High Resolution

EDX-7000

Previous model

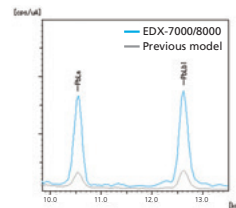Comparison of Energy Resolutions (sample: PPS resin)

Equipped with an electronically cooled high-performance semiconductor detector, the EDX-7000/8000 is designed for reduced running costs and ease of maintenance while providing better sensitivity, throughput, and resolution than conventional models. A wealth of optional functions is available, including a vacuum measurement unit, which is effective for light element analysis, and a turret unit, which is effective for consecutive analyses. Two software programs are included as standard. PCEDX-Navi allows easy operation, and PCEDX-Pro is for general analysis applications. As an analysis option, the instrument can also be equipped with the screening functions achieved with the EDX-LE. From management applications involving compliance with RoHS/ELV directives and other environmental regulations to research applications involving the high-level needs of general sample analysis, the EDX-7000/8000 can be applied broadly, whatever the industry. The EDX-8100 is a model that accommodates light elements and allows for helium purge.

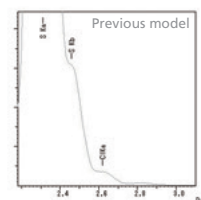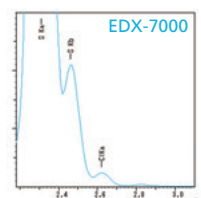|	EDX-7000	EDX-8000	EDX-8100
Elements to be determined	$_{11}$Na to $_{92}$U	$_{6}$C to $_{92}$U	
Sample chamber dimensions	300 (W) × 275 (D) × approx. 100 (H) mm max. (Assuming no rounded corners)		
Primary filters	5 types (6 including the open position); automatic replacement		
Software	Simple analysis software (PCEDX-Navi) General analysis software (PCEDX-Pro)		
Options	Vacuum measurement unit, helium purge unit, turret unit, screening analysis kits	Vacuum measurement unit turret unit; screening analysis kits	

Note: Options are not included.

## Integrated EDX-FTIR Analysis Software
EDXIR-Analysis

The integrated EDX-FTIR analysis software, EDXIR-Analysis is especially for qualitative analysis, utilizing data acquired with energy dispersive X-ray fluorescence spectrometers (EDX) and Fourier transform infrared spectrophotometers (FTIR). This software provides identification results and degrees of matching by performing an integrated analysis of data acquired with FTIR, which is ideal for the identification and qualitative analysis of organic compounds, and data acquired with EDX, which is ideal for the analysis of the elements contained in metals and inorganic compounds. It can also perform either EDX or FTIR analysis separately. Shimadzu's proprietary library (containing 485 data as standard), created through cooperation with waterworks agencies and food product manufacturers, is used for the data analysis. Additional data as well as image files and document files in PDF format can be registered in the library. It is also effective for linked storage with a variety of data as digital files.

EDX data

FTIR data

Loading the acquired data

Integrated Analysis for Contaminant Analysis and Data Comparisons for Confirmation Tests

The examples here show an integrated analysis of black rubber contaminant data acquired 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, which were not detected in the standard product. Accordingly, it is surmised that the examination object contains components different to those in the standard product.

Integrated data analysis
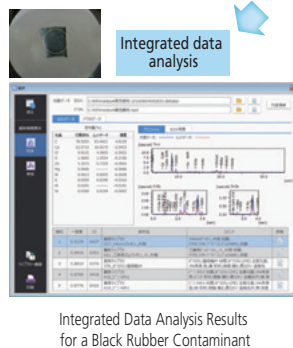
Data comparison

Integrated Data Analysis Results for a Black Rubber Contaminant
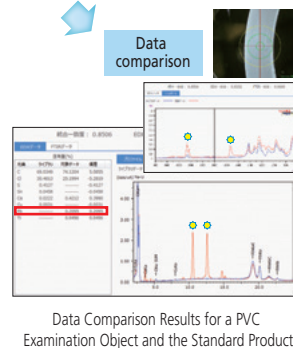
Data Comparison Results for a PVC Examination Object and the Standard Product

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

47

Energy Dispersive X-ray
Fluorescence Spectrometer

Pharmaceutical Elemental Impurities Analysis System for EDX-7000

With the pretreatment-free, non-destructive features, this system is designed for µg/g level analyses and control of elemental impurities in pharmaceuticals. The targeted elements are 12 elements in total from the 24 elements listed in the ICH Q3D Guideline for Elemental Impurities (Class 1: Cd, Pb, As, Hg; Class 2A: V, Co, Ni; Class 2B: Ir, Pt, Ru, Rh, Pd).

In the risk assessment management of µg/g level impurities in new pharmaceutical materials, which in most cases are organic compounds, analysis can be performed using the EDX-7000 as an alternative method to ICP-AES and ICP-MS analysis, which involve chemical pretreatment and are listed in the United States Pharmacopeia (USP), the European Pharmacopoeia (EP), and the Japanese Pharmacopoeia (JP). Doing so reduces the burden of chemical pretreatment, and also leads to reductions in the total cost of analysis.

Energy Dispersive X-ray
Fluorescence Spectrometer for RoHS/ELV screening

EDX-LE

The software for this system is loaded with the optimal functions for screening, including automatic calibration curve selection and automatic reduction of measurement time, and the hardware includes a large sample chamber, capable of analyzing a variety of samples. In addition, an electronically cooled detector has been adopted, so instrument maintenance is kept to a minimum. Utilizing optional analysis kits, the EDX-LE can also accommodate screening analysis of halogen compounds and antimony that are subject to regulations. Furthermore, in combination with the optional Additional Function Kit, the instrument can also be used for applications besides screening, such as qualitative analysis, film thickness analysis, and steel grade determinations utilizing general analysis software.

	EDX-LE
Elements to be determined	$_{13}$Al to $_{92}$U
Sample chamber dimensions	370 (W) × 320 (D) × approx. 155 (H) mm max.
Primary filters	5 types (6 including the open position); automatic replacement
Software	Screening software
Options	Halogen Screening Analysis Kit RoHS, Halogen, Antimony Screening Analysis Kit Additional Function Kit

Note: Options are not included.

Sequential X-Ray Fluorescence Spectrometer

XRF-1800

The XRF-1800 provides local analysis and 250 mm mapping capabilities as standard features, enabling reliable analysis of a local area, only a 0.5 mm in diameter in the wavelength dispersive method. More than a 30% sensitivity improvement compared with a conventional 3 kW X-ray tube is achieved through the use of a 4 kW X-ray tube with a thin window.

Elements to be determined	$_8$O ~ $_{92}$U with LiF, PET, Ge and TAP analyzing crystal $_4$Be~$_7$N with optional analyzing crystal
X-ray tube	4 kW with a thin window
250 µm Mapping resolution as standard	

Multi-Channel X-Ray Fluorescence Spectrometer

MXF-2400

The MXF-2400 features a compact design and ease of operation. A maximum of up to 36 elements can be simultaneously determined (depends on configuration).

Elements to be determined	$_5$B, $_6$C, $_7$N, $_8$O to $_{92}$U
Converging system	Curved crystal
X-ray tube	4 kW with a thin window

X-Ray Diffractometer with Wide-Range and High-Speed Detector

XRD-6100 OneSight/7000S OneSight/7000L OneSight

XRD-6100 OneSight

XRD-7000S OneSight / XRD-7000L OneSight

These X-ray diffractometers are equipped with the OneSight wide-range and high-speed detector, which makes possible high-speed and high-sensitivity measurements. The measurement window of the software has also been completely revised, so operability is greatly enhanced. A door lock mechanism is activated whenever X-rays are emitted, thus contributing toward the enhanced safety of the unit. The system can accommodate a broad variety of applications, ranging from fundamental ones, such as qualitative and quantitative analyses, to applications such as crystalline structure analysis, which can be accomplished using optional software. The XRD-6100 OneSight is a compact and simplified model, which is equipped with a vertical type, high-precision goniometer. The XRD-7000S OneSight and 7000L OneSight are equipped with a horizontal-sample-type goniometer, which allows extremely large samples to be accommodated.

	XRD-6100 OneSight	XRD-7000S OneSight / 7000L OneSight
X-ray generator	2 kW or 3 kW, controlled by computer	
Goniometer	θ-2θ linkage, θ, 2θ independent	
Detector	Wide-range and high-speed detector	
Operational range	2θ: -6° to 163°	θs: -6° to 82°, θd: -6° to 132°

Wide-Range and High-Speed Detector for XRD-6100/7000

OneSight

This is an optional detector that can be installed in an existing XRD-6100/7000. This is a wide-range detector comprising 1,280 channels of semiconductor elements. An intensity that is more than 100 times greater than existing scintillation detectors can be achieved, thus allowing high-speed measurement. Moreover, by taking advantage of the wide-range angle measurement, the unit can offer the "One-Shot Mode," which performs analysis while the goniometer is in a fixed position. Ease-of-use has also been improved using the software that provides for measurements with OneSight.

Number of channels	1,280
Strip width	50 µm
Active area	64 (W) × 8 (L) mm
Dimensions	71 (W) × 24 (D) × 100 (H) mm

Electron Probe Microanalyzer

EPMA-8050G

Debut of the Grand EPMA

Shimadzu's FE-EPMA system features a cutting-edge FE electron optical system that provides the ultimate in advanced analytical resolution. This provides unprecedented spatial resolution for SEM observation with beam current higher than 3 µA. In combination with Shimadzu's traditionally high performance X-ray spectrometers, this advanced FE electron optical system can provide both maximum resolution and maximum sensitivity at the same time.

Features

- Includes cutting-edge FE electron optical system
- Up to five high-sensitivity 4-inch spectrometers can be included.
- Includes 4-interval high-sensitivity BSE detector
- Windows-compatible operating system
- Intelligent vacuum evacuation system
- Includes easy mode analysis function for the automation system
- Dual stigmator included standard

Elements analyzed	4Be (optional) and 5B to 92U
X-ray spectrometer	Max. five high-sensitivity spectrometers
Max. sample size	100 mm square × 50 mm thick
X-ray take-off angle	52.5 deg.
Mapping resolution	20 nm (10 kV to 10 nA)
Secondary electron resolution	3 nm

Ultra High Resolution Mapping
The beam can be emitted at a maximum current over 3 µA.

Cr — 5 µm   Mn — 5 µm
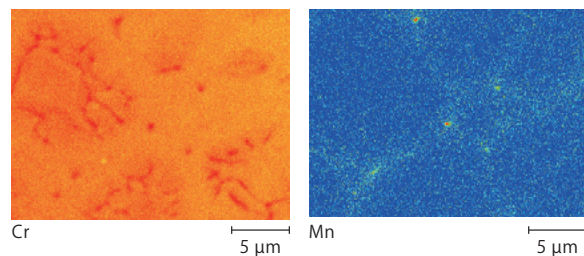
Mapping Analysis of Trace Elements in Stainless Steel
Left: Clearly shows distribution of phases with slightly differing concentrations of Cr.
Right: Distribution of Mn concentrations less than 0.1 % are visible.

Electron Probe Microanalyzer
EPMA-1720/1720H

The Electron Probe Microanalyzer (EPMA) allows highly sensitive analysis of elements in micron-scale regions on the sample. The fully digital control system offers revolutionary observation and analysis operations using only the mouse and keyboard. It can also be operated from a networked PC. EPMA-1720H incorporates a high-performance CeB6 filament that allows EPMA analysis of sub-micron regions.

Secondary-Electron Image Resolution	6 nm (EPMA-1720)	5 nm (EPMA-1720H)
Analyte Elements Range	$_4$Be to $_{92}$U	
Number of X-Ray Spectrometers	2 to 5 channels	
X-Ray Take-Off Angle	52.5°	

Imaging X-Ray Photoelectron Spectrometer
KRATOS ULTRA2 (AXIS Supra)

This surface analyzer features higher performance and the ability to control all operations via a computer, while maintaining the same system configuration freedom as before. The high-speed real-time XPS imaging using a spherical mirror analyzer achieves spatial resolution of 1 µm that clearly shows the chemical distribution in micro areas. An ample selection of options ensures the system can be used for a wide variety of applications, such as in-situ testing without exposure to air or high-energy XPS measurements.

Imaging resolution	1 µm
Sensitivity	(monochrome X-rays, 0.48 eV FWHM Ag3d) Macro analysis: 400 kcps, 27 µm dia. analysis: 8 kcps
Options	Mg/Al X-ray source, UV light source for UPS, FE Auger electron gun, air-sensitive sample transporter, sample heating/cooling unit, catalyst reaction cell, Ar gas cluster ion gun, Ag monochrome X-ray source, etc.

Imaging X-Ray Photoelectron Spectrometer
KRATOS NOVA

The Micro XPS instrument significantly automates the stages from introducing the sample to starting analysis. The analysis position can be rapidly assigned to any point on the 110 µm-diameter sample platen from a CCD camera image or realtime photoelectron image. The revolutionary, patented charge neutralization method produces high-resolution spectra with no damage to the sample, thereby allowing micro analysis of organic matter that was conventionally difficult.

Image resolution	3 µm max.
Sensitivity	(monochrome X-rays, 0.48 eV FWHM) Macro analysis: 250 kcps 15 µm dia. analysis: 0.8 kcps

High-Resolution Scanning Probe Microscope
SPM-8100FM

HR-SPM
See the Nano World Come to Life

The HR-SPM is a next-generation scanning probe microscope that employs a frequency detection method. Existing SPMs (scanning probe microscopes) and AFMs (atomic force microscopes) generally employ an AM (amplitude modulation) method. In principle however, the FM (frequency modulation) method is a high-sensitivity measurement method, which enables imaging at even higher levels of resolution. Not only does it enable ultra-high-resolution observation of atmospheric or liquid-based targets, but now, for the first time, observation of hydration/solvation of the solid-liquid interface is made possible.

Features of the HR-SPM
- Uses the FM method
- Noise in air and liquids is reduced to 1/20 that of existing methods.
- Achieves the performance level of a vacuum-type SPM, even in air and liquids.
- Enables measurement of the local structure at the solid-liquid interface.
- HT scanner extends observation area and shortens observation times.
- Dual monitors and signal indication function provide significant improvement in flexibility.

Observation mode	Contact, dynamic (AM method and FM method), lateral force (LFM)
Resolution	Horizontal: 0.2 nm; Vertical: 0.01 nm
SPM head	Displacement detection system: Light source, optical lever, detector Light source: Laser diode (ON/OFF) Irradiates a cantilever continuously even while replacing samples Detector: Photodetector

Differences Compared with Existing SPM/AFM

Atomic Resolution Observation in Liquids

AM method — FM method
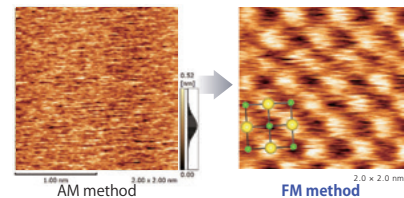
KPFM Observation* of Atmospheric Pt Catalyst Particles
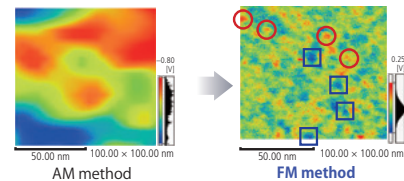
* KPFM : Keivin Probe Force Microscope

AM method — FM method

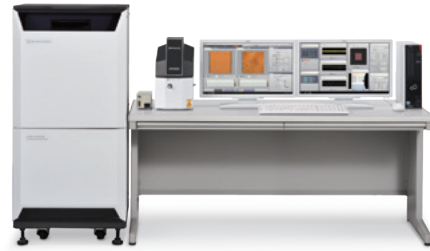## Scanning Probe Microscope
SPM-9700HT

This microscope can observe the three-dimensional image or local properties of samples at high magnifications. It enables high-resolution observation, and can measure a variety of samples in air and in liquids. Due to the newly developed high response speed HT scanner and the optimized control system design and software, it is now possible to acquire image data at more than five times the speed of Shimadzu's previous models.
This supports the improvement of total throughput via significant reductions in measurement time. The system is ideal for measurements involving a large number of samples or for routine observations.

Observation modes	Standard: Contact, Dynamic, Phase, Lateral Force (LFM), Force Modulation Optional: Magnetic Force (MFM), Current, Surface Potential (KFM)
Resolution	X, Y: 0.2 nm, Z: 0.01 nm
AFM head	Displacement detection system: Light source, optical lever, detector Light source: Laser diode (ON/OFF) Irradiates cantilever continuously, even while replacing samples. Detector: Photodetector

Environment-Control Scanning Probe Microscope
WET-SPM Series

Permits SPM observations in a controlled environment.
The environment-controlled chamber with a large viewport and twin gloves permits all types of pretreatment in a fully controlled environment. It offers in-situ SPM observations of changes to a sample due to fluctuations in factors such as temperature, humidity, pressure, light quantity, and concentration. (Japan and US Patented)

Glove ports	2 (both arms)
Pumps	Rotary pump, turbomolecular pump (option)
Vibration isolation	Internal air-spring damper

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

TOC-L

TOTAL ORGANIC CARBON ANALYZER

The role of the TOC analyzer is to quickly and reliably measure all sorts of organic compounds in water. The most important feature of such an analyzer is its ability to efficiently oxidize not only easily-decomposed, low-molecular-weight organic compounds, but also hard-to-decompose insoluble and macromolecular organic compounds. A new series of Shimadzu TOC analyzers has been released, which delivers both high-efficiency detection of organic compounds via the 680°C combustion catalytic oxidation method, and high sensitivity capable of even pure water management.
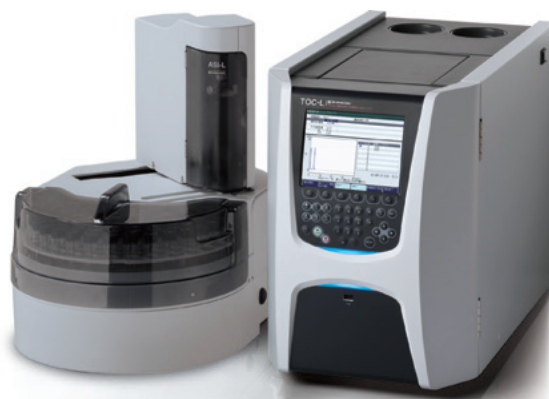
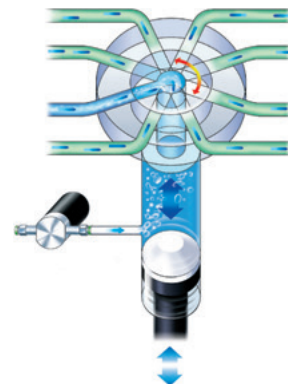|		High-sensitivity model		Standard model	
Model		TOC-LCPH	TOC-LCSH	TOC-LCPN	TOC-LCSN
Operation method		PC-controlled	Standalone	PC-controlled	Standalone
Measurement method		680°C combustion catalytic oxidation – non-dispersive infrared detection (NDIR) method			
Measurement items		TO, IC, TOC, NPOC (Optional: POC, TN)			
Measurement range	TC	0 to 30,000 mg/L		0 to 30,000 mg/L	
	IC	0 to 35,000 mg/L		0 to 3,000 mg/L	
Detection limit		4 µg/L		50 µg/L	

This product conforms to Shimadzu's Eco-labeled designation.
* Energy consumption has been reduced by 36% in comparison with conventional Shimadzu models.

Extremely wide measurement range, from 4 µL to 30,000 mg/L, applicable to everything from ultrapure water to highly-contaminated water (TOC-LCSH/CPH)

▌Capable of TC, IC, TOC (=TC-IC), and NPOC measurements. In addition, installation of optional units enables POC (volatile organic carbon), TOC via POC and NPOC, and even TN (total nitrogen) measurements.
▌The blank check function evaluates system blanks by measuring ultrapure water processed automatically within the instrument.
▌The automatic dilution function enables measurements up to 30,000 mg/L.

Reliable Sample Injection System

▌Automatic sample acidification and sparging
▌The automatic dilution function reduces sample salinity, acidity, and alkalinity, significantly extending the period of use of catalysts and combustion tubes. (The effectiveness will differ depending on the samples and measurement conditions.)
▌Even when an autosampler is used, stat or priority samples can be added at any time to the analysis schedule without interrupting operation by equipping the system with a sample collection tube for single-unit TOC analyzer measurements.

Multifunction sample pretreatment injector

Select from 4 Models to Suit your Application

▌LCD and keyboard equipped standalone models and PC-controlled models
▌High-sensitivity model with a detection limit of 4 µg/L, suitable for a variety of applications including pure water measurements, as well as a standard model designed with cost performance in mind

A Wealth of Options to Further Expand Applications

▌TN unit capable of total nitrogen measurements via thermal decomposition/chemiluminescence
▌Capable of measuring not only aqueous samples but also samples in solids, and gas samples
▌Special-purpose combustion tubes/catalysts result in maintenance reductions when measuring seawater samples
▌Accommodates smaller sample volumes. (Capable of automated 5 mL/3 NPOC measurements)

TOC-LCSH/CSN standalone model   TOC-LCPH/CPN PC-controlled model

Applicable in a Variety of Fields

Process Control
Effluent treatment
process control
Processes
Ultrapure water recycling
and re-purification processes

Quality Control
Water supply equipment
Electronic components
Aluminum foil
Raw materials

Investigations and Experimental Research
Global environment
and eutrophication
River water, lakes and marshes,
underground water, sea water, soil,
sludge, sediments, etc.
Biodegradable plastics and
cement secondary products

Water Quality Control
Tap water
Ultrapure water
Effluent (treated/untreated)
Pool water, spa water, boiler water,
water from industrial processes

Pharmaceutical Manufacturing
Pharmaceutical water control
Evaluation of cleaning effectiveness
(Cleaning validation)

Approx 340 mm

*Space savings:
Approximately 20% narrower in comparison
with conventional Shimadzu models

Autosampler for TOC-L Series
ASI-L

ASI-L

Combination with the TOC-L series results in a fully automatic measurement system.
Vials with three different capacities, 9 mL, 24 mL, and 40 mL, can be used.

• Vials with a septum can be used (24 mL and 40 mL vials).
• Can be equipped with a magnetic stirrer (optional).

Types and number of vials	9 mL × 93 vials 24 mL × 93 vials 40 mL × 68 vials

8-Port Sampler for TOC-L Series
OCT-L

OCT-L

Combination with the TOC-L series results in an automatic measurement system at an affordable price.
Settings are extremely simple, since special vials are not required. In addition, the effects of contamination can be reduced if measurements are performed as is using large-capacity collection bottles.

• Can be combined with commercially-available stirrers and water baths.

Units connected	Up to 2 units can be connected.
Number of vials	8 vials per unit Maximum of 16 vials (with 2 units)

TN (Total Nitrogen) Unit for TOC-L Series
TNM-L

Combination with the TOC-L series results in a simultaneous TOC and TN measurement system.
This system can also be used to meet regulations on effluent nitrogen and total volume.
The space-saving design enables installation above the TOC-L, meaning that installation space is not a problem when expanding.

Measurement method	Chemiluminescence method
Measurement item	TN (total nitrogen)
Measurement range	0 to 10,000 mg/L

Solid Sample Combustion Unit for TOC-L Series
SSM-5000A

SSM-5000A

When combined with the TOC-L series, TC, IC, and TOC measurements can be performed in soil, sludge, sedimentation, and other solid samples.
In addition, with GMP cleaning validation, the system can also be used to evaluate residues using the swab sampling/direct combustion carbon analysis method.

• Can also be connected to the TOC-V series

Combustion temperature	900°C
Measurement range	TC: 0.1 to 30 mgC IC: 0.1 to 20 mgC
Sample volume	1 g max.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Wet Oxidation TOC Analyzers
TOC-V_{WS/WP} Series

Wet oxidation TOC Analyzers aim for high sensitivity with great oxidation performance by combining UV light, heat, and persulfate methods.

Ultra-high sensitivit	0.5 μg/L detection limit

Choice of Standalone or PC-controlled model. (Standalone model can be upgraded to PC-controlled model.)

PC-controlled model supports FDA 21 CFR Part 11 compatibility

Measured items	TC, IC, TOC, NPOC
Measurement range	TC 0 – 3,500 mg/L, IC 0 – 3,500 mg/L

On-Line TOC Analyzer
ON-LINE TOC-V_{CSH}

High-sensitivity continuous monitoring of water samples such as pure water and tap water.

680°C combustion catalytic oxidation /NDIR method.

Measured items	NPOC, TC, IC, TOC (TC-IC), (Option: TN)
Measurement range	TC 0 – 25,000 mg/L, IC 0 – 30,000 mg/L
Measurement cycle	Approx. 5 – 999 minutes (for NPOC measurement)

Equipped with off-line measurement functions.

On-Line Total Organic Carbon Analyzer
TOC-4200

Highly Advanced On-Line TOC Analyzer Excels in a Wide Range of Applications

Support for a Wide Range of Samples

▊ Select a sampling unit to match the sample

▊ Wide measurement range from 5 mgC/L full-scale to 20,000 mgC/L full-scale
Supports for applications from recovered water of semiconductor manufacturing to heavily polluted pretreatment water

▊ High sensitivity measurements from 0 to 1 mgC/L (optional)

▊ Diverse TOC measurements (NPOC, TC-IC*, NPOC + POC* measurements), TN measurements*

*Optional

Advanced Operability

▊ Color LCD touch screen

▊ Supports data-storage devices. Easy to store measured values or measurement conditions to a USB flash drive

▊ Calendar scheduling setup

▊ Compatible with various communication systems: Digital bus, Web-based monitoring*

*Optional
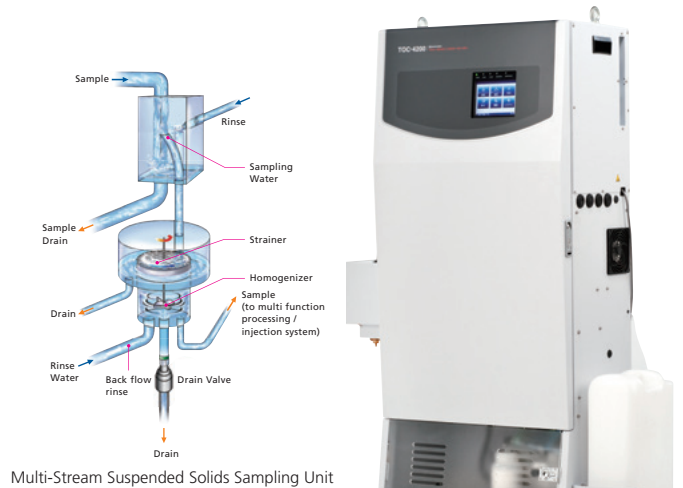
Multi-Stream Suspended Solids Sampling Unit

Calendar scheduling setup

Measurement Principle	680°C combustion catalytic oxidation
Measurement Items (*Optional)	NPOC, TC, TOC (TC-IC)* TOC (NPOC+POC)*
Measurement Range	0-5 to 0-1,000 mgC/Lf.s. (0 to 20,000 mgC/f.s. with dilution function)
Measurement Cycle	4 minuts min. (Using NPOC)
Repeatability	Within ±2% f.s.*

* With automatic settings

Transportable NOx-O₂ Analyzer

NOA-7100

The normal pressure chemiluminescence method is adopted for NOx analyzers, and the zirconia method is adopted for O₂ analyzers.
This all-in-one portable analyzer incorporates the pretreatment parts needed for measurements.
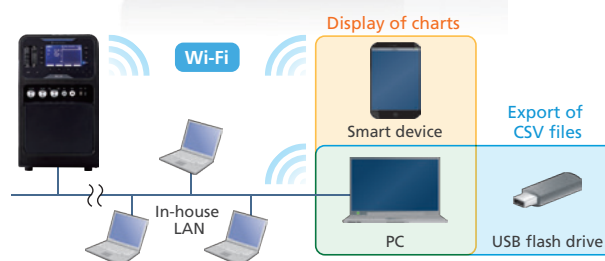Switching between eight ranges from 25 to 4,000 ppm supports a wide range of NOx measurements.
Two types are available, for measuring exhaust gas from combustion equipment (type 1) and for testing and research (type 2).

Features
- Pretreatment parts such as the pump, cooler, and filter are built-in.
- Thanks to wireless data communication, measured values and charts can be displayed on PCs and smart devices.
- Measurement data can be exported using a USB flash drive. The analyzer can be connected to a PC via Wi-Fi or a LAN cable for data export.
- Measurements can be performed on sample gases with flowrates as low as 100 mL/min. (type 2)
- Thanks to a function for bypassing the converter catalyst that reduces NO_2 to NO (optionally available, type 2 is provided as standard), it is possible to switch measurements between NOx and NO, and output the difference as NO_2.

	Type 1	Type 2
Amount of sample gas collected	Approx. 2 L/min	100mL/min
Measurement range	NOx: 0 to 25/50/100/250/500/1,000/2,500/4,000 ppm O_2: 0 to 5/10/25 vol%	NOx, NO, NO_2: 0 to 2/0/100/250/500/1,000/2,500/4,000 ppm
Repeatability	Within ±0.5 % of full scale	
Weight	Approx. 16 kg	

All-in-One Measurement

Wi-Fi

Display of charts

Smart device

Export of CSV files

In-house LAN

PC

USB flash drive

Transportable Gas Analyzer

CGT-7100

CGT-7100   CFP-8000

The CGT-7100 analyzer measures the concentration of gases using a ratio photometric non-dispersive infrared absorption method, which offers superior stability. All pretreatment parts required for measurement, such as the pump, filter, and electric cooler, are built-in. The analyzer can measure three components including CO, CO_2, or CH_4 (any two of these) and O_2, and is compatible with measurement at 100 vol%.
It is capable of wireless data transmission via Wi-Fi, so measurement values and charts can be displayed wirelessly on PCs or smart devices, and measurement data can be exported using a USB flash drive. There is a lineup of three types to suit your measurement application. The CFP-8000 pretreatment set is also available for use in combination with the CGT-7100 when measuring special gases and for continuous measurements.

Type	Type 1: CO-CO_2 analyzer for measuring exhaust gases from combustion Type 2: CO-CH_4 analyzer for fuel cell research Type 3: CO-CO_2 analyzer for catalyst research (small flow rate type)
Measurement range	CO: 0-100 ppm to 0 -100 vol% CO_2: 0-1,000 ppm to 0-100 vol% CH_4: 0-200 ppm to 0-100 vol% O_2: 0 to 5/10/25 vol% (optional)
Repeatability	Within ±0.5 % of full scale
Weight	Approx. 16 kg

Portable Gas Analyzer for SO₂

SOA-7000

This analyzer can measure SO_2 and O_2 concentrations in various exhaust gases from combustion equipment and boilers.
Pretreatment parts including a dehumidifier, filter, and pump are all built-in.
Although this is a light-weight, compart, portable model, it provides comparable performance to stationary models, with easy operability and a wealth of functions.

Measurement range	SO_2: 0-100 ppm to 0 to 1 vol% O_2: 0 to 5/10/25 vol% (optional)
Repeatability	Within ±0.5 % of full scale
Weight	Approx. 14.5 kg

Flue Gas Multi-Component Gas Concentration Analyzer
NSA-3080

The NSA-3080 employs a micro-computerized, multi-component, Ratio-NDIR gas analyzer for the measurement of NOx, SO_2, and CO or CO_2. An O_2 detector is also incorporated to allow measurement of a total of the five components simultaneously.

Application	Measurement of NOx, SO_2, CO, CO_2, and O_2 concentrations in exhaust gases from various boilers, industrial plants (petroleum refinery, steel, cement, etc.), incinerators, and thermal treatment furnaces.

Continuous Gas Analyzer in Flue Gas
NSA-308

This analyzer measures four or five components in exhaust gases from combustion equipment. Two types are available, for measurement of four components: NOx, SO_2, CO, and O_2, and for measurement of these four components plus CO_2 for a total of five components. The analyzer adopts a high-performance, high-functionality ratio infrared analyzer and a magnetic wind oximeter, to achieve simple and highly reliable sampling.

Measurement method	Non-dispersive infrared ray absorption method (ratio photometry) O_2: Magnetic wind method
Measurement range	It differs depending on the components measured, so inquire for details.

AUTOGRAPH Precision Universal Tester

AG-Xplus Series
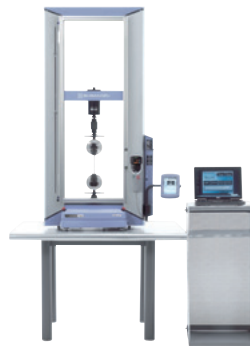

Table-Top Type SC (10 N to 10 kN)

Table-Top Type (10 N to 50 kN)

Floor Type (20 kN to 300 kN)

With the AG-Xplus series, the control resolution has been increased by a factor of eight, which increases the reliability of test results. The autotuning function allows stress control and strain control to be easily carried out, while the ultrahigh-speed sampling rate of 0.2 ms (5 kHz) captures sudden changes in test force, such as when brittle materials fracture. Functions to reduce power consumption by 10 to 25 % during standby have been incorporated in order to reduce environmental load. In addition, short-column (SC) and high-speed (HS) models have been added to the lineup.

Load capacity	Table-top type: 10 N to 50 kN, Floor type: 20 kN to 300 kN	
Test speed	Table-top standard type: 0.0005 to 1,500 mm/min (apart from some models)	
	Table-top high-speed type: 0.001 to 3,000 mm/min (AG-5kNX plus HS only)	
	Floor type: 0.0005 to 1,000 mm/min (20 kN to 100 kN), 0.0005 to 500 mm/min (250 kN/300 kN)	
Test force measurement accuracy	High-precision type	Within ±0.5 % of displayed test force (for 1/100 to 1/1000 of load cell capacity) Within ±0.3 % of displayed test force (for 1/1 to 1/100 of load cell capacity)
	Standard precision type (Select either)	Within ±1 % of displayed test force (for 1/1 to 1/1000 of load cell capacity) Within ±1 % of displayed test force (for 1/1 to 1/500 of load cell capacity)

Note: The test jigs, touch panel unit, special software, and computer are not included.

AUTOGRAPH Table-Top Precision Universal Tester

AGS-X Series
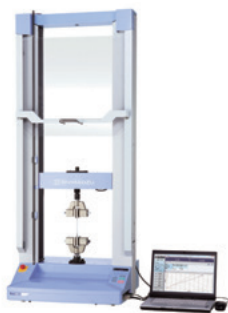
Combining all necessary functions in a compact design, this high-performance, cost-efficient testing machine has been developed for low-capacity strength evaluations. Increase testing efficiency using dedicated data processing software (TRAPEZIUM LITE X).

Load capacity	1 N to 10 kN (11 types)
Test speed	0.001 to 1000 mm/min (Stepless)
Test force accuracy	Within ±0.5 % of display test force (for 1/1 to 1/500 of load cell capacity)

Micro AUTOGRAPH

MST-I

Utilize the MST-I to evaluate the strength of small test samples such as electronic parts, micro-devices and fine wire. A high-precision drive system and measurement system allows very small test forces and displacements to be measured and controlled, enabling various types of data to be obtained. An X-Y stage and a microscope are provided to enable easy positioning and observation of the sample.

Test force measuring range	2 mN to 2 kN
Drive resolution	HR type: 5 nm, HS type: 20 nm
Displacement display resolution capability	20 nm
Test speed	HHR type: 0.0012 to 30 mm/min, HS type: 0.0048 to 120 mm/min

Compact Tabletop Tester

EZ-X Series

EZ-LX/EZ-LX HS

EZ-SX

This easy-to-use, compact, stylish frame incorporates enhanced functions, enabling tests to be carried out with good efficiency.

		EZ-SX	EZ-LX	EZ-LX HS
Load capacity		500 N	5 kN	2 kN
Test speed		0.001 to 1,000 mm/min		0.001 to 2,000 mm/min
Return speed		1,500 mm/min		3,000 mm/min
Test force measurement accuracy	High-precision type	±0.5 % of indicated value (Range from 1/500 to 1/1 of the load cell capacity) Complies with JIS B7721 class 0.5, ISO 7500-1 class 0.5, EN 10002-2 grade 0.5, and ASTM E4		
	Standard precision type	±1 % of indicated value (Range from 1/500 to 1/1 of the load cell capacity) Complies with JIS B7721 class 1, ISO 7500-1 class 1, EN 10002-2 grade 1, and ASTM E4		

Fully Automatic Plastic Testing System

This is a fully automatic tensile and bending tester for plastics. It is capable of continuous operation from measurement of specimen dimensions, supply, and data processing.

Load capacity	Max. 10 kN (tensile)/5 kN (bending)
Test speed	0.0005 to 1,000 mm/min
Specimen storage method	Palette type (120 pcs) or magazine type (150 pcs)

Fully Automatic Rubber Tensile Testing System

This system provides full automation, from measurement of specimen dimensions, supply to the testing machine, and fixing of chucks to measurement of extension between standard lines and data processing. The system can be used for continuous nighttime testing, which helps save labor costs.

| Load capacity	Max. 1 kN
Test speed	0.001 to 1,000 mm/min
Specimen storage method	Palette type (120 pcs)
Applicable standard	JIS K6251

Fully Automatic Metal Tensile Testing System

This is a fully automatic tensile testing system for metals. The system is fully automated from supply of specimens, measurement of specimens, tensile testing, recovery of specimens, and data processing, and is capable of continuous nighttime testing.

Load capacity	100 kN
Applicable specimen	JIS No. 5, ASTM 1/2"
Specimen storage method	Stacking type
Measuring device	Magnet scale type (thickness) Laser scan type (width)
Transport device	Linear type auto hand
Details of data processing	Specimen size Upper yield point Yield strength point Max. stress Fracture elongation r value, etc.

Material Testing Software
TRAPEZIUM X
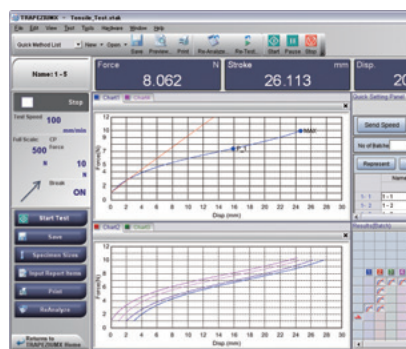
Windows 10 compatible TRAPEZIUM X can carry out various tests ranging from simple test control to complex custom-made patterns, using the industry's first data search and preview function, free layout reports, visual wizard settings, quick panel, and quick conditions lists.

Non-Contact Digital Video Extensometer
TRViewX

The TRViewX non-contact digital video extensometer can accurately measure extension and width of films, which is difficult with contact extensometers, over a wide range without affecting the specimen. It is capable of measuring extension to an accuracy equivalent to JIS B7741 0.5 class.

Type	Optical non-contact, standard line mark tracking format
Gauge length	Any length within camera field of view
Camera field of view	55 to 800 mm
Measurement accuracy	The larger of ±1.5 µm or ±1.5 % of indicated value (for camera field of view 240 mm or less and constant temperature measurement)

Automatic Extensometer
SIE-560A/560SA

Provides high-precision measurement of the extension of metals, plastics, etc. from the elastic range (very small displacement) to failure (large displacement). All operations, such as automatic fitting and removal of the extension arm onto the specimen, automatic setting of the distance between standard lines, etc., can be executed by the software.

Measurement range	Max. (560 - gauge length) (mm)
Measurement precision	560SA ± 1 µm, 0.5 % (JIS B7741 0.5 class) 560A ± 2.5 µm, 0.5 % (JIS B7741 1 class)
Gauge length	560SA 50 mm (variable with option) 560A 10 to 550 mm

Hydraulic Universal Testing Machines
UH-X Series and UH-FX Series

UH-500kNX

UH-F500kNX

The operability and visibility of the computer-controlled hydraulic servo type universal testing machine (UH-X) and the high-performance universal testing machine (UH-FX), equipped with front opening type hydraulic grips, have been greatly improved by the adoption of a large color touch panel. Equipped with a semi autotuning function that automatically adjusts the control parameters, stress control and strain control (ISO 6892 compliant) can be easily carried out without the need for a preliminary test.
The UH-Xh and UH-FXh models feature a new hybrid hydraulic oil source that reduces the required quantity of hydraulic oil, thereby achieving a major reduction in electrical power (about 50 %).

	UH-X Series	UH-FX Series
Load capacity	200, 300, 500, 1,000, 2,000, 3,000, 4,000 kN (7 types)	300, 500, 1,000, 2,000, 3,000, 4,000 kN (6 types)
Capacity	6 stages	
Test control functions	Single, cycle, stress, strain, stroke 3 stage switching, concrete	Front-opening type hydraulic system

Note: Hybrid type and a type without an analog indicator are also available.

Concrete Compression Testing Machine
CCH-X/CCM-X Series

CCH-2000kNX

In recent years the importance of concrete quality control has increased. This testing machine can carry out concrete compression tests efficiently in accordance with JIS A 1108. With options it can also be used for concrete bending tests and concrete tensile tests.

Load capacity	CCH-X Series 2,000 kN, 3,000 kN, 5,000 kN (3 types)
	CCM-X Series 1,000 kN, 2,000 kN (2 types)

Concrete Compression Testing Machine
CONCRETO 2000X/3000X

CONCRETO 2000X

This compression testing machine can safely and efficiently perform tests at a high capacity without causing explosive fracture (failure of the specimen) on ultra-high-strength concrete, which is used as a structural material in high-rise buildings, etc.
This one machine can be used for materials ranging from ultra-high-strength concrete to specimens that have been recently cast, mortar, etc.

Testing capacity	40 to 2,000 kN in 6 stages range (CONCRETO 2000X)
	60 to 3,000 kN in 6 stages range (CONCRETO 3000X)
Control method	Hydraulic servo type (with explosion-proof function)
Upper and lower plate diameter	220 mm

30 MN Large Structural Testing Machine

This is a 30 MN testing machine, the largest in Japan. It is used for checking the strength properties of either complete actual structures or portions thereof with respect to self-weight, imposed loading, or external loads such as earthquake, wind, and snow, in particular the deformation and ultimate strength, in order to verify the safety of the structure.

Note: The capacity and performance, etc., of the testing machine can be changed in accordance with discussions.

High-Rigidity Compression Testing Machine

A high stiffness compression testing machine is achieved with an integral loading frame structure by hollowing out an extremely thick steel plate. It is provided with a test force (displacement) control function ideal for evaluation of the strength of high-strength concrete, rocks, etc., and is capable of preventing explosive fracture during compression.

Load capacity	3,000, 5,000 kN

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Micro Vickers Hardness Tester

HMV-G Series

This micro hardness tester features a novel G frame and a built-in CCD camera for standardized automatic length measurement. Hardness can be measured simply and accurately with easy-to-use PC software. The lineup also includes fully automated (FA) machines equipped with an electrically driven revolver mechanism and electrically driven XYZ. A manual machine with an optical head is also included in the lineup.

Test force range	0.098 to 19.6 N
Reading method	Automatic (G21) Manual (G20)
Maximum number of indenters and object lenses installed	S: Indenters 1, Object lenses 2 D: Indenters 2, Object lenses 4
With electrically driven revolver	HMV-G21ST/G21DT

Dynamic Ultra Micro Hardness Tester

DUH-211/211S
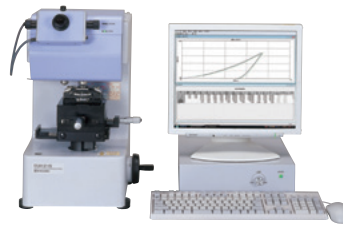
This tester can be used for measuring the surface properties (hardness and elastic modulus) metal materials, thin films, DLC films, surface treated layers such as alumite, plastics, and rubbers. Measurement can be carried out with test forces as low as 0.1 mN (resolution 0.2 µN).

Test force range	0.1 to 1,961 mN (0.01 to 200 gf)
Indentation depth range	0 to 10 µm
Minimum display	0.0001 µm
Testing mode	3 types (211 model), 7 types (211S model)

Micro Compression Tester

MCT Series

With high temperature system, length measurement kit (option)

This is a strength evaluation tester for micro parts and micro particles generated in powder processing. It is capable of carrying out not only compression tests, but also loading and unloading tests, repeated tests, and various other load patterns, with excellent operability and functionality.

	MCT-510	MCT-511	MCT-210	MCT-211
Loading method	Electromagnetic loading method			
Test force range (mN)	9.8 to 4903		9.8 to 1961	
Displacement measurement range (µm)	0 to 100	0 to 10	0 to 100	0 to 10

Capillary Rheometer Flowtester

CFT-500EX/100EX

This device evaluates viscosity properties from the relationship to temperature, pressure, and flow velocity, etc., for flowable materials. It demonstrates its power in research and development, production processes, and quality control for various flowable materials such as thermoplastic resins, thermosetting resins, toner, composite materials, ceramics and rubbers.

Extrusion force	CFT-500EX: 0.4903 to 49.03 MPa (0.4903 MPa step) CFT-100EX: 0.098 to 9.807 MPa (0.098 MPa step)
Test temperature	(Room temperature + 20) to 400 °C
Test type	Constant temperature tests, constant velocity rising temperature tests

Mooney Viscometer

SMV-301/301RT

This device evaluates the Mooney viscosity and vulcanization properties of rubbers. Operation is simple using the color LCD touch panel, and basic performance, such as temperature recovery properties, is excellent. A stress-relieving function is also provided based on ISO/ASTM standards (SMV-301RT). It can also be operated using PC software.

Applicable standard	JIS K6300-1, ISO 289-1 to -4, ASTM D1646
Mooney viscosity measurement range	0 to 200.0 M
Temperature control range	70 to 200 °C

Servopulser Table-Top Fatigue and Endurance Testing Machine
EHF-LM/LV Series

EHF-LV Series

This revolutionary fully digital servo controlled multi-functional materials testing machine opens up a new era in fatigue testing systems. It provides excellence in all aspects, including precision, reliability, and expandability, through its fully digital control achieved by bringing together the latest technologies.

Maximum test force	Dynamic, ±5, ±10, ±20 kN
Max. amplitude	±25 mm, ±50 mm
Waveform	Sine, triangular, rectangular, ramp, and haversine waves

Note: Select the control device from two options: the 4830 (V), and the 4890 (M).

Servopulser Overhead Actuator Type Fatigue and Endurance Testing Machine
EHF-UM/UV Series

This is a multi-functional fatigue testing machine suitable for specimens, structures and full-sized parts. It is an overhead actuator type with a broad test space, so it is ideal for various types of environmental tests, such as those in corrosion tanks or constant temperature tanks.

Maximum test force	Dynamic, ±50, ±100, ±200 kN
Main unit format	Overhead actuator type, testing table with T groove
Waveform	Sine, triangular, rectangular, ramp, and haversine waves
Control mode	Test force, stroke

Note: Select the control device from two options: the 4830 (V), and the 4890 (M).

Servopulser Fatigue and Endurance Testing Machine
EHF-EM/EV Series

This is the standard electrohydraulic servo fatigue testing machine, offering outstanding stable performance. It is capable of carrying out tests ranging from static tests to fatigue tests.

Maximum test force	Dynamic, ±10, ±20, ±50, ±100, ±200 kN
Max. amplitude	±25 mm, ±50 mm
Waveform	Sine, triangular, rectangular, ramp, and haversine waves
Control mode	Test force, stroke

Note: Select the control device from two options: the 4830 (V), and the 4890 (M).

Electromagnetic Force Micro Tester
Micro-Servo MMT Series

Achieves test forces in the order of grams and high-speed repeated loads at the micro level through its use of an electromagnetic servo actuator. It is optimal for evaluation of the dynamic strength of items such as micro materials and miniature parts.

	MMT-11NV-2	-101NV-10	-250NV-10
Test force capacity	±10 N	±100 N	±250 N
Stroke	±2 mm	±10 mm	
Max. frequency	60 Hz	100 Hz	
Power requirements	AC100 V		

Chromatography Systems
Mass Spectrometry Systems
Spectroscopy Systems
Life Science Systems
X-ray and Surface Analysis Systems
Environmental Measurement Systems
Material Testing and Non-Destructive Inspection Systems
Physical Properties Measurement Systems

Electromagnetic Force Fatigue and Endurance Testing System

Servopulser EMT Series

EMT-1kN   EMT-5kN

High-speed repeated load tests can be carried out with a maximum velocity of 2 m/s, and maximum stroke of ±50 mm, using clean and quiet electromagnetic force as the driving power, without the use of oil. The test space is large so environmental tests can also be carried out using the constant temperature tank (option).

	EMT-1kNV-30	EMT-1kNV-50
Maximum test force	±1 kN (static and dynamic tests)	
Stroke	±30 mm	±50 mm
Max. speed	1 m/s	2 m/s
Max. frequency	200 Hz	

	EMT-5kNV-30	EMT-5kNV-50
Maximum test force	Dynamic: ±5 kN, Static: ±3.5 kN	
Stroke	±30 mm	±50 mm
Max. speed	1 m/s	
Max. frequency	200 Hz	100 Hz

High-Speed Impact Testing Machines

HITS-X Series   *New*

HITS-TX

With the increasing demand for safety and reliability, evaluation of the dynamic strength (impact properties) of materials and parts is becoming more and more important. This machine can obtain data, such as the maximum test force, energy, and displacement, up to a maximum velocity of 72 km/h (20 m/s).
A tensile load type (HITS-TX) and a punching type (HITS-PX) are available.

Impact test force	10 kN
Speed setting range	1 to 20 m/s
Piston stroke	300 mm
Controller	Controller 4870 (dedicated controller for high-speed impact testing)
Software	TRAPEZIUM HITS high-speed impact testing software

Note 1: The PC and printer are not included, so they must be ordered separately.
Note 2: A constant temperature tank can be added as an option.

Energy-Conservation Unit for Servopulser Hydraulic Power Supply Unit

ECU1/ECU2 Series

The conventional hydraulic power supply unit for fatigue and endurance tests is always driven at full power to achieve the maximum test force and maximum velocity and the hydraulic power supply unit is selected in order to satisfy the maximum test performance. Therefore, depending on the test conditions, energy is excessively consumed. With the ECU Series the motor rotational speed and the supply pressure of the hydraulic power supply unit can be set in multiple stages, so energy savings of up to about 50% can be achieved depending on the test conditions and test circumstances. It is used in combination with the Servo Controller 4830. (The Servo Controller 4830 is provided separately.)

Applicable hydraulic power supply unit	Water-cooled type, air-cooled type
Motor capacity	5.5 kW, 11 kW, 22 kW, 37 kW

Ultrasonic Fatigue Testing System

USF-2000A

This machine uses ultrasonic vibrations to evaluate the fatigue strength of materials in the order of gigacycles over a short period of time. The condition settings and monitoring can be carried out from the included computer.

Test frequency[Note 1]	20 kHz ± 500 Hz
Test stress[Note 2]	180 to 900 MPa (in the case of a steel circular taper specimen)
Stress ratio	-1

Note 1: The test frequency is determined from the resonance frequency of the sample.
Note 2: Stress values depend on sample shape and physical property values.
Note 3: An air compressor is included. A displacement measuring device is an option.

Servopulser Control Unit
4830

Using the touch-panel operation, measurement and control of tests ranging from static tests to dynamic tests can be simply carried out. Up to four testing machines can be operated simultaneously. Functions such as data acquisition and programmed loads can be expanded using USB connection software (option).

Test waveforms	Sine, triangular, rectangular, etc.
Amplifier	Test force, stroke
Control mode	Test force, stroke, virtual transducer
Power requirements	Single-phase 100 V, 300 VA

Note: A wide range of software is available.
Contact Shimadzu for details.

Electric Motor Driven Actuator
NJ-SERVO Series

This is a ±10 kN±100 mm electrical powered vibrator that can save about 75 % of the power. The drive source is a motor, so cooling water for a hydraulic oil source is not required. The durability of full-size parts such as automotive parts can be evaluated by applying repeated loads.

| Static/dynamic test force	±1 kN, ±5 kN, ±10 kN, ±20 kN, ±30 kN
Effective stroke	±100 mm (±150 mm)

Compact Hydraulic Vibrator Force Simulator
EHF-JF Series

This is a ±20 kN ±100 mm vibrator weighing only about 25 kg. It is a light and compact easy-to-handle hydraulic vibrator that can evaluate durability by applying repeated loads to products such as automotive parts, furniture and structures.

Dynamic test force	±5 kN, ±10 kN, ±20 kN, ±30 kN (4 types)
Effective stroke	±50, ±100, ±150 mm (selective)

Servopulser Structural Fatigue Testing Machine (Jack System)
EHF-J Series
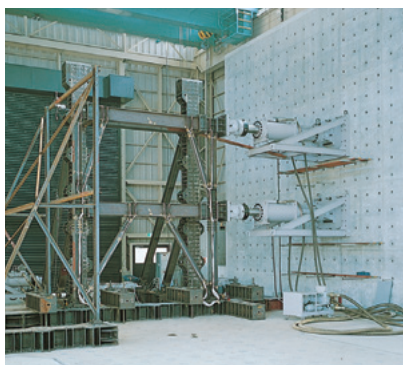
This is a structural fatigue testing machine for researching the dynamic behavior of full-size or model structures by applying repeated loads. The actuator that supplies the loads to the specimens can be installed on load frames, reaction floors, reaction walls, etc.

Loading method	Electro-hydraulic servo method (capacity 10 to 1 MN)
Control mode	Test force and displacement (strain) (Strain) is a special ancillary
Test speed	0.001 to 30 Hz (the upper limit increases or decreases depending on the capacity of the hydraulic pressure source)

Servopulser Vibration Testing Machine
EHV Series

This machine performs vibration tests on structures, equipment, transport packages, etc. Vibration directions include horizontal and vertical. Large capacity and large stroke can be obtained with the electro-hydraulic servo system.

Vibration method	Electro-hydraulic servo method
Vibration force	Horizontal 50 kN, vertical 40 kN
Stroke	±50 mm
Vibration direction	Horizontal, vertical
Control mode	Peak values of displacement and acceleration

Ono Rotary Bending Fatigue Testing Machine
H-7 Type

This machine carries out rotary bending fatigue tests at high temperatures or at room temperature on heat-resistant materials and normal metal materials. The rotation speed can be varied between 1,700 and 3,400 rpm, and it has been designed for high-speed continuous operation. To carry out high-temperature tests, a furnace, temperature-adjustment device, and chucking rod are used (options).

Max. bending moment	100 N·m (10 kgf·m)
High-temperature test device	300 to 850 °C

Dimensional X-Ray CT System

New

XDimensus 300
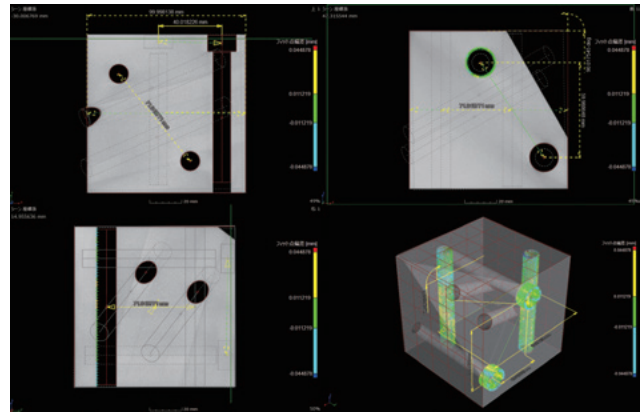
A "New Dimension" in Measurement

The XDimensus 300 is a dimensional X-ray CT system capable of measuring samples in 3D. In addition to the external surface form of objects, it is capable of measuring the internal form (in locations where probes and lasers cannot reach). It brings added value that could not be provided by conventional measurement systems, by enabling dimensional measurement and observation and analysis of internal structure and defects using CT images.

Features

- **Highest Level of Measurement Accuracy in Its Class***
  An ultra-high accuracy rotating table as well as a high-accuracy CT stage with excellent stability such as a granite stage frame have been adopted. In addition, an instrument internal temperature adjustment function is provided in order to maintain stable measurement accuracy.
- **Compact External Appearance with a Maximum Measurement Field of View of 300 mm in Diameter**
  With a compact size of width 2.2 m, depth 1.6 m, and height 2 m, the maximum measurement field of view of 300 mm in diameter can be maintained.
- **Easy and Rapid CT Scanning**
  The system supports setting of the ideal CT scan conditions, so even an operator unfamiliar with CT systems can rapidly take CT images.

* Based on Shimadzu's evaluation of sphere distance error

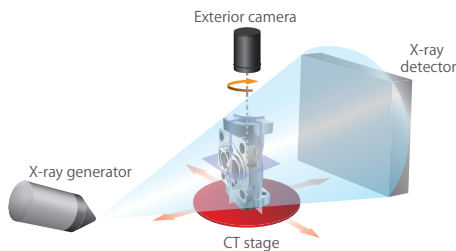| Target object	Resins and light metals
Max. sample size	Max. 300 mm dia. × 210 mm
Max. sample weight	Max. 10 kg
Max. field of view	300 mm dia.
Accuracy (sphere distance error)	±(3.8+L/50) µm

Dimensional measurement

Microfocus X-Ray CT System
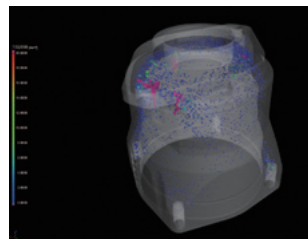
inspeXio SMX-225CT Series

inspeXio SMX-225CT FPD HR

Principle of System

Exterior camera

X-ray detector

X-ray generator

CT stage

The target object (sample) is placed between the X-ray generator and X-ray detector. The target object is rotated 360 degrees, and X-ray fluoroscopic data is collected from various angles, and cross-sectional images are calculated.

This is a high-performance microfocus X-ray CT system equipped with a Shimadzu microfocus X-ray generator and high-sensitivity X-ray detector. Using the intuitive user interface, anyone can easily observe the 3D structure of the interior of samples. With its wide CT stage and new detector, larger samples can be inspected. A model with a large high-resolution flat panel detector mounted has been added, so even higher resolution and higher contrast CT images can be achieved.
It is suitable for observation of the internal structure of a wide range of samples such as aluminum die castings, electronic parts, and GFRP/CFRP composite materials.

	inspeXio SMX-225CT FPD HR	inspeXio SMX-225CT FPD
Target object	Aluminum die castings, electronic circuit boards, electronic parts, composite materials, etc.	
Max. sample size	Max. 400 mm dia. × H300 mm	Max. 350 mm dia. × H300 mm
Max. sample weight	Max. 12 kg	Max. 9 kg
X-ray detector	16-inch flat panel detector	8-inch flat panel detector
Max. field of view	400 mm dia.	250 mm dia.

Aluminum Die Cast Defect Analysis
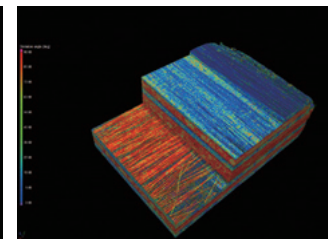
Analysis of CFRTP Fiber Orientation (supplied by Ehime University)

Examples of Images Obtained by the inspeXio SMX-225CT FPD HR

Material Testing and Non-Destructive Inspection Systems

Microfocus X-Ray Inspection System

Xslicer SMX-6000

The Xslicer SMX-6000 is an X-ray inspection system equipped with a Shimadzu microfocus X-ray generator and a high-sensitivity flat panel detector, and it features CT scanning capability. With a seamless fusion of X-ray fluoroscopy and CT scanning, the fluoroscopic images and cross-sectional images can be rapidly viewed using the smooth switching operation. In addition, the system includes the new Xslicer CT image processing engine used to fully automate calibration and provide high-speed scanning and reconstruction. The system enables the detailed observation of internal structures and defects in flat samples such as electronic devices with high-resolution images without distortion.

| Target object	Mounted circuit boards, electronic parts, etc.
Max. sample size	Max. W470 × D420 × H100 mm
Max. sample weight	Max. 5 kg
X-ray output (max.)	160 kV-100 μA (max. 16 W)
Detector	Flat panel detector
Fluoroscopic field of view size	0.75 (vertical) × 1.3 (horizontal) to 21 (vertical) × 38 mm (horizontal)
CT field of view size	3 to 30 mm (given 45° laminographic angle) / 3 to 14 mm (given 60° laminographic angle)

Principal and Effect of CT Imaging

X-ray fluoroscopic images are captured by tilting the flat panel detector and rotating it 360 degrees. The resulting fluoroscopic images are then combined by a reconstruction process to create cross-sectional images. In fluoroscopic images, features in the depth (or thickness) direction overlap. As a result, it is not possible to differentiate between the front and back side of a double-sided surface mounted circuit board, for example. However, with X-ray CT images, each layer of the board can be observed.
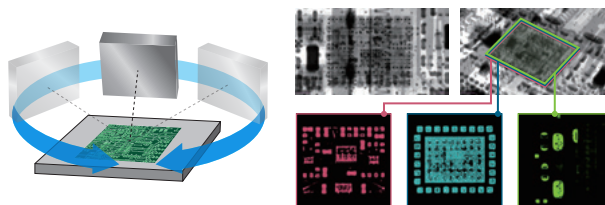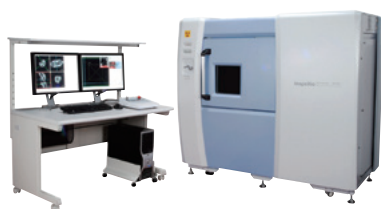
Useful Functions That Support Inspection

With the teaching function, fluoroscopic imaging and cross-sectional imaging (CT scanning) can be set for each registered point.

point 1	point 2	point 3
Fluoroscopic Image	Fluoroscopic Image	Cross-Sectional Image (CT Scan)
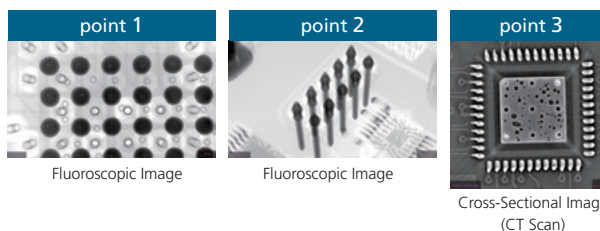
Microfocus X-Ray CT System
inspeXio SMX-100CT

The inspeXio SMX-100CT is a system capable of performing high-magnification 3D observations of resins, pharmaceuticals, bones, and other materials with low specific gravity. The system is equipped with an X-ray tube with 5 μm resolution and ultra-high-sensitivity X-ray detector. The HPC inspeXio high-performance computing system is equipped as standard, so high-magnification, clear CT images can be obtained faster and more clearly.

Target object	Resins, pharmaceuticals, bone, etc.
Spatial resolution	5 μm (chart resolution, fluoroscopic image)
Max. sample size	Max. 180 mm dia. × 250 mm
Max. sample weight	Max. 4 kg
X-ray output (max.)	100 kV-200 μA (Approx. 20 W)
Detector	4-inch variable field of view image intensifier
Max. field of view	90 mm dia.

Microfocus X-Ray CT System
inspeXio SMX-90CT Plus

Built to be easy to use, fast, and compact, the inspeXio SMX-90CT Plus benchtop X-ray CT system makes CT imaging simple for everyone. The HPC inspeXio high-performance computing system is equipped as standard, so CT images can be viewed immediately after completion of scanning. The system can be used for a wide range of applications such as observation and analysis of the structure of teeth, bone, and pharmaceuticals, and for the inspection of resin parts and small electronic parts.

Target object	Resins, pharmaceuticals, bone, etc.
Max. sample size	Max. 160 mm dia × H100 mm
Max. sample weight	Max. 4 kg
X-ray output (max.)	90 kV - 250 μA (10 W)
Detector	Flat panel detector
Max. CT scan area	50 mm dia.

Microfocus X-Ray Inspection Systems
SMX-1000 Plus/SMX-1000L Plus

SMX-1000 Plus

The SMX-1000 Plus and SMX-1000L Plus X-ray inspection systems are a further refinement of the previous models (SMX-1000/SMX-1000L). By combining with separately sold optional systems, the automatic judgment system for ball grid array (BGA) measurement can be configured.
In addition, by mounting the optional VCT unit, 3D analysis that could not be performed with the fluoroscopic function alone is enabled.
Note that a Plus modification kit has been prepared for the previous models (SMX-1000/SMX-1000L).

Target object	Mounted circuit boards, electronic parts, resins, etc.
Max. sample size	350 × 450 mm (1000 Plus), 570 × 720 mm (1000L Plus)
Max. sample weight	Max. 5 kg
X-ray output (max.)	90 kV - 110 μA (10 W)
Detector	Flat panel detector
Magnification	Approx. 8× to 161×

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Differential Scanning Calorimeter

DSC-60 Plus Series

Addressing All Needs for DSC Applications

The DSC is an indispensable thermal analyzer for materials characterization in R&D and quality control applications in the areas of polymers, pharmaceuticals, foods, etc. It offers high sensitivity and easy operation required for the development of high-performance, highly functional new materials.

### All Temperature Ranges Measured at High Sensitivity

The new detector in the DSC-60 Plus series and heating furnace unit achieve a stable baseline across the entire measured temperature range (-140 °C to 600 °C) as well as top-class calorimetric sensitivity for a DSC. It also features a wide dynamic range of ±150 mW.

Various Measurements Achieved by Simple Operation

The liquid-nitrogen cooling chamber permits easy measurements at even below room temperature without having to install special accessories. The sample loading temperature function enables quick sample change during sequential analysis without moisture condensation.

Complies with Analytical Laboratory Regulations

The DSC complies with various regulatory guidelines involving analytical laboratories, such as the PIC/S GMP guidelines, and electronic record/electronic signature (ER/ES) regulations, including the US FDA 21 CFR Part 11. In addition, it is compatible with other analytical instruments and connected network systems.

DSC-60 Plus
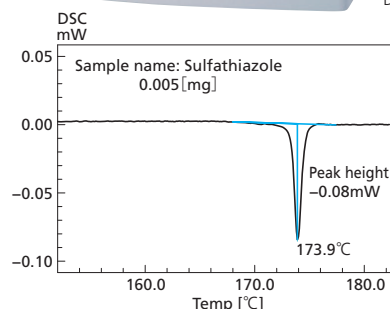
High-Sensitivity Measurements of Trace Samples (pharmaceutical)

- Also included in the lineup is the DSC-60A Plus which has a built-in compact autosampler which allows automated measurement, analysis and printing of reports for up to 24 loaded samples in a single operation.

Temperature range	-140 to 600 °C (Liquid nitrogen used below room temperature)
Calorimetric measurement range	±150 mW
Baseline noise	0.5 µW max. (rms, when held at 150 °C using blank)

TG-DTA Simultaneous Measuring Instrument

DTG-60/60H/60A/60AH

DTG-60A

This simultaneous TG-DTA (thermogravimetry/differential thermal analysis) measuring instrument features a differential type top loading balance with a Roberval mechanism, and a plugin type high-sensitivity thermocouple.
It can measure samples up to 1 g. It also provides improved DTA sensitivity at high temperatures.
With the auto DTG models (60A/60AH) that incorporates a autosampler, it is possible to place about one day's worth of samples. They are also capable of automatically measuring both empty cells and samples.

Temperature range	Room temperature to 1,100 °C (DTG-60/60A) Room temperature to 1,500 °C (DTG-60H/60AH)
Measurable range (weight)	±500 mg
Measurable range (differential thermal)	±1,000 µV
Number of settable samples	24 per sample tray (DTG-60A/60AH)

Thermomechanical Analyzer

TMA-60/60H

This analyzer can handle a wide variety of samples and measurement methods and a large temperature range to perform thorough measurement of the mechanical properties of materials. A high-precision digital sensor allows displacement measurement with a low drift in a wide range.

Temperature range	Ambient to 1,000°C/1,500°C from -140°C with an optional adapter
Measurement range	Displacement : ±5 mm Load : ±5 N
Sample size	ø8 × 20 mm, 5 × 1 × 20 mm (60 type)

Thermogravimetric Analyzers
TGA-50/50H/51/51H

Our TGA units have been designed to provide excellent performance for all aspects related to analysis, from vibration resistance and stability to noise level and fluctuations due to ambient temperature. These units can even clearly detect mass fluctuations as small as the several mg order (10 µg for 51-model units). High-temperature H models are available for ceramic, catalyst, and other high-temperature applications.
The 51-model units are macro-type analyzers.

Temperature range	Room Temp. to 1,000°C/Room Temp. to 1,500°C (H-models)
Measurement range	±20 mg, ±200 mg,(only ±2,000 mg(51-models)only
Maximum sample weight	1 g(tare weigtht)/ 10 g(tare weight for 51 models)

Differential Thermal Analyzer
DTA-50

This is a DTA unit that utilizes a dumbbell type detector. The DTA-50 has a temperature controller, gas flow rate adjuster, transmission interface, and many other features built into a slim 17.3 cm-wide body. The DTA-50 also offers high-temperature DSC performance.

Temperature range	Room temp.to 1,500°C
Measurement range	±0.2 to ±1,000 µV (from a minimum of ±0.2 mW)
Heating speed	0 to ±50°C/min.

Thermal Analyzer Workstation
TA-60WS

The TA-60WS uses 32-bit application software that is fully compatible with Windows 10/7. Up to four thermal analyzers can be connected to the workstation, which is equipped with multi-channel, multi-task functions that make it possible to make measurements while simultaneously performing analysis.

The workstation takes full advantage of the outstanding functions of Windows 10/7.
Thermal analysis data can be transmitted quickly through Internet E-mail.
The software is OLE compatible, making it easy to prepare reports using analysis data.
The TA-60WS can also be connected to 50-Series thermal analyzers.

Chromatography Systems

Mass Spectrometry Systems

Spectroscopy Systems

Life Science Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Aggregation Analysis System for Biopharmaceuticals
Aggregates Sizer
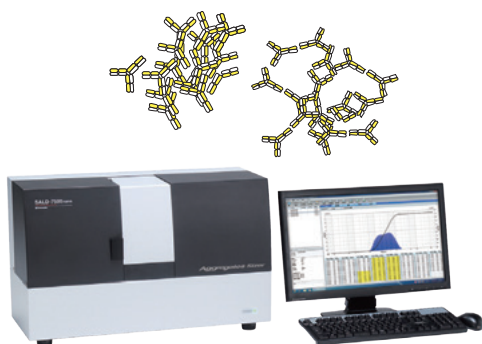
Protein aggregates of 100 nm to 10 μm in size which are contained in biopharmaceuticals and are concerned about severe side effects such as shock symptoms can be quantitatively evaluated as the number concentration (number/mL). Furthermore, by applying mechanical stress at a constant temperature (20 to 42 °C), the aggregation process can be shortened and the throughput of protein screening can be greatly enhanced. It can be used for efficiency improvement and quality control of development of antibody drugs, vaccines, clinical testing agents, etc.

Measurement range	40 nm + 20 μm
Measurement temperature	20 to 42 °C (constant temperature)
Batch cell	Sample amount: 5 mL mechanical stimulus can be applied while measuring
Micro cell	Sample amount: 125 μL

Nano Particle Size Analyzer
SALD-7500nano

Delivering 10 times the sensitivity of previous models, this innovative analyzer is capable of continuously measuring changes in particle size and particle size distribution at one-second intervals, within a range spanning 7 nm to 800 μm. In addition, unique options that accommodate the measurement of even high-concentration samples (up to 20 wt%) and trace quantity samples (down to 15 μL) are available. Due to its leading-edge measurement capabilities, the analyzer will likely be used for many applications in new areas, including nanotechnology, the life sciences, and fine bubbles (microscopic bubbles).

Measurement range	7 nm to 800 μm
Light source	Violet semiconductor laser (405 nm wavelength)
Detection elements	84 elements
Options	Batch cell, multifunction sampler, high-concentration measurement system

Laser Diffraction Particle Size Analyzer
SALD-2300

The new standard in the SALD series. While maintaining continuity and compatibility with respect to the data of the SALD-2000/2100/2200, which were popular, widely distributed models, this instrument is equipped with many new functions useful for evaluating changes (dispersion, aggregation, dissolution) in particle size distribution relative to the concentration or time.
It supports a particle concentration range from 0.1 ppm to 20% and can perform a series of measurements of 200 data points at 1 second minimum intervals.

Measurement range	17 nm to 2,500 μm
Light source	Red semiconductor laser
Detection elements	84 elements
Options	Multifunctional variable-volume sampler, batch cell, high-concentration sample measurement system, cyclone injection type dry measurement unit

Single Nano Particle Size Analyzer
IG-1000 Plus

Shimadzu's highly innovative Induced Grating (IG) particle size measurement technology is adopted. This method employs dielectrophoresis instead of scattered light. Numerous particles form a diffraction grating, and the particle sizes are measured based on the speed of diffusion/disintegration of this diffraction grating. As a result, adequate signals can be obtained even in the single nano region, so highly sensitive measurements with excellent reproducibility can be obtained.
It offers approximately 10 times the sensitivity of the previous model, the IG-1000.

Measurement range	0.5 to 200 nm
Measurement time	30 sec
Batch cell method, sample volume	250 to 300 μL

Analytical Balance

AP Series

Thanks to the built-in UniBloc AP integrated aluminum mass sensor and an optimized control system, this balance achieves high-speed measurements with a response as quick as 2 seconds. Featuring an easy-to-read organic EL display, it has been redesigned for excellent operability. The AP-W series is equipped with a function to automatically calculate the weight values required for sample concentration preparation, which supports routine weighing operations.

AP-W Series (with built-in calibration weight)

Model	Capacity	Minimum Display
AP135W	135 g	0.01 mg
AP125WD	120 g/52 g	0.1 mg/0.01 mg
AP225WD	220 g/102 g	0.1 mg/0.01 mg
AP124W	120 g	0.1 mg
AP224W	220 g	0.1 mg
AP324W	320 g	0.1 mg

AP-X Series (with built-in calibration weight)

Model	Capacity	Minimum Display
AP124X	120 g	0.1 mg
AP224X	220 g	0.1 mg
AP324X	320 g	0.1 mg

AP-Y series

Model	Capacity	Minimum Display
AP124Y	120 g	0.1 mg
AP224Y	220 g	0.1 mg
AP324Y	320 g	0.1 mg

Analytical Balances

AU Series
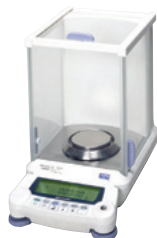
These balances are capable of speedy measurements, with a high-speed 3 second display. They are equipped with automatic calibration for room temperature changes, and clock-CAL for calibration at pre-set times, and are capable of direct data readout to Excel and other applications.

Dual Range Semi-Micro Balances AUW-D Series

Model	Capacity	Minimum Display
AUW120D	42 g/120 g	0.01 mg/0.1 mg
AUW220D	82 g/220 g	0.01 mg/0.1 mg

Analytical Balances AUW Series
(equipped with clock-CAL and fully automatic calibration functionality)

Model	Capacity	Minimum Display
AUW120	120 g	0.1 mg
AUW220	220 g	0.1 mg
AUW320	320 g	0.1 mg

Analytical Balances AUW Series
(equipped with fully automatic calibration functionality)

Model	Capacity	Minimum Display
AUX120	120 g	0.1 mg
AUX220	220 g	0.1 mg
AUX320	320 g	0.1 mg

Analytical Balances AUY Series (popular, all-purpose model)

Model	Capacity	Minimum Display
AUY120	120 g	0.1 mg
AUY220	220 g	0.1 mg

Analytical Balances

AT Series

These are equipped with the same "UniBloc" technology found in high-end Shimadzu models although they are low cost instruments. They features highly stable performance, and are capable of highly reliable weight measurements even with extended use.

ATX Series (with built-in calibration weight)

Model	Capacity	Minimum Display
ATX84	82 g	0.1 mg
ATX124	120 g	0.1 mg
ATX224	220 g	0.1 mg
ATX324	320 g	0.1 mg

ATY Series

Model	Capacity	Minimum Display
ATY64	62 g	0.1 mg
ATY124	120 g	0.1 mg
ATY224	220 g	0.1 mg
ATY324	320 g	0.1 mg

Electronic Balances
UW/UX Series [Uni Bloc] [Windows DIRECT]

UW6200H

Shimadzu's newest top-loading balance series provides the supreme combination of performance and innovative features. The weighed result is displayed instantly and stands still. Excellent durability also meets repeated use in production sites. Choice of auto print modes and Shimadzu's unique WindowsDirect function enhance productivity without optional software. Check-weighing modes for quality control purposes and a back light display are also useful features in factory use. Measurement administration is also given good consideration.

A calibration report can be automatically output to meet international standards. The UW is equipped with built-in calibration weight and PSC, and Clock-CAL fully automatic calibration functions as standard. Specific gravity measurement software is already installed and an optional measurement kit allows more efficient measurements.

UW Series

Model	Capacity	Minimum display	PSC	Clock-CAL	GLP/GMP/ISO calibration report	Windows Direct
UW220H	220 g	0.001 g	•	•	•	•
UW420H	420 g	0.001 g	•	•	•	•
UW620H	620 g	0.001 g	•	•	•	•
UW820H	820 g	0.001 g	•	•	•	•
UW1020H	1,020 g	0.001 g	•	•	•	•
UW2200H	2,200 g	0.01 g	•	•	•	•
UW4200H	4,200 g	0.01 g	•	•	•	•
UW6200H	6,200 g	0.01 g	•	•	•	•
UW420S	420 g	0.01 g	•	•	•	•
UW820S	820 g	0.01 g	•	•	•	•
UW4200S	4,200 g	0.1 g	•	•	•	•
UW8200S	8,200 g	0.1 g	•	•	•	•

UX Series

Model	Capacity	Minimum display	PSC	Clock-CAL	GLP/GMP/ISO calibration report	Windows Direct
UX220H	220 g	0.001 g			•	•
UX420H	420 g	0.001 g			•	•
UX620H	620 g	0.001 g			•	•
UX820H	820 g	0.001 g			•	•
UX1020H	1,020 g	0.001 g			•	•
UX2200H	2,200 g	0.01 g			•	•
UX4200H	4,200 g	0.01 g			•	•
UX6200H	6,200 g	0.01 g			•	•
UW420S	420 g	0.01 g			•	•
UX820S	820 g	0.01 g			•	•
UX4200S	4,200 g	0.1 g			•	•
UX8200S	8,200 g	0.1 g			•	•

Electronic Balances
TW-N/TX-N/TXB Series

TW-N/TX-N Series   TXB Series

The beginning of the new standard: TX/TXB has everything you need. We changed key layout for easy operation, making operation as easy as using a cell phone. One-touch operation enables easy adjustments for optimum stability. It is equipped with WindowsDirect, which enables direct transport of data to a PC, requiring only a PC cable. And this product has various functions, including an Expanded Piece Counting function, Illuminated display, anti-theft options, and more.

TW-N Series

Model	Capacity	Minimum display	Windows Direct
TW223N	220 g	0.001 g	
TW323N	320 g	0.001 g	
TW423N	420 g	0.001 g	

TX-N Series

Model	Capacity	Minimum display	Windows Direct
TX223N	220 g	0.001 g	•
TX323N	320 g	0.001 g	•
TX423N	420 g	0.001 g	•
TX2202N	2,200 g	0.01 g	•
TX3202N	3,200 g	0.01 g	•
TX4202N	4,200 g	0.01 g	•

TXB Series

Model	Capacity	Minimum display	Windows Direct
TXB222L	220 g	0.01 g	•
TXB422L	420 g	0.01 g	•
TXB622L	620 g	0.01 g	•
TXB2201L	2,200 g	0.1 g	•
TXB4201L	4,200 g	0.1 g	•
TXB6201L	6,200 g	0.1 g	•
TXB6200L	6,200 g	0.1 g	•

Portable Electronic Balances
ELB Series
Handy low-cost balances, but with no compromise in accuracy.
A reliable strain-gauge load cell brings resolution up to 30,000.

Model	Capacity	Minimum display	Rechargeable battery (option)	Dry battery operation (standard)
ELB120	120 g	0.01 g	N/A	•
ELB200	200 g	0.01 g	N/A	•
ELB300	300 g	0.01 g	N/A	•
ELB600	600 g	0.05 g	N/A	•
ELB600S	600 g	0.1 g	N/A	•
ELB1200	1,200 g	0.1 g	N/A	•
ELB2000	2,000 g	0.1 g	N/A	•
ELB3000	3,000 g	0.1 g	N/A	•
ELB6000S	6,000 g	1 g	N/A	•
ELB12K	12 kg	1 g	N/A	•

Precision Platform Balances

BW-K/BX-K Series Uni Bloc Windows DIRECT

Animal Balances

Large-capacity balances with fine readability offer various possibilities for industries: weighing precious materials in bulk, efficient but precise compounding, confirming small parts not missing in a large assembly, etc. UniBloc technology gives fast response, display stability and endurance, all of which are essential for large-capacity industrial balances. Auto print, WindowsDirect and various productivity functions are ready for use as standard features. The BW-K has a large-size built-in calibration weight to ensure utmost accuracy.

Model	Capacity	Minimum display	Built-in calibration weight	GLP/GMP/ISO calibration report	Windows Direct
BW12KH	12 kg	0.1 g	•	•	•
BW22KH	22 kg	0.1 g	•	•	•
BW32KH	32 kg	0.1 g	•	•	•
BW32KS	32 kg	1 g	•	•	•
BW52KS	52 kg	1 g	•	•	•
BX12KH	12 kg	0.1 g		•	•
BX22KH	22 kg	0.1 g		•	•
BX32KH	32 kg	0.1 g		•	•
BX32KS	32 kg	1 g		•	•
BX52KS	52 kg	1 g		•	•

Electronic Moisture Balance

MOC-120H

Reliable moisture measurement backed by UniBloc technology

Thanks to the large sample pan backed by the unique continuous auto-taring mechanism, the MOC-120H delivers perfect accuracy, even to customers with high sample volumes and large quantities. Regardless of your application, the wide selection of measuring modes offers the best solution to achieve fast and accurate results. Best suitable for research laboratories, delivery inspection and in-process control.

Weighing capacity	120 g
Minimum indication	0.001 g / 0.01%

Unibloc Moisture Analyzer

MOC63u

A new type of moisture analyzer has been introduced.
This electronic moisture analyzer is capable of performing reliable moisture content measurements quickly and easily.
Simply load the sample on the pan and shut the cover to start measuring.
The system can accommodate a wide range of samples, thereby contributing to heightened work efficiency.

Weighing capacity	60 g
Minimum indication	0.001 g / 0.01%
External output	RS-232C interface USB interface DATA I/O interface

Static Remover, 2-Way Ionizer

STABLO®-AP

NEW Shimadzu's unique 2-WAY ionizer
Hand-held / On stand

Static removal method	AC corona discharge
Static removal range	Approx. 5 to 50 cm from discharge electrode (Fan ON)
Ozone concentration	0.04 ppm (measured 2 cm from discharge electrode, Fan ON)
Discharge electrode material	SUS304, service life 10,000 hours
Weight	Approx. 540 g (ionizer unit approx. 110 g, stand approx. 430 g)

▶

SHIMADZU

Shimadzu Corporation

www.shimadzu.com/an/