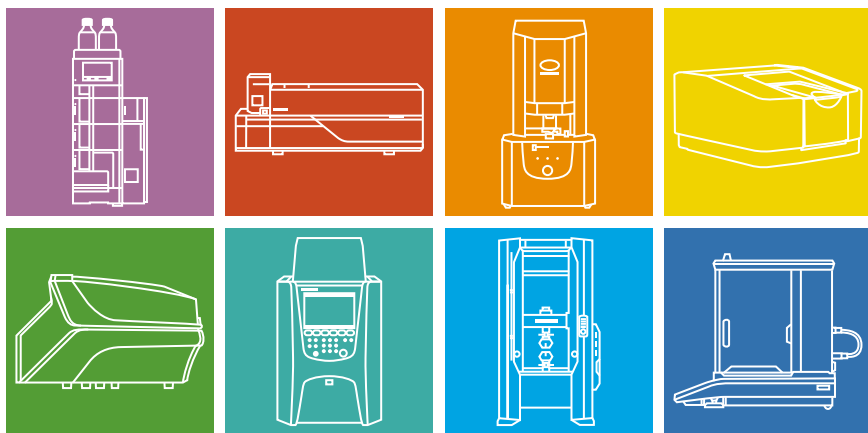


# Shimadzu Analytical and Measuring Instruments



**2023**

# 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.



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Chromatography Systems

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Mass Spectrometry Systems

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Life Science Lab Systems

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Spectroscopy Systems

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X-ray and Surface Analysis Systems

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Environmental Measurement Systems

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Material Testing and Non-Destructive Inspection Systems

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Physical Properties Measurement Systems



# Instruments for Pharmaceutical Sciences Research, Development and QC



## 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, ICP
	CMC (Development, Formulation, Manufacturing QA/QC)	Analytical method development	HPLC, GC, Material testing machine, X-ray CT/inspection system, Balances
		Pharmaceutical formulation investigation	Thermal analyzers, Particle size analyzer, Material testing machine, X-ray CT system
		Impurities analysis	Co-Sense, Headspace GC (GCMS)
Biopharmaceuticals	Drug Discovery	Structural analysis	MALDI-TOF MS, HPLC
		Culture solution analysis	HPLC
	CMC (Development, Formulation, Manufacturing QA/QC)	Analytical method development	HPLC, Protein sequencing systems, Aggregation analysis system, Balances
Pharmacokinetics, Metabolomics, Safety		PK/TK ADME	HPLC, LCMS, Imaging mass microscope
Manufacturing		Quality control	Balances
		Cleaning validation	TOC, UV, HPLC, LCMS

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



■ **Nexera series** →P. 8  
■ Ultra High Performance Liquid Chromatograph



■ **LCMS-8060NX** →P. 19  
■ Liquid Chromatograph Triple Quadrupole Mass Spectrometer



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■ Preparative Purification Liquid Chromatograph



■ **Headspace Analysis System** →P. 26  
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■ Aggregation Analysis System for Biopharmaceuticals



# Analytical and Testing Instruments for Food, Beverages and Drinking Water



## Support for Food Safety and Development

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, X-ray CT/inspection system, GC, GCMS
	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-TOF MS
	Total organic carbon	TOC
	Packaging	GC, GCMS, Material testing machine, UV, Balances
Food Development (Functional Foods and Supplements)	Food texture, taste	EZ Test, Particle size analyzer, Thermal analyzers, Moisture analyzers
	Flavor	GC, GCMS
	Functionality	HPLC, LCMS, GC, GCMS
	Therapeutic efficacy	Molecular imaging instrument

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



■ **LCMS-8060NX** →P. 19  
 ■ Liquid Chromatograph  
 ■ Triple Quadrupole Mass Spectrometer



■ **GCMS-TQ8050 NX** →P. 25  
 ■ Triple Quadrupole  
 ■ Gas Chromatograph Mass Spectrometer



■ **TOC-L** →P. 44  
 ■ Total Organic Carbon Analyzer



■ **SALD-7500nano** →P. 60  
 ■ Nano Particle Size Analyzer



■ **AP Series** →P. 61  
 ■ Analytical Balance



■ **EZ Test** →P. 49  
 ■ Table-Top Universal Testers

# 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
	Marker discovery	MultiNA
	Analysis of nucleic acid compounds	MALDI-TOF MS, LCMS, TMSPC, SPM
	Genetic examination of foods	MultiNA, BioSpec-nano
	Microbial and viral examinations	MultiNA
Proteomics	Protein expression analysis	MALDI-TOF MS, LC-MS/MS, nano-LC, AccuSpot
	Post-translational modifications analysis	MALDI-TOF MS, nano-LC, AccuSpot
	Structural analysis	LC-MS/MS
	N-terminal amino acid sequencing analysis	Protein sequencing system, MALDI-TOF MS
	Marker discovery	MALDI-TOF MS, LC-MS/MS, nano-LC, AccuSpot
Metabolomics	Marker discovery	GCMS, LC-MS/MS, Imaging mass microscope
	Metabolite analysis	GCMS, HPLC, LCMS
Imaging	In vitro imaging	MALDI-TOF MS, Imaging mass microscope, EPMA
	Optical brain-function imaging	LIGHTNIRS, LABNIRS

- Genomics
- Proteomics
- Metabolomics
- Imaging



■ ■ **iMScope QT** →P. 31  
■ ■ Imaging Mass Microscope



■ ■ **LCMS-9050** →P. 19  
■ ■ Quadrupole Time-of-Flight Liquid Chromatograph Mass Spectrometer



■ ■ **MALDI-8030** →P. 30  
■ ■ Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer



■ ■ **MultiNA** →P. 32  
■ ■ Microchip Electrophoresis System



■ ■ **BioSpec-nano** →P. 33  
■ ■ Life Science Spectrophotometer



■ ■ **PPSQ-51A/53A** →P. 33  
■ ■ Protein Sequencer



■ ■ **LIGHTNIRS** →P. 31  
■ ■ Portable functional Near-Infrared Spectroscopy System for Research

# Evaluation Instruments for Renewable Energy



## 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, XPS, FTIR, SPM
	Evaluation of homogeneous photocatalysts	UV, LCMS, FTIR
	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, XPS, FTIR, SPM
Fuel Cells (Solid PEFC)	Catalyst layers	EDX, FTIR, XPS
	Supported carbons	Particle size analyzers, Balances
	Membrane electrode assemblies (MEA)	X-ray CT system, EPMA
	Electrolytes	Thermal analyzers, SPM, Micro 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-1900i** →P. 33  
■ UV-VIS Spectrophotometer



■ **IRXross** →P. 36  
■ Fourier Transform Infrared Spectrophotometer



■ **EDX-7200** →P. 40  
■ Energy Dispersive X-ray Fluorescence Spectrometer



■ **SPM-Nanoa** →P. 43  
■ Scanning Probe Microscope/Atomic Force Microscope



■ **LCMS-8060NX** →P. 19  
■ Liquid Chromatograph Triple Quadrupole Mass Spectrometer



■ **GCMS-QP2020 NX** →P. 24  
■ Gas Chromatograph Mass Spectrometer



■ **Nexis GC-2030** →P. 14  
■ Gas Chromatograph

## Ultra High Performance Liquid Chromatograph

# Nexera series

## EXPERIENCE NEW BENCHMARKS

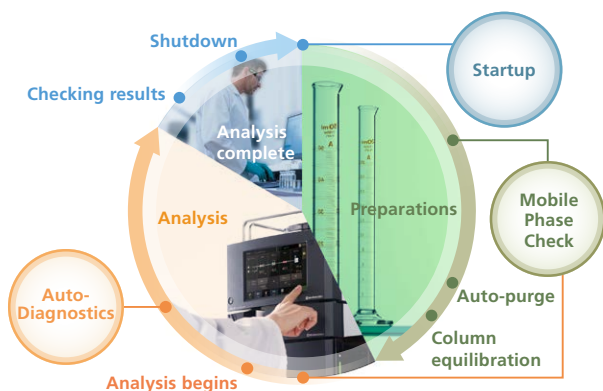
In response to the wide variety of customer demands for improving analytical workflow, Shimadzu is constantly introducing advancements in high-performance liquid chromatographs, with features such as superior reproducibility of retention times or for ultra-trace sample injection volumes, fast multianalyte analysis, low carryover, automatic sample pretreatment, high-sensitivity detection, and longer-lasting consumables. Using network technology based on the Internet of Things (IoT) and the cloud to automatically collect information about instruments within laboratories, it is now possible to not only monitor the operating status of instruments, but also ensure instruments can always be used in their optimal state. By merging and making further advancements to such state-of-the-art technologies, the Nexera series offers the unprecedented experience of analytical instruments thinking on their own to better support the analysis workflow of customers.

## • A New Benchmark of Intelligence

Nexera systems are equipped with startup, self-diagnostics/self-recovery, mobile phase monitoring, and other critical functionality for ensuring the system is always in optimal condition during analysis. That maximizes the ratio of operating hours during which the system is operated in good condition and automates the tedious processes which were previously performed by operators. Consequently, it contributes significantly to improving operating efficiency.

### Fully Automated Process Flow Achieves Long-Term Data Reliability

Long-term reliable data acquisition is achieved by incorporating the operating know-how of expert analysts for the entire process flow, from instrument startup until analyses are finished. Systems also include many other functions for automatically eliminating factors that can cause problems.



### Mobile Phase Level Monitor Prevents Running Out of Mobile Phase during Continuous Analysis

This monitor uses weight sensors (optional) to monitor the level of mobile phases, autosampler rinse solutions, or other solutions (up to 12 solutions) in real time. If the remaining solution level is less than required when starting an analysis, then a message is displayed to notify the operator. The operator is also notified if there is a risk of running out of the solution during an analysis. A smart device can be used to check the current level of each bottle, which makes it easier to decide in advance when to replenish bottles.



Movies >

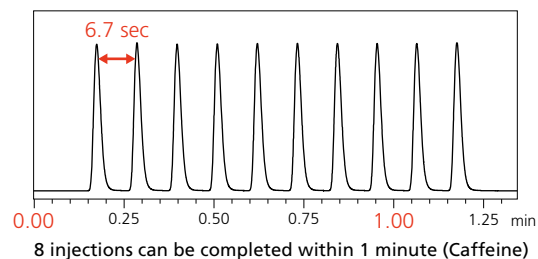
## • A New Benchmark of Efficiency

Functionality is included for maximizing throughput and increasing analytical process efficiency to the next level, such as functionality for ultra fast injection and low carryover. Also, IoT technology is used to ensure reliable instrument operation and contribute to laboratory asset management.

### LC-MS Analysis Process Efficiency Improved by Ultra Fast Injection and Non-Stop Analysis of up to 17,000 Samples

The SIL-40 series offers about two times faster injection speeds than previous models. By using plate changers, up to about 17,000 samples can be analyzed continuously.\* Plate changers provide powerful support for LC-MS high-throughput screening and analysis.

\* When using three plate changers with 384-well plates



## • A New Benchmark of Design

Offers both exceptional LC performance and also space and power savings. Due to the broad product line, optimal solutions for satisfying customer objectives can be offered, while also maximizing utility from laboratory equipment.



reddot award 2019  
winner

Brochure No. C196-E096



Automated support functions utilizing digital technology, such as M2M, IoT, and Artificial Intelligence (AI), that enable higher productivity and maximum reliability.

**New** Ultra High Performance Liquid Chromatograph

# Nexera XS inert

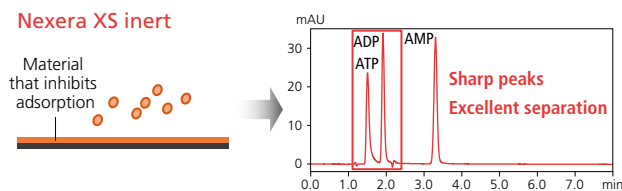
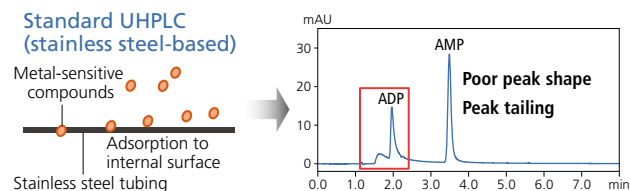
## EXPERIENCE NEWFOUND CLARITY

Acquiring highly reliable data with a standard UHPLC system that uses stainless steel parts can be difficult due to the adsorption of small and medium-sized metal-coordinating compounds such as oligonucleotides and compounds with phosphate groups to metal surfaces. Mobile phases with high salt concentrations and extreme pH levels can also lead to the corrosion of stainless steel parts. Nexera XS inert is a UHPLC system (resistant to 105 MPa) that uses non-metal materials in wetted flow lines. This reduces adsorption of metal-coordinating compounds in flow lines and improves peak shapes, thereby improving peak separation, sensitivity, and quantitative accuracy in LC and LC/MS analysis. The use of non-metal materials also eliminates the risk of flow line corrosion by mobile phases and resolves system durability issues. The optional pHM-40 pH monitor stores mobile phase pH data gathered in real-time as a data file for even greater data reliability and traceability.

Major component units SCL-40, LC-40D XSi, SIL-40C XSi, CTO-40S, SPD-M40, Low pressure gradient unit, pHM-40, LabSolutions LC, and others

Brochure No. C190-E275

### Assured Reliability and Reproducibility



Movies >

## High Performance Liquid Chromatograph Nexera lite inert

**New**



Nexera lite inert is an HPLC system (up to 20 MPa with aqueous mobile phases) that produces reliable data for size exclusion chromatography and ion exchange chromatography even when running mobile phases with high concentration haloid salts and using methods with extreme mobile phase pH levels. HPLC systems with stainless steel parts must be cleaned immediately with pure water after running these types of mobile phases, but Nexera lite inert uses non-metal materials in wetted flow lines, thereby preventing rust-related issues and ensuring stable long-term operation. The use of non-metal materials in flow lines also prevents the adsorption of metal-coordinating compounds and helps improve peak shapes and peak separation. Nexera lite inert supports a wide variety of system configurations for high-pressure and low-pressure gradients, mobile phase blending, and other conditions.

Major component units CBM-40lite, LC-40i, DGU-403, SIL-20AC (inert kit), CTO-40C, SPD-40, LabSolutions LC, and others

Brochure No. C190-E292

## Ultra High Performance Liquid Chromatograph Nexera Method Scouting System



Nexera Method Scouting System is constructed with the objective of automating and shortening the time required for the analysis method development process. With this system, data is automatically acquired using a maximum of 192 (16 times 12) method combinations based on 16 (4 times 4) mobile phase solvents and 12 columns. This enables a comprehensive investigation of analysis conditions while shortening the total time required for method searches. Using the mobile phase blending function to investigate mobile phase composition and FlowPilot to protect the column during automated equilibration significantly improve the efficiency and reliability of your analytical method development.

Major component units SCL-40, LC-40D X3x2, DGU-405x2, SIL-40C X3, CTO-40C, SPD-M40, LabSolutions LC, and others

• Configuration also possible with Nexera XS inert

Brochure No. C190-E216



## Nexera Application System Nexera 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-40, LC-40D, DGU-403, SIL-40C, CTO-40C, RID-20A, LabSolutions LC, LabSolutions GPC software, and others
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Brochure No. **C190-E092**

## Ultra High Performance Liquid Chromatograph for Online Dissolution Testing Nexera FV



Nexera FV systems automate process steps ranging from dispensing and analyzing solutions eluted from dissolution testing systems to generating reports. Two analysis modes are available, either of which can be selected to significantly reduce the labor involved in dissolution testing. The fraction analysis mode supports high-speed sampling at five-minute intervals for formulations that dissolve quickly, whereas the direct analysis mode immediately analyzes the solutions eluted during the specified sampling interval, such as for analyzing sustained-release formulations with long sampling intervals. That means reliable dissolution testing results can be obtained quickly with systems configured based on Nexera series models, which have earned a reputation for speed, sensitivity, and stability. Because Nexera systems can also be used as a regular UHPLC system, the ability to use them for fast analysis can be expected to increase instrument uptime rates at sites using them for testing.

Major component units	CBM-40lite, LC-40D X3, DGU-405, SIL-30ACFV, CTO-40C, SPD-40, LabSolutions LC, and others
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Brochure No. **C190-E214**

## Ultra High Speed LCMS System for Multiplex Analysis Nexera MX



Nexera MX systems offer up to double the LCMS sample processing capacity. In addition to separating and detecting injected samples, LCMS analysis normally also requires various other processing steps, such as rinsing the column, equilibrating the column at the initial mobile phase concentration, rinsing the autosampler, injecting the next sample, and so on. Therefore, to increase analysis throughput, there has been a need for solutions that shorten the time required for the above non-data acquisition processes. The Nexera MX features the unique Nexera MX Dual Stream Technology (MX-DST) that can maximize LCMS data acquisition efficiency by alternating between two streams used to inject samples into the LCMS system.

Major component units	SCL-40, LC-40B XR×2, DGU-405, DGU-403, SIL-40C XR, Plate Changer, CTO-40C, Startup kit, LCMS-8060NX, LabSolutions LCMS/Insight, LabSolutions Connect MRM, and others
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Brochure No. **C190-E190**

## Comprehensive Two-Dimensional Liquid Chromatograph Nexera-e

**New**



Comprehensive 2D-LC methodology is a paradigm shift in liquid chromatography separation. By combining two independent separation modes orthogonally in combination with a dual-loop/dual-valve alternate switching design, the highest possible peak capacity is achieved. The new Nexera-e is the ideal solution for the separation and characterization of most challenging and complex samples. It enables comprehensive data collection by analyzing at an extremely low flow rate in the first dimension and ultra-high speed in the second dimension. The Nexera-e is equipped with the "Auto-Diagnostic" function, which monitors baseline changes and pressure fluctuations to check for abnormalities. When it detects an unusual fluctuation, it can automatically pause the analysis. This feature prevents the loss of valuable samples due to abnormal pumping. 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, and synthetic polymers.

Brochure No. **C190-E172**

Nexera Application System

**Reducing Sugar Analysis System**

This analysis system uses post-column fluorescence derivatization detection. It can detect reducing sugars in samples with many contaminant components with high sensitivity and selectivity. The reducing sugar analysis system is configured with new Nexera series units, and uses features such as the FlowPilot function, which successively increases mobile phase flowrates in stages based on mobile phase level gauge and column oven temperature values, to ensure that typically expensive columns for reducing sugar analysis are used more reliably. In addition, the i-PeakFinder function enables easier chromatogram peak integration with higher reproducibility. Other functionality, such as the startup function, can also further improve the efficiency of customer analysis operations.

Major component units	CBM-40, LC-40Dx2, DGU-403, SIL-40C, CTO-40C, RF-20Axs, CRB-40, LabSolutions LC, and others
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Brochure No. C190-E279

Nexera Application System

**Organic Acid Analysis System**

Shimadzu's unique post-column pH-buffered electroconductivity method is ideal for the selective and highly sensitive detection of organic acids. Compared to conventional methods, such as the UV short wavelength method or a simple conductivity method, this system improves quantitation reliability. Compared to the post-column VIS absorption detection methods using pH indicators, this system has higher sensitivity, better linearity, and is easier to use. Complex samples (which usually require troublesome pretreatment) can be analyzed after simple pretreatment techniques such as dilution and filtration.

Major component units	CBM-40, LC-40Dx2, DGU-403, SIL-40C, CTO-40C, CDD-10AvP, LabSolutions LC, and others
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Anion Suppressor Ion Chromatograph

**HIC-ESP**

The HIC-ESP is a new anion suppressor ion chromatograph with built-in electrodiolytic suppressor, boasting the same low carryover and excellent injection precision characteristic of Shimadzu HPLCs to bring you highly-reliable results. The newly developed anion suppressor prevents peak spreading and achieves high sensitivity, providing stable functionality even over long periods of use. The HIC-ESP is suitable for applications in a wide range of fields including environmental science, medicine, chemistry and food science.

Major component units	CBM-40lite, LC-20ADSP, DGU-403, SIL-20A, CTO-40S, CDD-10AvP, LabSolutions LC, and others
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Brochure No. C197-E002

Preparative Purification Liquid Chromatograph

**Nexera Prep**

These preparative purification LC systems offer expandability for collecting up to 3240 fractions in 10-mm diameter test tubes by linking up to six new LH-40 liquid handler or new FRC-40 fraction collector units, which require about 50 % less installation space than comparable competing products, and a column hub that can hold up to six columns and four flow channel selection valves. LH-40 liquid handlers can be used not only as a fraction collector, but also as an autosampler equipped with a liquid level detection function (optional) or for seamlessly checking purity by reinjecting fractions after fractionation (optional). That supports achieving even higher efficiencies for preparative purification operations.

Major component units	CBM-40, LC-20APx2, DGU-405x2, SPD-M40, LH-40, Column Hub, LabSolutions LC, and others
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Brochure No. C193-E034

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

## Supercritical Fluid Extraction/Chromatography System Nexera UC/s: SFC/UHPLC Switching System



By simply adding one UHPLC pump to an SFC system, this system can automatically switch between SFC and UHPLC analysis modes to measure the same sample with both separation modes. In addition to use as a conventional UHPLC system for analyzing in the normal way, it can also be used for samples that are difficult to separate by UHPLC to evaluate analytical conditions for SFC analysis, which offers a different separation mode than UHPLC. It enhances user-friendliness and operability by allowing the investigation of separation conditions and performing reverse-phase high-speed analysis in a single system. Shimadzu also provides a kit to upgrade from your current UHPLC system to the UHPLC/SFC switching system.

Major component units	LC-30AD SF, SFC-30A, CBM-40, LC-40D XR×2, DGU-405×2, SIL-40C XR, CTO-40C×2, SPD-M40, Upgrade Kit, LabSolutions Multi LC-PDA, and others
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Brochure No. C190-E288

## Semi-Preparative Supercritical Fluid Chromatography System Nexera UC Prep



Nexera UC Prep is a preparative supercritical fluid chromatography system created by the combination of Nexera UC's superior fundamental technology and innovative new technology. By using our unique gas-liquid separation technology "LotusStream Separator", we can achieve a high recovery rate even for volatile components by suppressing a decrease in recovery rate due to the scattering of eluate during CO<sub>2</sub> vaporization. The dedicated software, which enables intuitive parameter settings, helps ensure preparation for the targeted, regardless of skill. This space-saving benchtop model includes a carbon dioxide pump that does not require an external chiller. While the system is compact and can be installed in any environment, it achieves both high recovery rate preparative processing and excellent operability, and promotes the efficiency of preparative processing.

Major component units	LC-40P SF, CO <sub>2</sub> Cooling Unit, SFC-40P, FRS-40, HEX-40, CBM-40, LC-20AP, LC-20AR, CTO-40C, SPD-M40, DGU-403, FCV-20AH <sub>2</sub> , LabSolutions LC, Prep Solution, and others
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Brochure No. C190-E288

## High Performance Liquid Chromatograph

# i-Series

## LC-2050/LC-2060

Amid increasing calls for improved work efficiency and a more flexible working style, ideas of LC analysis are changing. The time has come for an HPLC that delivers rugged, reliable results with less frequent interaction by the analyst. The new, integrated i-Series LC system maintains the excellent performance of its predecessor while addressing the need for automation efficiency.

### innovative

Analytical Intelligence functions, such as FlowPilot and mobile phase monitoring, and LabSolutions Direct can provide an automated workflow together with remote operation and monitoring from instrument startup to analysis completion. Automated workflows incorporate the work-style habits of experienced analysts. The result is reliable data collected over extended periods.

### intelligent

Migrating a test method (analytical conditions or method) from one instrument to another while obtaining the same chromatogram can be a challenging process. The i-Series is designed with the same internal system volumes as previous Shimadzu systems and competitor systems to ensure system compatibility and data reproducibility. An Analytical Condition Transfer and Optimization (ACTO) function also adjusts gradient start time automatically, so analysts can make adjustments to separations obtained by gradient analysis easily.



ANALYTICAL  
INTELLIGENCE

## Finally, an LC as Smart and Flexible as You.



Movies >

### intuitive

In addition to the temperature control function for flow cells, the i-Series employs new temperature control technology for detector optical systems, known as TC-Optics (Temperature Controlled Optics). This ensures a more stable baseline that is less susceptible to room temperature variation and increased precision during verification testing and quantitative testing of trace components.

Brochure No. C196-E098



## High Performance Liquid Chromatograph i-Series Method Transfer System



This system includes two streams respectively configured for UHPLC and HPLC volumes. Therefore, in addition to supporting a wide range of applications for various testing methods, it can also streamline the process of converting HPLC analytical/testing methods to high-speed UHPLC methods. That means analytical/testing methods established using a non-Shimadzu HPLC system can be migrated with excellent reproducibility, which can significantly reduce the amount of work involved in analytical method validation. ACTO functionality included in LabSolutions can not only be used to edit concentration gradient programs in existing methods but also move the injection timing based on the difference in internal volumes between systems. It can even convert existing HPLC methods to high-speed methods by simply loading the HPLC method.

Brochure No. C190-E269

## High Performance Liquid Chromatograph System LC-2030C NT



As HPLC becomes more commonplace, there is growing demand for instruments that cater to both novices and experts. The LC-2030C NT provides a simple touch-screen user interface and a workflow that requires no specialist training. The Shim-pack NT-ODS is a slide-in column that can be inserted in one motion, with no need for a wrench or other tools. The column is automatically connected into the flow path with no risk of human error. The dedicated Shim-pack NT-ODS is a monolithic-type column. The packing state of its separation medium is maintained over a long continuous analysis, whereas a particle-type column may deteriorate. The Shim-pack NT-ODS therefore provides long-term stability even over a large number of continuous injections.

Brochure No. C190-E259

## HPLC columns Shim-pack Scepter series



Product >

The Shim-pack Scepter series uses an organo-silica hybrid material for the packing material to deliver superior performance and durability over a wider range of analytical conditions than conventional silica particle-type columns. With its rich particle size and column size lineup, it can be used for a wide variety of applications from ultrafast analysis to preparative separation.

Stationary phases	C18-120, C18-300, HD-C18-80, C8-120, C4-300, Phenyl, PFPP, Diol
Particle diameter	1.9 $\mu\text{m}$ , 3.0 $\mu\text{m}$ , 5.0 $\mu\text{m}$
Column I. D.	2.1 mm, 3.0 mm, 4.6 mm

Brochure No. C190-E221

## Packed Columns for Supercritical Fluid Chromatography Shim-pack UC series



Product >

When conducting analysis with the Nexera UC supercritical fluid chromatography system, because diffusion of the sample band in the mobile phase is high compared to liquid chromatography, separation behavior changes significantly depending on the types of columns used. The Shim-pack UC series was designed to meet diverse research and development needs with 20 types of stationary phases and sizes. It enables a wider range of analysis than other companies' SFC columns and, in addition, there are 12 types of stationary phases with preparative sizes. Column scouting is effective by using a set of 6 columns, each providing a different separation selectivity.

Stationary phases	C18, Sil, Diol, Polybutylene terephthalate, Poly(4-vinylpyridine), Penta bromobenzyl, etc. (20 types in total) Above is the contents of a 6 columns set.
Particle diameter	3.0 $\mu\text{m}$ , 5.0 $\mu\text{m}$
Column I. D.	2.1 mm, 3.0 mm, 4.6 mm, 10 mm, 20 mm

Brochure No. C190-E251

## Gas Chromatograph

# Nexis GC-2030

## The Next Industry Standard

Nexis GC-2030 is a high-end 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 August 2020, 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 possible Pressure: 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

Brochure No. C184-E043



Movies >

### Tool-free Column Installation

ClickTek connectors 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. In addition, a light has been installed inside the oven to brightly illuminate the area at hand, easing the burden on the operator when attaching columns.



ClickTek Connector

### One-touch Inlet Maintenance

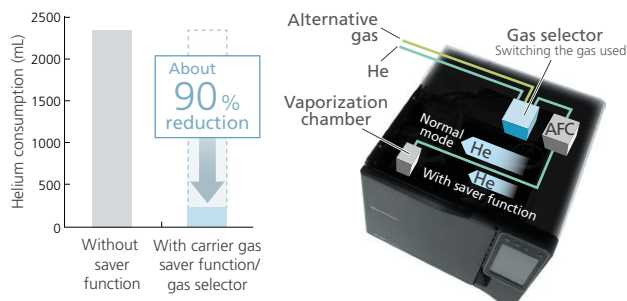
The injection port can be opened or closed without tools by simply sliding the ClickTek lever. Replace the insert, slide the lever and feel the click for a leak-free install every time.



ClickTek Nut

### Solutions for Switching between Methods and Saving Gas

The optional gas selector system can switch between up to four gas lines. It can reduce gas consumption by automatically switching to a substitute gas during idling. In addition, switching to a method that uses a substitute gas can be achieved in a short period of time using the automatic switching capability.



### LabSolutions Direct Accommodates Remote Work

LabSolutions Direct is a remote access tool used to control or monitor GC systems via a simple user interface on a commercially-available smartphone or tablet. Consequently, analyses can be performed while monitoring the status of instruments from locations away from the laboratory.



Sulfur Chemiluminescence Detection Gas Chromatograph  
**Nexis SCD-2030**



This sulfur chemiluminescence detector (SCD) offers high reliability that has changed industry reliability levels. It features the industry's first horizontally-oriented redox cell, which improves oxidation-reduction reaction efficiency of samples by providing ample reaction space and reaction time within the cell. The patent-pending ultra-short flow path technology enables unstable components generated within the cell to move into the reaction bar very quickly, thereby achieving about 2.5 times higher sensitivity than previous products. The horizontal orientation also provides easier access to enable inner pyro tube replacement without disassembling the reactor. "Analytical Intelligence" technology fully automates process steps from gas and temperature control during system startup to sample conditioning.

Minimum detection sensitivity	0.3 pgS/sec
Stability	<3 %RSD (24 hrs)

Brochure No. **C184-E048**

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

Brochure No. **C184-E026**

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)

Brochure No. **C184-E014**

Auto Injector/Auto Sampler for GC/GC-MS  
**AOC Series**



AOC-20s U

AOC-30i



reddot winner 2022



The AOC-30i is a next-generation intelligent auto injector with Sampler Navigator functionality that is packed with injection expertise. The skip function uses vial-sensing technology to increase throughput and help improve data integrity. The 30-vial sample capacity is large enough to handle most workflows, but can be expanded to 150 vials in combination with an AOC-20s U auto sampler. Though the AOC-20i Plus offers exceptional cost-effectiveness for broad market appeal, it also features extensive functionality, such as co-injecting derivatizing agents.

	Auto Injector		Auto Sampler
	AOC-30i	AOC-20i Plus	AOC-20s U
Number of vials	30	6/12	150
Applicable models	Nexis GC-2030, GCMS-NX series	GC-2010/2014/2025, GCMS-QP/TQ series	All of GC, GCMS

Brochure No. **AOC-30 series C180-E096**  
**AOC-20i/20s C189-E021**

## GC Application System Headspace Analysis System



Nexis GC-2030 + HS-20 NX

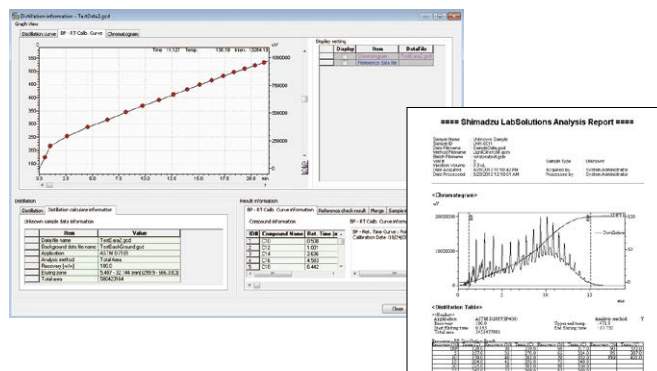
With short transfer lines and patented isolation gas technology, HS-20 NX series headspace samplers reduce carryover to one-tenth the level of previous models and significantly increase laboratory productivity. The ability to overlap processing of up to 12 vials makes the samplers especially useful in fields that require high throughput. Featuring the world's only\* electronically-cooled trap, the HS-20 NX Trap enables over ten times higher sensitivity than regular headspace analysis. The product line also includes an HS-20 Long Transfer Line (LT) model compatible with packed columns.

\* As of August 2021, according to a Shimadzu survey

Applicable models	Nexis GC-2030, GC-2010 Plus/2010, GC-2014
Number of vials	90
Vial stirring	5-stage

Brochure No. C180-E094

## GC Application System Distillation Gas Chromatograph System



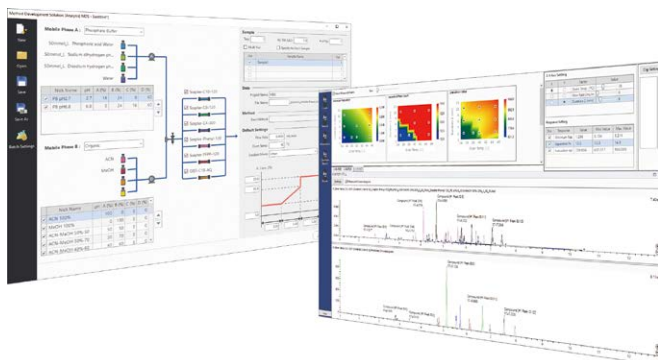
The boiling point distribution of petroleum fractions can be measured by simple operation from LabSolutions menus. This system supports various distillation GC standards such as ASTM and JIS.

- 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.)
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Brochure No. C184-E030

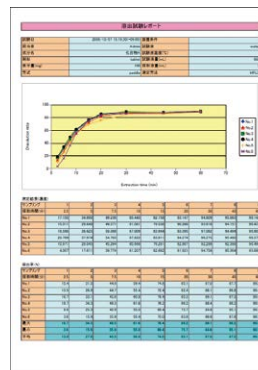
## Solution for Method Development and Analytical Quality by Design LabSolutions MD



Based on Analytical Quality by Design (AQbD), a method for evaluating and verifying analytical methods by clarifying the development process and rationale, this software streamlines the method development flow from data acquisition using the experimental design method to visualization using the design space, enabling the development of optimal analytical methods even by non-expert users. Accurate peak tracking is essential for the accurate prediction of separation. The i-PeakTracer function provides automatic tracking of analyte peaks based on any chosen parameter, such as spectral similarity or area. Utilizing mass data also enables reliable peak tracking of compounds with similar UV spectra. Design spaces provide a visual representation of the relationship between analytical conditions and separation, allowing the user to identify the most robust analytical conditions. Click on any analytical condition point in the design space and the software predicts how a given change in conditions affects separation behavior before running an analysis.

Brochure No. C190-E278

## Optional Software for LabSolutions DB/CS 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.

Brochure No. C191-E029



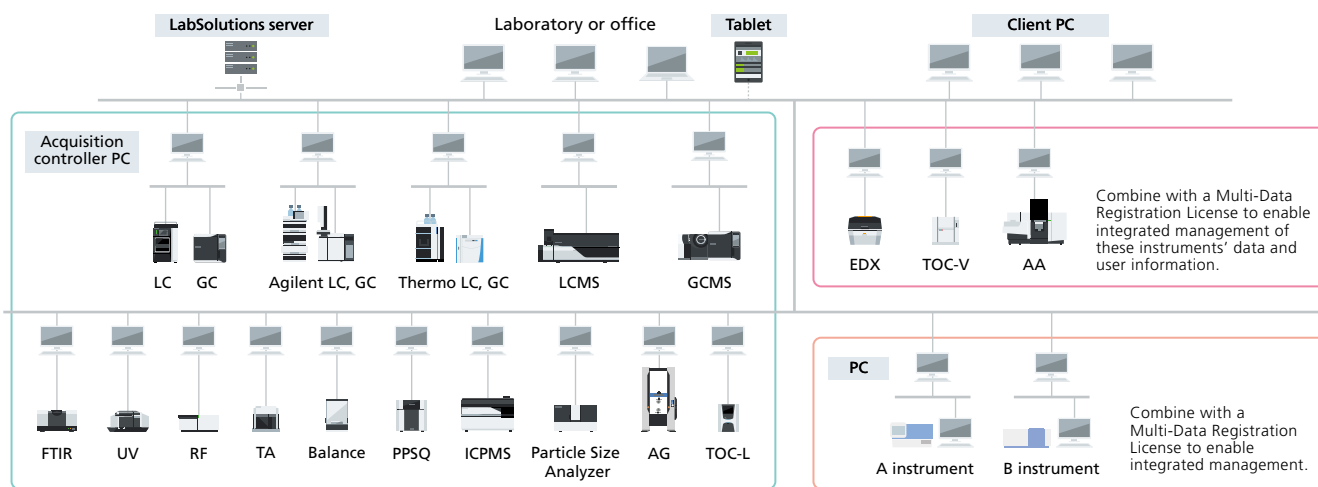
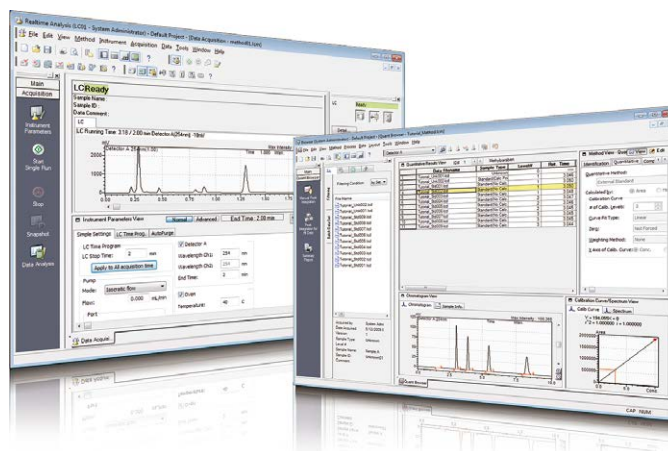
Analytical Network Data System

# LabSolutions

LabSolutions features an innovative operating environment and provides complete data management to ensure secure information in networked laboratories.

The LabSolutions series of integrated workstation software controls a wide variety of analytical instruments and performs data management. Software is sometimes complex, but the LabSolutions series offers superior ease of use and a highly reliable system environment with solutions for a variety of issues encountered in the analytical laboratory.

Brochure No. C191-E018



## LabSolutions Series Support Operations in a Variety of Laboratory Environments

LabSolutions LC/GC is a file-based standalone system for simultaneous instrument control and data analysis of up to four HPLC and GC units from a single PC. LabSolutions LC/GC offers integrated control over data acquisition, analysis, and reporting, providing an intuitive operating environment that is easy to master. LabSolutions Direct facilitates the control and monitoring of HPLC and GC units from personal smartphones and tablet PCs, allowing you to check the status of instruments during ongoing analysis while out of the laboratory.

LabSolutions DB and CS integrate a data management function with LabSolutions LC/GC and are compliant with ER/ES Regulations. LabSolutions DB and CS ensure data integrity with features that prohibit data tampering and offer enhanced support for regulatory compliance.

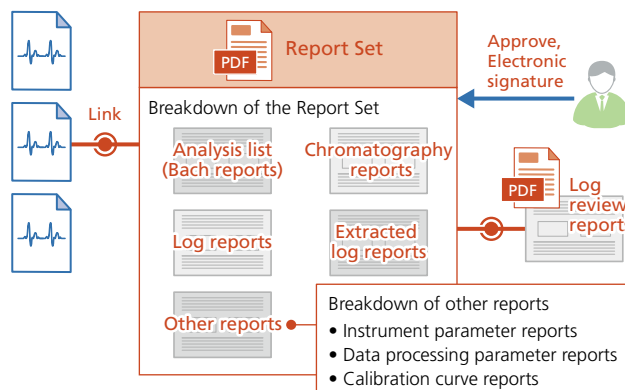
LabSolutions DB offers these regulatory compliance features in a standalone system for even a single instrument. This setup is ideal for customers with only a small number of instruments who intend to manage all their data from a single PC.

LabSolutions CS is a networked system for the centralized management of analytical data on a server-based database. LabSolutions CS facilitates the remote control of HPLC, GC, and MS units and the analysis of data obtained by various types of instruments from any client PC. LabSolutions CS also directly controls HPLC and GC units made by Agilent Technologies and Thermo Fisher Scientific and imports data from other companies' instruments.

## LabSolutions Report Set for Analytical Data Reliability and Productivity

Information from a sequence of analyses (batch analysis), analysis results and conditions, and even the entire operational log from the start to the end of analysis procedures, is summarized in a single PDF file (Report Set). This simplifies confirmation of analysis results and operations, thereby ensuring reliability and reducing the burden of confirmation procedures. Editing of the sequence of analysis results is automatically disabled, preventing the revision, substitution, or tampering of results. A report confirmation record can be left at any point in the analysis results report. In addition, electronic signatures can be used. These functions enable paperless operations and increase productivity.

Brochure No. C191-E047



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

New

Liquid Chromatograph Mass Spectrometer

# LCMS-2050

## SIMPLY EFFORTLESS

The LCMS-2050 is a single quadrupole liquid chromatograph mass spectrometer (LC-MS) that is easy to use, high in basic performance, and compact. The LabSolutions LCMS workstation for the LCMS-2050 delivers streamlined instrument control and sophisticated data analysis using Analytical Intelligence. It also foresees and addresses the increase in demand for energy savings.

Mass range	$m/z$ 2 to 2,000
Resolution	0.7 u
Scan speed	Max. 5,000 u/sec
Positive-negative ion polarity switching time	10 ms

Note: LC units are not included with this product.

Brochure No. C146-E442

UPLC  
ULTRA FAST MASS SPECTROMETRY



Movies >

ANALYTICAL  
INTELLIGENCE

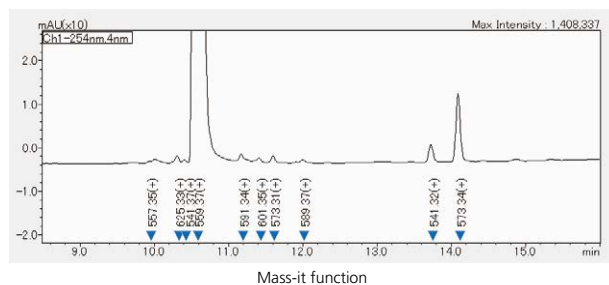
### Seamless integration with LC by design

Nexera series



LCMS-2050

We pursued ease of use as an LC detector in all aspects of the instrument design, instrument control, and analysis data. As with other LC detectors, it can be integrated into any Shimadzu LC architecture, whether it is a high-throughput analytical system, a preparative LC with fraction collection, or even a legacy model. And it is as simple to use as other LC detectors. Only the simplest of acquisition parameters are required to obtain reliable and sensitive detection. The LCMS-2050 has a new "Mass-it" function that automatically overlays mass information on chromatograms obtained by an LC detector. This function reduces the trouble of comparing LC and MS chromatograms and the risk of missing data.

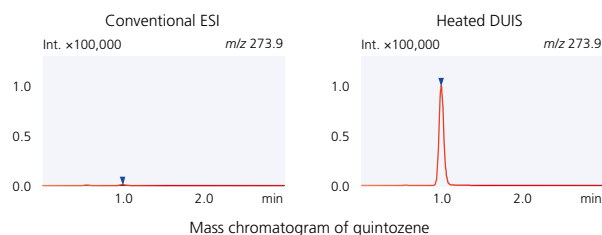


### Superior detection for added confidence

Inheriting Shimadzu's patented technology, the versatile LCMS-2050 delivers excellent data quality. The LCMS-2050 provides the world's fastest\* performance, with a scan speed of 15,000 u/sec and a positive/negative ion switching speed of 10 msec. Thanks to the sufficient sampling rate, the instrument reliably captures sharp UHPLC peaks. The LCMS-2050 is equipped with the newly developed Heated Dual Ion Source (Heated DUIS) as the standard configuration. This hybrid source combines the benefits of electrospray ionization (ESI) and atmospheric pressure chemical ionization (APCI), two orthogonal techniques widely used in mass spectrometry. The result is excellent sensitivity achieved for compounds for a diverse range of chemical properties, including low-polarity compounds such as quintozene, which can not be detected with ESI but can be detected at high sensitivity with the heated DUIS.



\* As of June 2022, according to a Shimadzu survey



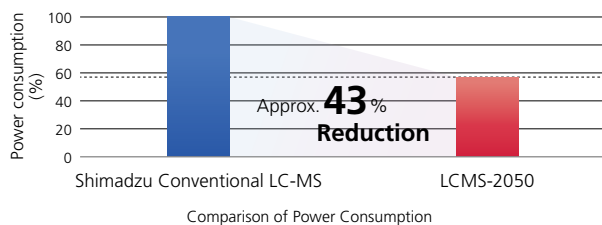
Mass chromatogram of quintozene

### Streamlined operation for cost efficiency

Equipped with eco-friendly functions, it reduces energy by 43% compared to the LCMS-2020. It is certified as "Eco-Products Plus," Shimadzu's original environmentally conscious product designation. The system not only limits running costs during analysis, but contributes to realizing a carbon-free society by limiting CO<sub>2</sub> emissions.



This product is certified as Shimadzu's Eco-Products Plus. Reduced power consumption by 43% compared with conventional Shimadzu's products.



Comparison of Power Consumption

Assumptions: the ecology mode detects idle times and automatically shuts down the system (vacuum not stopped) for 8 h/day on average, including 2 h/day during working hours; for 2 days/week, the instrument, including the vacuum, is fully shut down.

Automated support functions utilizing digital technology, such as M2M, IoT, and Artificial Intelligence (AI), that enable higher productivity and maximum reliability. Allows a system to monitor and diagnose itself, handle any issues during data acquisition without user input, and automatically behave as if it were operated by an expert. Supports the acquisition of high quality, reproducible data regardless of an operator's skill level for both routine and demanding applications.

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

# LCMS-9050

## Accelerate Discovery

The LCMS-9050 quadrupole time-of-flight mass spectrometer inherits the world-class mass accuracy and stability of the LCMS-9030 while incorporating newly developed UFstabilization technology for simultaneous positive ion/negative ion analysis with high mass accuracy at even higher speeds. Ease of use is evident throughout the system from mass calibration to maintenance, allowing the LCMS-9050 to be used easily in any scenario that requires accurate mass spectrometry.

### Trusted mass accuracy

Shimadzu's unique precision temperature control system prevents mass accuracy variations caused by external factors, facilitating accurate mass measurements without the need for mass calibration.

### Ultra-stable polarity switching

UFstabilization technology, newly developed for superior mass accuracy, is incorporated for stable positive/negative polarity switching on a world-class level.

### Truly versatile with flexible extensions

The LCMS-9050 can be combined with a variety of optional products such as DPiMS, CLAM, Nexera UC, and Nexera Mikros to better utilize the characteristic advantages of Q-TOF and expand the scope of acquirable data.

Mass range	Quadrupole mass range: $m/z$ 10 to 2,000 (resolving mode) TOF mass range: $m/z$ 10 to 40,000
Resolution (TOF)	ESI positive : 45,000 FWHM at $m/z$ 1,972 ESI negative: 45,000 FWHM at $m/z$ 1,626
Mass accuracy	Unipolarity Analysis (MS mode): <1ppm at $m/z$ 622.5662 Polarity switching analysis (MS mode): <5ppm at $m/z$ 922.3547 switching speed 800 msec
Maximum acquisition rate	MS/MS mode up to 200 Hz (200 MS/MS spectra per second)

Note: LC units are not included with this product.

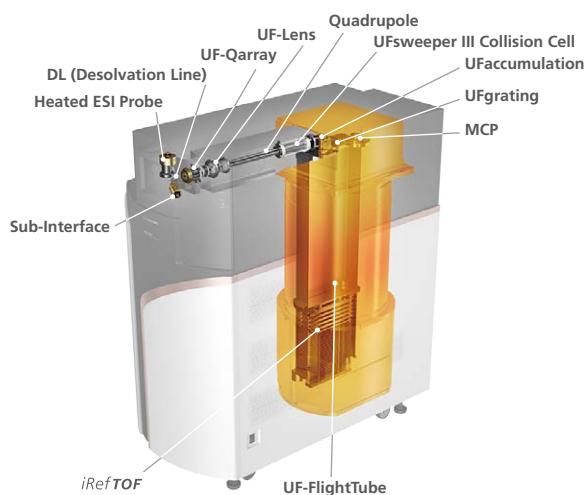
Brochure No. C146-E462



UFMS  
ULTRA FAST MASS SPECTROMETRY



Movies >



## Quadrupole Time-of-Flight Liquid Chromatograph Mass Spectrometer LCMS-9030



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.

\* As of June 2018, according to a Shimadzu survey

Mass range	Quadrupole mass range: $m/z$ 10 to 2,000 (resolving mode) TOF mass range: $m/z$ 10 to 40,000
Resolution (TOF)	ESI positive : 30,000 FWHM at $m/z$ 1,972 ESI negative: 30,000 FWHM at $m/z$ 1,626
Mass accuracy	<1 ppm at $m/z$ 622.5662
Maximum acquisition rate	100 Hz

Note: LC units are not included with this product.

Brochure No. C146-E365

## Liquid Chromatograph Triple Quadrupole Mass Spectrometer LCMS-8060NX



UFMS  
ULTRA FAST MASS SPECTROMETRY

The LCMS-8060NX is a triple quadrupole mass spectrometer with world-class sensitivity and detection speeds. It boasts increased robustness and ease of use as well as Analytical Intelligence functions to maximize your laboratory's output.

Mass range	$m/z$ 2 to 2,000
Resolution	$R < 0.7 \mu$ (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.

Brochure No. C146-E410

## 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.

Brochure No. C146-E232

## Liquid Chromatograph Triple Quadrupole Mass Spectrometer LCMS-8045



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 scan speed (30,000 u/sec) and polarity switching speed (5 msec). These enable ultra-high-speed, high-sensitivity analysis.

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.

Brochure No. C146-E321

## Liquid Chromatograph Triple Quadrupole Mass Spectrometer LCMS-8040



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.

\* As of May 2012, according to a Shimadzu survey

Mass range	$m/z$ 10 to 2000
Resolution	$R < 0.7$ FWHM
Scan speed	Max. 15,000 u/sec
Positive-negative ionization switching time	15 msec
MRM measurement speed	Max. 555 ch/sec

Note: LC units are not included with this product.

Brochure No. C146-E188

## High-Performance Liquid Chromatograph Mass Spectrometer LCMS-2020



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.

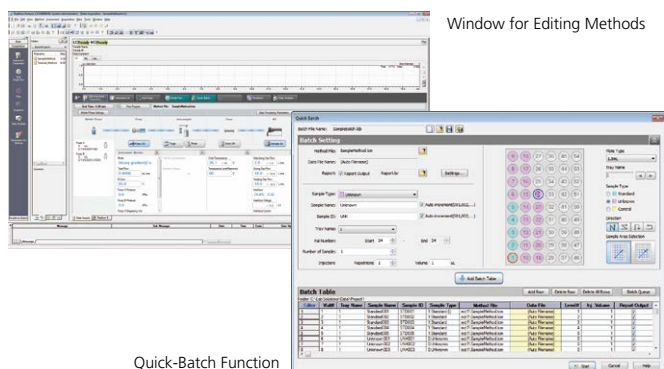
Mass range	$m/z$ 10 to $m/z$ 2,000
Sensitivity	ESI: reserpine 1 pg, S/N > 150 (RMS) APCI: reserpine 1 pg, S/N > 100 (RMS)
Resolution	$R = 2$ M
Scan speed	Max. 15,000 u/sec
Positive-negative ion polarity switching time	15 msec

Note: LC units are not included with this product.

Brochure No. C146-E121



## Workstation Software for LCMS Systems LabSolutions LCMS



LabSolutions LCMS is used for LCMS-9050/9030/8060NX/8050/8045/8040/2050/2020 system control, data acquisition, and data analysis. In addition to simultaneous LC control, data acquisition, and data analysis, it also supports sophisticated application functionality, such as for co-injection and expansion to a method scouting system. It can also be used to freely specify various measurement parameter settings for analysis that meets a diversity of needs, from routine qualitative and quantitative analysis to unique customized analysis applications. The intuitive LCMS user interface includes a window for editing methods that shows the control panel in graphical form and a Quick-Batch function. That ensures the desired data can be obtained using simple operations.

Note: LCMS-2010 series, LCMS-QP8000 series, and LCMS-IT-TOF systems are not supported, but data processing is supported for LCMS-2010 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.

Brochure No. C146-E346

## LC/MS/MS Screening Software LabSolutions Insight Library Screening



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 or 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

Brochure No. C146-E419

## Analysis Software for LCMS-8060/8050/8045/8040 LabSolutions Connect



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.

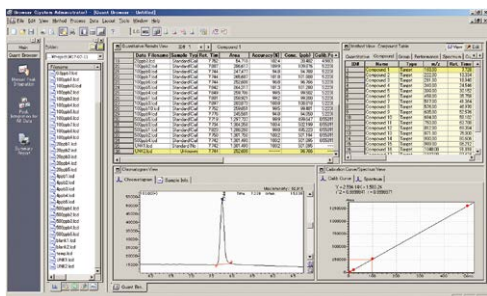
Note: LabSolutions LCMS and LabSolutions Insight are required separately.

## Optional Software for LabSolutions Insight LabSolutions Insight Explore



This software supports everything from qualitative analysis to quantitative analysis of accurate mass spectrometry data. In addition to quantitative data processing for multiple analytes, it also enables highly precise library searches, structural analysis, formula prediction, and multiply-charged ion analysis based on high-resolution and high-accuracy mass spectrometer data. It includes a variety of functionality, such as “Analyze” functionality for predicting the composition of unknown compounds or searching for the molecular or structural formula based on accurate mass data, or “Assign” functionality for predicting the fragmentation patterns of molecular structures or calculating the attribution of respective fragments to specific spectral peaks. All of the extensive functionality works together seamlessly to minimize the effort involved in analyzing data from accurate mass spectrometry.

## 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.

Residual Pesticides	836 components
Veterinary Drugs	129 compounds
Water Quality Analysis	76 compounds
Rapid Toxicology Screening	231 compounds
Primary Metabolites	198 compounds
Lipid Mediators	214 compounds
Cell Culture Profiling	144 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
Restricted Chemicals in Textiles	105 compounds
Bile Acids	49 bile acids
Modified Nucleosides	4 components
PFAS in Drinking Water	52 compounds
Glycosaminoglycans	6 glycosaminoglycans
Reactive Sulfur Profiling	17 sulfur-containing metabolites

Brochure No. C10G-E094

## Open Access Software for LC and LCMS Open Solution



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: LCMS-9030/9050, LCMS-2010 series, LCMS-QP8000 series, and LCMS-IT-TOF systems are not supported.

## LC/MS, GC/MS Data Analysis Software Multi-omics Analysis Package

**New**



The Multi-omics Analysis Package is metabolic engineering software that can automatically generate metabolic maps and perform a variety of data analysis based on the vast amounts of mass spectrometry data generated in fields such as metabolomics, proteomics, and flux analysis. In conjunction with the various method packages and databases offered by Shimadzu for metabolomic analysis, the Multi-omics Analysis Package can help increase the efficiency of metabolomic data analysis work. It makes it easy to use volcano plots for comparing two groups, principal component analysis (PCA) for comparing multiple groups, hierarchical clustering analysis (HCA), and box plots. Linked PCA, HCA, and box plot results can be displayed in the same window to conveniently identify significant compounds. The metabolic map can be enlarged to confirm where identified compounds are located on the map and to support confirming and interpreting the data. The intuitive visualization of data provides powerful support for drug discovery, functionally enhanced foods, bioengineering, and other life science research applications.

Brochure No. C146-E385

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



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.

Major component units	LCMS-8060NX, Mikro-ESI 8060, CBM-40lite, DGU-403, LC-Mikros, CTO-Mikros, SIL-40C XR, LabSolutions Insight, and others
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Brochure No. **C146-E350**

Kit for Direct Probe Ionization Mass Spectrometer  
**DPiMS QT**



DPiMS QT + LCMS-9030

The DPiMS QT can be connected to a quadrupole time-of-flight mass spectrometer for quick and easy measurement without pretreatment. The DPiMS QT performs high-resolution mass spectrometry by ionizing a very small sample attached to the probe and introducing it into the MS section. The DPiMS QT unit can be easily switched with the ESI unit and can be combined with LCMS. Qualitative analysis and primary screening with the DPiMS QT can reduce the number of samples required for quantitative analysis.

DPiMS QT controller	Control of the DPiMS QT unit (Installed in the mass spectrometer)
DPiMS QT unit	Probe voltage: ±5 kV max. (set voltage) Probe stroke: 46.30 mm max.

Brochure No. **C146-E440**

Probe Electrospray Ionization Mass Spectrometer  
**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.

Mass range	<i>m/z</i> 10 to 2,000
Mass resolution	R = 2M
Sensitivity	100 ppb reserpine, S/N > 3

Brochure No. **C146-E341**

Kit for Direct Probe Ionization Mass Spectrometer  
**DPiMS-8060**



DPiMS-8060 + LCMS-8060NX

A triple quadrupole mass spectrometer with a DPiMS-8060 kit installed can acquire trace sample quantities using a probe and analyze component masses in the MS unit. The kit can also be used with an LCMS system, by installing it in an LCMS-8045/8050/8060(NX) system for easy switching between PESI TQ and ESI units. Its ability to quickly detect drugs or metabolites in blood or tissue samples with only extremely simple pretreatment makes it ideal for simple screening applications.

PESI TQ controller	Controller unit for PESI TQ unit (equipped with LCMS-8045/8050/8060/8060NX)
PESI TQ unit	Probe voltage: ±5 kV max. Probe drive cycle: 0.75 to 3 Hz
Mass range	<i>m/z</i> 10 to 2,000

Brochure No. **C146-E369**

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



**New**

Fully Automated Sample Preparation Module for LC-MS

# CLAM-2040

## Pave the way for the future of clinical research.

Operational improvements in LC-MS systems have made LC/MS an advantageous technique for clinical research, thanks to its specificity, its accuracy and its capability to analyze several targets simultaneously. The CLAM-2040 is an online automated sample preparation module that brings LC-MS smoothly into your laboratory. The CLAM-2040 accompanies you on most of the analytical workflow and improves your overall throughput by drastically reducing the sample preparation time. Simply place the blood tubes in position and the CLAM-2040 performs the next steps automatically, from sample extraction up to LC/MS analysis and data processing. It can be connected to the LCMS-9050/9030/8060NX/8060/8050/8045/8040 systems.

Volume in preparation vial	350 µL maximum
Preparation functions	Sample dispensing, reagent dispensing, shaking, suction filtration and heating *Up to 20 steps can be set in a protocol.
Sample handling	Multiple sample preparations overlap.
Onboard preparation vial capacity	Up to 60 filter vials and 60 collection vials

Note 1: LC and LCMS units are not included with this product.

Note 2: For Research Use Only. Not for use in diagnostic procedures.

Brochure No. C146-E469

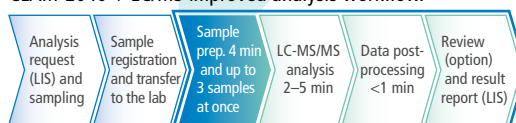


Typical LC/MS analysis workflow in the clinical research laboratory.



One result every 12 to 60 min.

CLAM-2040 + LC/MS improved analysis workflow.



These steps are managed by the CLAM-2040 and LC-MS instrument.

One result every 2.6 min.



Product >

## Gas Chromatograph Mass Spectrometer

# GCMS-QP2020 NX

### Smart Solutions for Maximizing the Potential of Laboratories

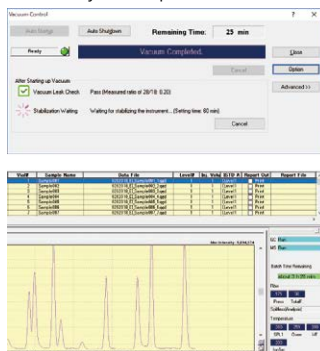
GC-MS systems, which are used in all sorts of fields, have now become a general purpose tool for analysis. Consequently, customers are increasingly demanding GC-MS systems that offer higher performance for the cost and enable a better work-life balance for operators. The GCMS-QP2020 NX maximizes the potential of laboratories by offering efficiency improvements for various aspects of analytical work.

UFMS  
ULTRA FAST MASS SPECTROMETRY

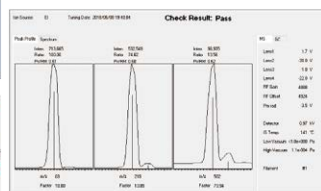


### Active Time Management

Active time management helps visualize how much time was spent on maintenance, switching between systems, or performing analyses, for example, to help manage the instrument downtime more appropriately. By automating tasks previously performed by users, it enables more efficient system operation.



Automatic System Startup/Shutdown

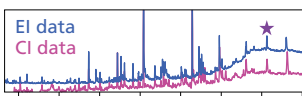
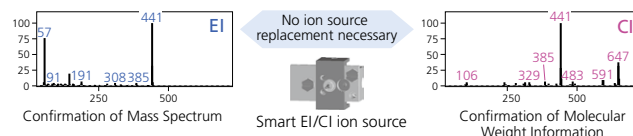


Automatic Tuning Decision-Making

Time Management for Continuous Analysis

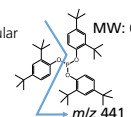
### Smart EI/CI Ion Source

The newly developed Smart EI/CI ion source can be used to acquire CI data without exchanging ion sources or losing the general applicability of EI sensitivity. With the EI mode, even if identification is difficult using a mass spectral library, molecular weight information can be collected from the CI mode data, which is especially useful for predicting unknown compounds.



Example of Analyzing Extract from a Packaging Container (Extracted with 20 % Ethanol)

Based on the EI mass spectrum and CI molecular weight information, the substance is presumed to be tris(2,4-di-tert-butylphenyl) phosphite, used as an oxidation inhibitor.



Brochure No. C146-E367

Triple Quadrupole Gas Chromatograph Mass Spectrometer  
**GCMS-TQ8050 NX**



The GCMS-TQ8050 NX features a new highly efficient detector and three noise reduction technologies that enable previously unachievable femtogram-level quantitative analysis of ultra trace quantities. The system also enables quantitative analysis for a variety of new applications, such as utilizing the dramatically high sensitivity for reducing the maintenance frequency and cost of long-term use, for example, or the high mass resolution to achieve even higher separation from contaminants.

Mass range	<i>m/z</i> 10 to 1,090
Mass resolution	0.4 to 3.0 u (FWHM)
El scan S/N	1 pg Octafluoronaphthalene <i>m/z</i> 272 S/N ≥ 2,000 (helium gas)
Scan rate	20,000 u/second
Maximum MRM speed	800 MRM transitions/second

Brochure No. C146-E363

Triple Quadrupole Gas Chromatograph Mass Spectrometer  
**GCMS-TQ8040 NX**



Smart performance offers simultaneous high-sensitivity analysis of multiple components, smart productivity achieves outstanding productivity with thorough efficiency improvements, and smart operation provides support for easy method creation and data analysis. In combination, these three types of “smart” features provide a universal triple quadrupole GC-MS system that offers high performance for a wide variety of applications.

Mass range	<i>m/z</i> 10 to 1,090
Mass resolution	0.4 to 3.0 u (FWHM)
El scan S/N	1 pg Octafluoronaphthalene <i>m/z</i> 272 S/N ≥ 1,500 (helium gas)
Scan rate	20,000 u/second
Maximum MRM speed	800 MRM transitions/sec

Brochure No. C146-E366

Gas Chromatograph Mass Spectrometer  
**GCMS-QP2010 SE**

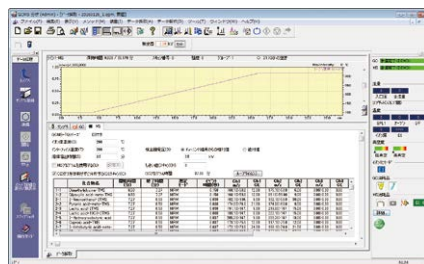


The GCMS-QP2010 SE is a high cost-performance model featuring both a variety of functions and ease of operation. In addition to high level performance, the user friendly design ensures that anyone can quickly and easily acquire highly reliable data, with ease of operation and maintenance in every situation.

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

Brochure No. C146-E157

Workstation for GC-MS  
**GCMS Insight Software Package**



GCMSsolution Ver. 4



LabSolutions Insight

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.

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

## Peak Integration Software for LabSolutions Insight Peakintelligence for GCMS

**New**

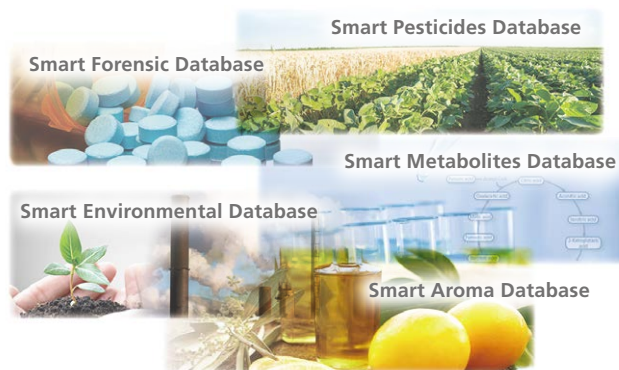


Peakintelligence for GCMS is a peak integration software equipped with new AI peak integration algorithms. AI algorithms trained with peak integration know-how provide peak integration on par with that of an experienced user, so configuring or adjusting parameters is not required. Even when processing chromatograms that previous algorithms couldn't handle, Peakintelligence can reliably detect peaks without adjusting any parameters. The software can significantly reduce the time required for conventional quantitative processing workflows because users only need to check the identification process results.

Note: LabSolutions DB GCMS and LabSolutions Insight DB GCMS are required for operation.

Brochure No. **C146-E460**

## Database for GC-MS and GC-MS/MS Smart Database Series

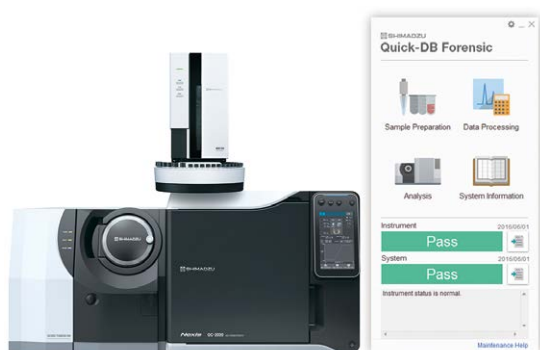


With the Smart Database, compound information, transitions, and collision energies are preregistered. Methods configured with the optimal measurement times can be created automatically using the automatic adjustment of retention time (AART) and Smart MRM functions.

Description	No. of compounds registered	Brochure No.
For residual pesticide analysis Smart Pesticides Database	MRM: 530 SIM: 530	<b>C146-E332</b>
For forensic toxicological substance analysis Smart Forensic Database	MRM: 486	<b>C146-E353</b>
For metabolite analysis Smart Metabolites Database	<b>New</b> Scan/SIM: 627 MRM: 540	<b>C146-E456</b>
For environmental analysis Smart Environmental Database	MRM: 527	<b>C146-E284</b>
For aroma analysis Smart Aroma Database	<b>New</b> Scan/SIM: 506 MRM: 487	<b>C146-E452</b>

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	Brochure No.
Quick-DB Residual Pesticides Database	MRM: 491 Scan/SIM: 474	<b>C146-E307</b>
Quick-DB Forensic Forensic Toxicology Database	MRM: 68	<b>C146-E319</b>

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



GCMS-QP2020 NX + HS-20 NX Trap

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. The trap model includes functionality for concentrating components with an electronically-cooled trap and also enabling the measurement of trace components. By using highly heat-resistant septa, even ultra-trace substances extracted from pharmaceutical packaging or containers can be measured, which has been attracting attention in recent years.

System configuration example	GCMS-QP2020 NX + GCMSsolution + HS-20 NX 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

Brochure No. **C180-E094**

Thermal Desorption System  
**TD-30 Series**



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 NX + 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.

Brochure No. C146-E349

GC-MS Application System  
**AOC-6000 Plus Multifunctional Autosampler System**



The AOC-6000 Plus supports multiple sample injection methods including liquid sample injection, headspace (HS) injection and 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. New functions for managing syringe and fiber usage history support accurate analysis.

System configuration example	GCMS-TQ8040 NX + GCMSsolution + AOC-6000 Plus
Sample capacity	162 2 mL vials (54 × 3) per tray 45 10/20 mL vials (54 × 3) per tray (Up to 2 trays can be loaded)
Syringe heating temperature	35 to 150 °C (1 °C steps)

Brochure No. C146-E396

GC-MS Application System  
**Off-Flavor Analyzer**



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-QP series, GCMS-TQ series Multifunctional autosampler: AOC-6000 Plus or AOC-5000 Plus Sniffing port: PHASER (GL Science B.V.) Multimode inlet: OPTIC-4 (GL Science B.V.)
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Brochure No. C146-E292

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-6000 for automatic insert replacement to further enhance productivity for multi-sample analysis.

System configuration example	GCMS-TQ8040 NX + GCMSsolution + OPTIC-4
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
Pressure range	7 to 700 kPa
Total flow range	5 to 500 mL/min (helium)

Brochure No. C146-E185

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy 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 Ver. 2



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 NX + GCMSsolution + LabSolutions Insight + Py-Screener + EGA/PY-3030D Multi-Shot Pyrolyzer (Frontier Laboratories)
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Brochure No. **C146-E438**

## 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 NX + GCMSsolution + EGA/PY-3030D Multi-Shot Pyrolyzer (Frontier Laboratories)
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- A system can be constructed with the GCMS-TQ series, QP series, and GC-2030/2010 Plus. Contact your Shimadzu representative for further details.

Brochure No. **C146-E184**

## GC-MS Differential Split Flow Turbo Molecular Pump System Comprehensive GC-MS (GC×GC-MS) System



The comprehensive GC-MS (GC×GC-MS) 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.

## 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
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- 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.

Brochure No. **C184-E015**



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



The AXIMA Performance is 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. Shimadzu's proprietary (patented) curved-field reflectron (CFR) enables true high-energy CID-MS/MS with a laboratory frame collision energy of 20 keV. It is an extremely versatile and powerful system, integrating workflows for a diverse range of analytical needs. LC-MALDI software allowing confident identification of off-line separated complex mixtures via automated MS/MS.

Mass range	Linear mode	1 to 500,000 Da
	Reflectron mode	1 to 80,000 Da
Mass resolution	Linear mode	5,000
	Reflectron mode	20,000
MS/MS function		CID/PSD
Mass accuracy	Reflectron mode	5 ppm (internal standard)

Brochure No. **MO300**

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)	–
Brochure No.		<b>MO305</b>	<b>MO304</b>

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.

MALDI Digital Ion Trap Mass Spectrometer  
**MALDImini-1**



reddot winner 2021  
best of the best

Despite its light and compact shape, The MALDImini-1 is capable of achieving MS<sup>3</sup> analysis, making it suitable for a large number of applications. With its simple configuration and compact size, it is possible to install the MALDImini-1 in places where mass analysis devices could not previously be used. The vacuum pumps are entirely contained within the device. The MALDImini-1 can be installed anywhere where there is an AC 100-120V power supply. By combining a MALDI ion source with Digital Ion Trap (DIT) technology, it is possible to carry out high-sensitivity MS<sup>n</sup> analysis even on micro-quantity samples.

Mass range	<i>m/z</i> 650 to 70,000
MS/MS mass range	<i>m/z</i> 350 to 5,000
Mass resolution	> 4,000 FWHM
MS <sup>n</sup>	1 ≤ <i>n</i> ≤ 3

Brochure No. **C146-E395**

### Benchtop Linear MALDI-TOF Mass Spectrometer MALDI-8020



The MALDI-8020 is a compact (width of main unit 60 cm) and lightweight (weight of main unit 86 kg) table-top linear mode MALDI-TOF instrument, 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.

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

Brochure No. **MO432**

### Dual-Polarity Benchtop Linear MALDI-TOF Mass Spectrometer MALDI-8030



The MALDI-8030 expands on the successful benchtop format of the existing MALDI-8020 MALDI-TOF mass spectrometer, to offer positive-ion and negative-ion analysis in the same footprint as the MALDI-8020. Instrument performance will mirror that of the MALDI-8020, with the performance specifications of the MALDI-8020 extended to cater for compounds best suited to analysis in negative ion mode. The benchtop system will offer a compact footprint, small enough for installation in any lab. The versatile system will be applicable to a wide range of analytes, including proteins, peptides, oligonucleotides, lipids, glycans, polymers and small molecules.

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

Brochure No. **MO473**

### MALDI-TOF 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)

\* ASDF: Axial Spatial Distribution Focussing

Brochure No. **MO363**

### Imaging Application Solution for MALDI-8020, MALDI-8030

### Benchtop MALDI-TOF Imaging Starter Kit **New**



The MALDI-TOF Imaging Starter Kit provides a complete MALDI imaging application solution for existing Shimadzu MALDI-8020 and MALDI-8030 benchtop MALDI-TOF instruments, expanding the already versatile capabilities of these systems. The kit contains everything a user needs to begin imaging experiments on their MALDI-8020 or MALDI-8030, including custom ITO-coated glass slides, a new custom glass slide holder, the MALDI Solutions Imaging license enabling MALDI Imaging acquisitions, and IonView imaging viewing software.

Brochure No. **MO491**

Imaging Mass Microscope

# iMScope QT

Inheriting the concept of a mass spectrometer equipped with an optical microscope from the iMScope series, the iMScope QT is also Shimadzu's flagship model for MS imaging with a Q-TOF MS. The iMScope QT boasts not only fusion with morphology studies but also excellent speed, sensitivity, and spatial resolution, clearing the way to next-generation mass spectrometry imaging. It has the spatial resolution of 5  $\mu\text{m}$ , three times the mass resolution and five times the imaging image acquisition speed of conventional models.

Ionization method	MALDI or LDI
Laser type	Laser-diode-excited Nd:YAG laser
Laser repetition frequency	Max. 20 kHz
Laser diameter	Min. $\leq 5 \mu\text{m}$ , Max. $\geq 100 \mu\text{m}$

Brochure No. C146-E415



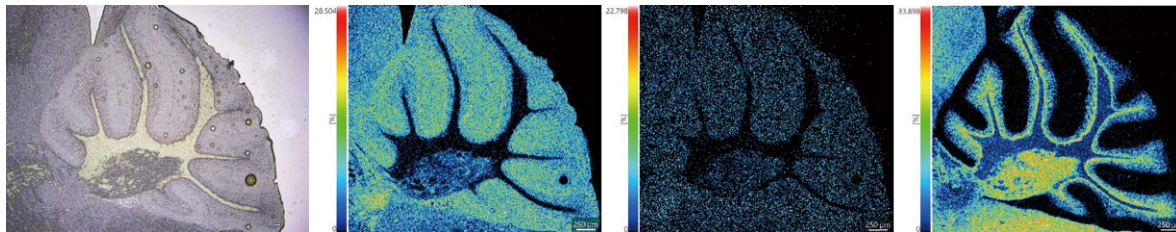
reddot winner 2021



Movies >

## Measurement Results for the Cerebellum with 5 $\mu\text{m}$ Spatial Resolution

The cerebellum was measured with a high-resolution of 5  $\mu\text{m}$ . High-resolution MS imaging and morphological observations with the optical microscope support cutting-edge research.



Optical microscope image

$m/z$  885.55

$m/z$  888.57

$m/z$  888.63

## 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.

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)

Brochure No. C297-E103

## 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 (2x conventional spatial resolution) and faster measurement (5x 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)

Brochure No. C297-E097

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Cell Culture Media Analysis Platform  
**C2MAP System**



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 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.

Brochure No. C297-E120

Automated Picking and Collecting Tool of Cell Colonies  
**CELL PICKER**



The CELL PICKER system automates the pickup and removal of cell colonies using a pipetter. Easy-to-operate software simplifies the cell pickup process. Cell pickup can be made even easier by connecting AUTO CHANGER, new optional equipment designed with automation in mind.

**Stress-Free Operations**

Unstable and delicate procedures during cell pickup are automated, so the operator can focus on the cell selection process. The software is simple to operate.

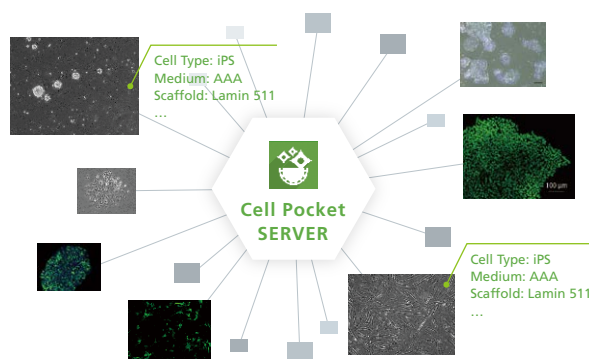
**Ensuring Traceability**

Procedural control and standardization are ensured by methods (procedural conditions). In addition, images of the cells can be recorded automatically before and after pickup.

Brochure No. C297-E127

Web Application Supporting Cell Observation  
**Cell Pocket Ver. 2**

**New**



Cell Pocket is a web application that makes cell image analysis and management incredibly easy. The web application is paired with deep learning to offer quick and easy gathering, analysis, and sharing of lab member data whether from the office or the laboratory.

Quantify the visual state of cells from various aspects

- Deep learning technology can offer the quantification of cell status.
- Easy quantifying and graphing with customizable analysis recipes.

Centralized management of all data from cell observation work

- Easy to gather various cell culture information such as culture conditions, image data, and analyzed data.
- Can be used by up to 20 users.
- Centralized management facilitates sharing data and knowledge among members.

User interface specialized for cell culture management

- Cell image data can be easily linked to culture conditions.
- The user interface for culture management is simple and easy to understand and supports a user's cell analysis work.

Brochure No. C297-E139

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

Brochure No. C297-E062



## Protein Sequencer PPSQ-51A/53A



PPSQ-53A Gradient System

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.

Brochure No. C297-E109

## UV-VIS Spectrophotometer UV-1280

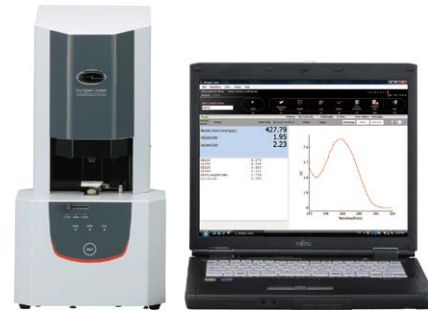


In addition to spectral measurements and quantitative analyses, photometrics, DNA/protein quantitation, and high-level multi-component quantitation can also be performed. This means that it is fully equipped with all of the measurement functions required of a UV-VIS spectrophotometer, thus making it an "All-in-One UV" instrument. By configuring the D<sub>2</sub>/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.

Wavelength range	190 to 1,100 nm
Spectral bandwidth	5 nm
Stray light	0.05 % max.
Installed software	Photometric, spectrum, quantitation, kinetics, time scan, multi-component quantitation, DNA/protein quantitation, instrument validation

Brochure No. C101-E130

## Spectrophotometer for Life Science BioSpec-nano



Capable of performing quantitation and purity checking of nucleic acids, quantitation of proteins, and photometric measurements. Simply drop 1 to 2  $\mu$ L 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 $\mu$ L or more, Optical path length 0.7 mm: 2 $\mu$ L or more
Wavelength range	220 to 800 nm
Wavelength accuracy	$\pm$ 1 nm

Brochure No. C101-E112

## UV-VIS Spectrophotometer UV-1900i

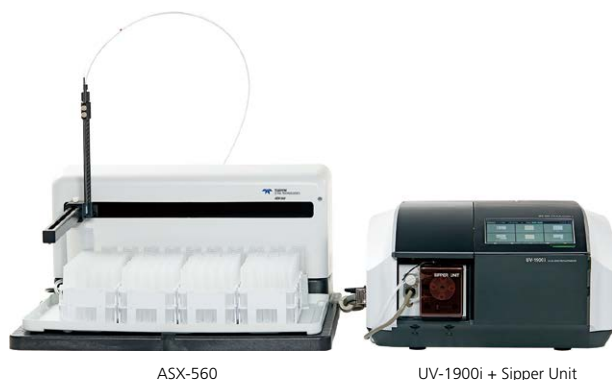
reddot award 2019  
winner

The UV-1900i is a double-beam UV-Vis spectrophotometer using Shimadzu's original Lo-Ray-Ligh diffraction grating technology. Low stray light levels and high reproducibility (photometric repeatability) ensure quantitative analysis can be performed accurately for either low or high concentrations. In addition to high performance, it also offers ultra-fast scanning for acquiring highly accurate spectra in just a few seconds. It also supports network connectivity. It is possible to check the acquired data even from a room with no equipment installed. (Additional expansion memory required). In addition to stand-alone operation using a color touch panel, PC control using LabSolutions UV-Vis software is also possible.

Measurement wavelength range	190 to 1,100 nm
Spectral bandwidth	1 nm
Wavelength scanning speed	29,000 nm/min maximum speed
Stray light	Less than 0.02% (220 nm, NaI and 340 nm, NaNO <sub>2</sub> )

Brochure No. C101-E168

## UV-VIS Spectrophotometer UV-1900i Automatic Analysis System



ASX-560

UV-1900i + Sipper Unit

Automatic UV-Vis analysis system contributes to operational efficiency. Automatic analysis application controls the CETAC ASX-280/560 autosamplers. The automatic analysis application allows the user to freely select the vial position and analysis sequence, as well as set measurement parameters, cleaning methods, and correction methods for each sample. It can automatically analyze up to 180 samples when using ASX-280 and up to 360 samples when using ASX-560. When combined with the spectrum evaluation function in LabSolutions UV-Vis, it is possible to automate from measurement to analysis and pass/fail decision.

Supported systems	This system is controlled by LabSolutions UV-Vis and is compatible with models equipped with Sipper/Syringe Sipper (refer to the following). UV-1800 / UV-1850 / UV-1900 series / UV-2600 series / UV-2700 series / UV-3600 Plus series CETAC Autosampler ASX-280 / ASX-560
Required accessory	Sipper 160 series or Syringe Sipper N / CN CETAC connect kit

## UV-VIS-NIR Spectrophotometer UV-3600i Plus



Three detectors of a photomultiplier tube (PMT), InGaAs, and PbS, are equipped not only with the main unit, but also with the multipurpose large-sample compartment and the integrating sphere attachment. It achieved high sensitivity over the entire measurement wavelength range. The ASR series absolute reflectance measuring devices enables high-precision absolute reflectance measurement, and the ISR-1503/1503F large integrating sphere with an inner diameter of 150 mm enables measurement of transparency of plastics and solar reflectance of coating films. 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
Spectral bandwidth	0.1 to 8 nm (UV/VIS), 0.2 to 32 nm (NIR)
Stray light	0.00008% or less (220 nm, NaI) 0.00005% or less (340 nm, NaNO <sub>2</sub> )

Brochure No. C101-E171

## UV-VIS Spectrophotometer UV-2600i/2700i



The UV-2600i is a single monochromator, while the UV-2700i is a double monochromator. These compact UV-Vis spectrophotometers feature miniaturized optical systems, a width of only 450mm, 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-2700i. In addition, the measurement range can be extended from 220 nm to 1,400 nm by installing the ISR-2600Plus Integrating Sphere Attachment with the UV-2600i. LabSolutions UV-Vis software and validation software are provided as standard.

Measurement wavelength range	185 to 900 nm (220 nm to 1,400 nm with the UV-2600i when the ISR-2600Plus is used)
Spectral bandwidth	0.1 to 5 nm
Stray light	UV-2600i: 0.005% max. (220 nm, NaI and 340 nm, NaNO <sub>2</sub> ) UV-2700i: 0.00002% max. (340/370 nm, NaNO <sub>2</sub> )

Brochure No. C101-E169

## UV-VIS-NIR Spectrophotometer SolidSpec-3700i/3700i DUV



This system equipped with an integrating sphere as standard. Equipped with three detectors, a photomultiplier tube (PMT), InGaAs, and cooled PbS, it has achieved the world's highest level of sensitivity, especially in the near infrared region. A large sample compartment can measure a wide variety of samples (A sample of up to 700 × 560 mm can be set horizontally for measurement.). With the optional Auto XY stage, multi-point automatic measurement of up to 310 × 310 mm samples with nitrogen purge is possible. LabSolutions UV-Vis software is included as standard. The DUV model is deep ultraviolet (From 175 nm).

Measurement wavelength range	3700i: 240 to 2,600 nm (When using the direct light receiving unit: 190 to 3,300 nm) 3700i DUV: 175 to 2,600 nm (When using the direct light receiving unit: 165 to 3,300 nm)
Spectral bandwidth	0.1 to 8 nm (UV/VIS), 0.2 to 32 nm (NIR)
Stray light	0.00008% or less (220 nm, NaI)

Brochure No. C101-E172

Photoreaction Evaluation System  
**Lightway**



Lightway is the world's first\* photoreaction evaluation system designed for the photochemistry field. It provides support for evaluating photoreaction quantum yield rates. By streamlining previous experiment process steps, it enables results to be obtained even more quickly. In addition, the software includes navigation functionality that allows even inexperienced users to operate the system easily. It eliminates the need to adjust the chemical actinometer, which minimizes operator variability and helps ensure accurate measurement results.

\* As of May 2020, according to a Shimadzu survey

Wavelength range	250 to 800 nm
Spectral bandwidth	15.0 nm
Photometric interval	0.1 sec. to 60 min.
Photometric range	Absorbance: 0 to 1.5 Abs

Brochure No. **C101-E174**

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<sup>-1</sup>, 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 <sup>-1</sup> (standard), 12,500 to 240 cm <sup>-1</sup> (optional)
Highest resolution	0.25 cm <sup>-1</sup>

Brochure No. **C103-E091**

Fourier Transform Infrared Spectrophotometer  
**IRSpirit**



IRSpirit is a compact Fourier Transform Infrared Spectrophotometer that travels where it's needed. It gracefully accommodates available bench space and the sample compartment is easily accessible with the system facing forward or sideways. In addition, IRSpirit is equipped with the widest sample compartment in its class, to easily accommodate both Shimadzu and third-party accessories. IRSpirit also offers the highest S/N ratio (30,000:1) in its class using the technology inherited from the high-end model. Furthermore, a newly developed dedicated IR Pilot program offers 23 standard application programs to simplify analysis for all users.

Interferometer	Michelson interferometer (30° incident angle) Equipped with Dynamic Alignment system Sealed interferometer with desiccant
Wavenumber range	7,800 to 350 cm <sup>-1</sup>
Highest resolution	0.9 cm <sup>-1</sup>

Brochure No. **C103-E114**

Fourier Transform Infrared Spectrophotometer Plastic Analysis System  
**Plastic Analyzer**



When analyzing plastics, libraries are used to qualify their material properties. However, infrared spectra of plastics that have been denatured (have deteriorated) due to heat or UV rays differ in shape from standard spectra, and qualifying them can sometimes be difficult. To address this, the Plastic Analyzer includes a deterioration library, so highly accurate qualification can be performed reflecting the state of deterioration.

Contents	IRSpirit Fourier transform infrared spectrophotometer QATR-S single-reflection ATR attachment Plastic Analyzer method package • UV-Damaged Plastics Library • Thermal-Damaged Plastics Library • Macro Program for IR Pilot/Parameter File
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Brochure No. **C103-E130**

**New** Fourier Transform Infrared Spectrophotometer

# IRXross

## IR, Xross over

### Performance × Operability

The IRXross creates a new concept for infrared spectroscopy. It offers the optimal solution for a new era with diverse application requirements.

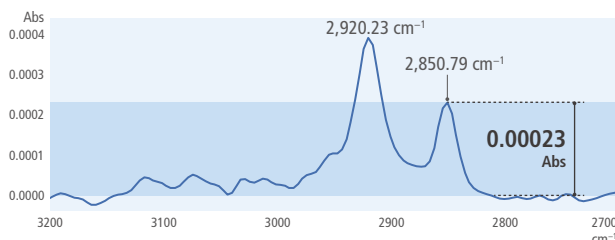


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#### High-End Sensitivity for Countless Applications

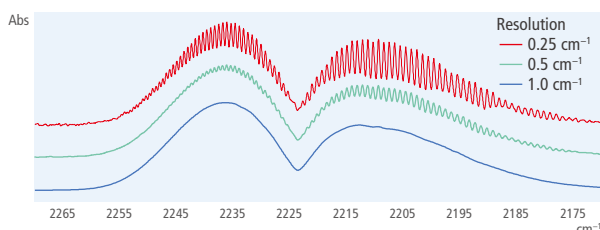
##### 55,000:1 S/N Enables Ultra-High-Sensitivity Measurements

The IRXross is a mid-level FTIR model that achieves high-end level S/N. It enables best-in-class low noise with P-P values of 55,000:1 for one minute of integration. Using the IRXross with a single-reflection ATR attachment, an oil stain on paper was analyzed. The system can detect even the extremely weak 0.00023 absorbance signal with good sensitivity.



##### 0.25 cm⁻¹ Resolution and 20 Spectra/Second Measurement Enables High-Resolution and High-Speed Measurements


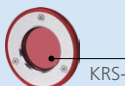
N<sub>2</sub>O gas (500 ppm), considered an environmental problem as a greenhouse gas, was analyzed. Measuring the gas at high resolution shows the peaks properly separated. In addition, high-speed measurements can accurately analyze the process of completing a reaction in 0.5 seconds.



#### Complies Fully with Regulations

##### Humidity-Resistant Window Material Compatible with the Wavenumber Measurement Range Specified in Pharmacopoeia

Either a KBr or KRS-5 window can be selected. The KRS-5 window maintains humidity resistance up to 90 %RH (for temperatures up to 30 °C) and is compliant with pharmacopoeia wavenumber range requirements (350 to 7,800 cm⁻¹).

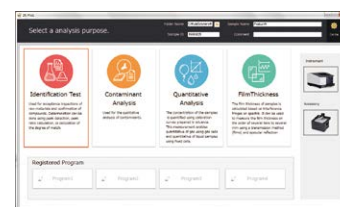
Window Material	KBr Window 	KRS-5 Window 
Humidity Resistance	With humidity-resistant coating Max. humidity at installation site: 70 %RH (with no condensation)	Max. humidity at installation site: 90 %RH (provided no condensation at temperatures up to 30 °C)
Wavenumber Range	350 to 7,800 cm⁻¹	
Transmittance	About 90 %T	About 70 %T

#### Built-in Analytical Intelligence

##### Easy Navigation with IR Pilot Ensures Anyone Can Get Started Easily



A total of 23 macro application programs are included. Even operators unfamiliar with FTIR analysis can analyze samples easily by simply selecting the purpose of analysis and attachment used. There is no need to set parameters. Multiple samples can be analyzed with a single click.



#### Shimadzu's Proprietary Database Useful for Contaminant Analysis

##### Contaminant Analysis Program



This program is included as a standard feature in LabSolutions IR software. The contaminant analysis program identifies measured contaminants with high precision using a spectral library for substances commonly detected as contaminants in combination with Shimadzu's proprietary identification algorithm.

#### Optional Libraries

##### Contaminant Library for LabSolutions IR

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

##### Thermal-Damaged Plastics Library

Unlike previous libraries, this library includes information about plastics that have degraded due to oxidation by heating. The library is especially useful for analyzing degraded contaminant substances, which are common.

##### UV-Degraded Plastics Library

Unlike previous libraries, this library includes information about plastics degraded by ultraviolet rays. Because many contaminants are degraded, this library is especially useful for such cases. It is also useful for analyzing microplastics.

Interferometer	Michelson interferometer (30° incident angle) Equipped with Advanced Dynamic Alignment system
Wavenumber range	7,800 to 350 cm⁻¹
Highest resolution	0.25 cm⁻¹

Brochure No. C103-E135



Infrared Microscope  
**AIMSight**

**New**



IRXross + AIMSight

Shimadzu's proprietary wide-field camera (standard) supports variable digital zooming as well as observation of large areas up to 10 × 13 mm. 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 areas as small as 30 × 40 μm. In AMSolution software, 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. AMSolution also includes functionality for measuring lengths, including the lengths of objects in infrared microscope images. The contaminant analysis program for automatically qualifying contaminants is included as a standard feature in LabSolutions IR software.

Supported FTIR	IRTracer-100, IRXross, IRAffinity-1 series
Measurement wavenumber range	5,000 to 700 cm <sup>-1</sup> (T2SL) 4,600 to 400 cm <sup>-1</sup> (TGS)

Brochure No. C103-E142

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.

Scanning wavelength range	200 to 900 nm and 0 order
Resolution	1.0 nm or less (Emission)
Wavelength slewing speed	60,000 nm/min.

Brochure No. C125-E009

**New** Infrared/Raman Microscope  
**AIRsight**



IRXross + AIRsight



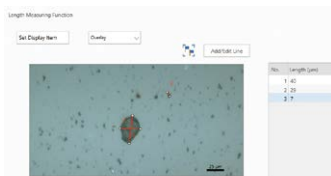
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**Raman and FTIR microscopy in perfect harmony**

The AIRsight infrared/Raman microscope combines two analytical techniques to provide complementary molecular information.

**Length measurement function**

AMSolution software now includes functionality for measuring lengths, including the lengths of objects in infrared Raman microscope images. Also, length measurement results can be output with a single button click.



Same position



**Both FTIR and Raman spectra can be measured without moving samples**

Because samples do not need to be moved, both infrared and Raman spectra can be measured from the same position in an extremely small area. That means information about both organic and inorganic substances can be obtained from the same position, which can significantly improve the accuracy of qualitative analysis.

Smart software



**One software to measure and analyze both FTIR and Raman spectra**

You can easily switch between infrared and Raman measurements with a click. In addition, infrared and Raman spectra can be superimposed and displayed, and various analyses can be performed.

Single system



**Obtain organic and inorganic information with one instrument**

Infrared microscopes can analyze organic substances, but have difficulty obtaining information for many inorganic substances. On the other hand, Raman microscopes can obtain information about inorganic substances such as titanium oxide and carbon, in addition to organic substances. A single AIRsight unit can analyze mixtures of both organic and inorganic substances.

Supported FTIR	IRXross, IRTracer-100, IRAffinity-1 series
Infrared measurement wavenumber range	5,000 to 700 cm <sup>-1</sup> (T2SL) 4,600 to 400 cm <sup>-1</sup> (TGS)
Raman measurement wavenumber range	4,000 to 150 cm <sup>-1</sup> (532 nm) 3,200 to 150 cm <sup>-1</sup> (785 nm)

Note: To use this product, a Fourier transform infrared (FTIR) spectrophotometer needs to be connected.

Brochure No. C103-E139

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

New

Atomic Absorption Spectrophotometer

# AA-7800 Series

## Infinite Possibilities.

The AA-7800 Series is versatile enough for a variety of analytical applications (Any Application), safe and easy to use even for beginners (Any User), and offers continuous analysis using autosamplers and remote data analysis via network connections to increase the flexibility of an operator's work style (Any Location).

Wavelength range	185 to 900 nm
Bandwidth	6-step automatic switching
Optics	Flame: Optical double-beam Furnace: High-throughput single beam
Background correction method	D <sub>2</sub> or SR method selectable

Brochure No. C122-E064

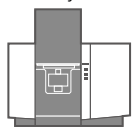


Movies &gt;

### Any Application

#### Systems can be modified based on how it is used.

The AA-7800 can be upgraded from a flame-only system to a dual atomizer system even after delivery, allowing the system to evolve in response to changes in customers' usage. Dual atomizer systems are available in two types: manual atomizer switching with excellent versatility and automatic atomizer switching with excellent operation and faster analysis.



Flame Analysis System

Dual Atomizer System  
(Selectable manual or automatic)

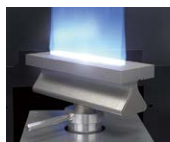
#### Automatically switches between eight hollow cathode lamps

The lamp housing includes functionality for automatically switching between eight hollow cathode lamps installed in a turret and simultaneously illuminating any two of the lamps.

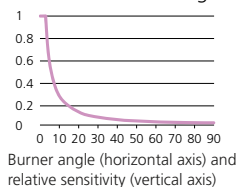


#### Flame analysis offers superior general applicability—Changing the burner angle—

Elements present in high concentrations can be measured in the flame analysis mode by adjusting the burner angle to decrease absorbance. That enables measurement of up to about 20 times higher element concentrations, which helps minimize dilution errors and the effects of measurement element contamination from containers or reagents.



With burner angle changed



### Any Location

#### World's smallest\* dual system

The dual atomizer system is a compact size with a width of 940 mm. In addition, a single autosampler can be used for both flame and furnace measurements.

\* As of May 2022, according to a Shimadzu survey



During Flame Measurements



During Furnace Measurements

### Any User

#### Safety technology for flame AA systems

With its high level of safety, even AA beginners can use the instrument without worry. Safety functions include automatic flame extinguishing by vibration sensor and excessive gas pressure detection of acetylene.

#### Automatic flame extinguishing function by vibration detection sensor



#### Simple and easy-to-use furnace system

Furnace measurements require replacing the graphite tube. Thanks to the simple furnace structure, even first-time users can replace the tube easily using a specialized positioning jig. It is also easy to differentiate between using different graphite tubes for given measurement applications.



#### GFA-TV Graphite Furnace Camera (Optional)

The camera can be used to confirm the sample injection position or sample drying status, which is helpful when evaluating or optimizing the temperature program. The sharp image clearly shows the status inside the graphite tube.



GFA-TV



Checking the sample injection position



Checking the drying status

#### LabSolutions CS supports laboratory network connectivity

By adding a WizAArd Agent connection kit (optional), you can connect to the LabSolutions CS network. LabSolutions CS manages all analytical data in a database on a network server, so that the data can be loaded and analyzed on any computer connected to the network.

Note: An additional software license is required for analyzing data on a computer not connected to the AA system.

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 Assistant function of the software automatically sets the optimal analysis conditions for quantitative analysis and 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)
	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

Brochure No. C113-E018

Multitype ICP Emission Spectrometer  
**ICPE-9800 Series**



The ICPE-9800 series is a Multitype ICP Emission Spectrometer that can be used in various fields such as environmental testing, pharmaceuticals, foods, chemicals, and metals. Acquisition for All Wavelengths, Automatic Wavelength Selection and a Diagnosis Assistant ensure the reliability of measurements with the most appropriate method at all times. The vertical torch orientation and both axial and radial views allow simultaneous analysis of trace to high-concentration samples without concern for contamination (ICPE-9820). The Mini Torch, Eco Mode and Vacuum spectrometer significantly reduce running costs.

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.

Brochure No. C113-E019

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.

Diffraction grating of monochromator unit	Concave radius of curvature: 1000 mm
Wavelength range	120 to 550 nm, 120 to 700 nm
Readout unit	Time-resolution photometry (PDA processing, total integral processing)
Number of light receptors	64 channels max.

Brochure No. C112-E013

Optical Emission Spectrometer  
**PDA-7000 Series**



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.

Diffraction grating of monochromator unit	Concave radius of curvature: 600 mm
Wavelength range	121 to 589 nm
Readout unit	Time-resolution PDA photometry
Number of light receptors	64 channels max.

Brochure No. C112-E011

Energy Dispersive X-ray Fluorescence Spectrometer

# EDX-7200

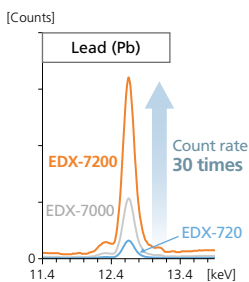
The EDX-7200 is a flagship model of the EDX series in pursuit of high sensitivity, high speed and high precision. This model supports new regulations and directives for consumer and environmental compliance, such as RoHS/ELV, REACH, and TSCA with full exclusive screening analysis kits. The EDX-7200 is equipped with a high-resolution SDD detector to achieve a higher count rate and detection efficiency.



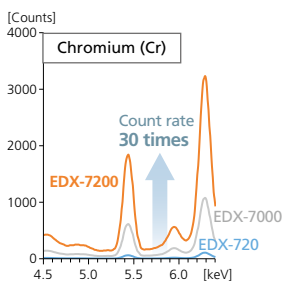
**High Speed**

— Throughput Increased by Up to a Factor of 30 —

Equipped with a high-speed circuit that increase the count rate by up to 30 times compared to the former model (EDX-720). Improved algorithms and improved performance also help to reduce measurement times.



Comparison of Lead Profiles in Copper Alloys



Comparison of Chromium Profiles in Copper Alloys

**High Sensitivity**

— Improves Lower Detection Limit by Up to 6 Times —

In metals analysis, the lower detection limit of trace elements in main components has been improved.

Guide of the Lower Detection Limit (300 sec) for Lead in Metals [ppm]

	EDX-7200	EDX-7000	EDX-720
Copper alloy	9.9	17.1	35.5
Solder	3.9	8.4	24.8
Aluminum alloy	0.7	1.1	3.3

Note: The detection limit is an example and not a guaranteed value.

Elements to be determined	<sup>11</sup> Na to <sup>92</sup> 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)

Brochure No. C142-E047

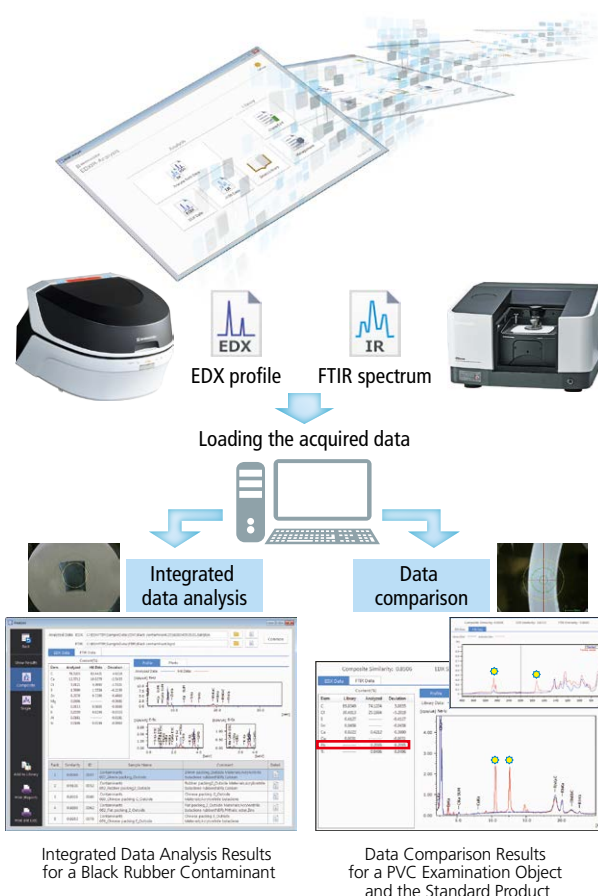
Integrated EDX-FTIR Analysis Software

# 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.

**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.



X-ray and Surface Analysis Systems



Energy Dispersive X-ray Fluorescence Spectrometer  
**EDX-8100**



Equipped with an electronically cooled high-performance semiconductor detector, the EDX-8100 is designed for reduced running costs and ease of maintenance while providing better sensitivity, throughput, and resolution than conventional models. The EDX-8100 is a model that accommodates light elements and allows for helium purge. 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. 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-8100 can be applied broadly, whatever the industry.

Elements to be determined	eC to $_{92}\text{U}$
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

Brochure No. **C142-E044**

Energy Dispersive X-ray Fluorescence Spectrometer for RoHS/ELV Screening  
**EDX-LE**



The software is loaded with the optimal functions for screening, including automatic calibration curve selection and automatic reduction of measurement time. 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.

Elements to be determined	$_{13}\text{Al}$ to $_{92}\text{U}$
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

Brochure No. **C142-E035**

Multi-Channel X-ray Fluorescence Spectrometer  
**MXF-2400**



The MXF-2400 features a compact design and ease of operation. The latest hardware designed to fully utilize the principle of X-ray fluorescence spectrometry and the data processing unit that uses various software programs to permit automatic management of analysis data combine to provide high analytical productivity both in R&D and production control. Up to 36 elements can be simultaneously determined by the fixed monochromator and up to 48 elements can be determined sequentially by the optional scanning monochromator. High analytical precision is provided even in high sensitivity analysis of a few ppm quantity level.

Elements to be determined	$_{5}\text{B}$ , eC, $_{7}\text{N}$ , eO to $_{92}\text{U}$
Converging system	Curved crystal
X-ray tube	4 kW with a thin window

Brochure No. **C142-E024**

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

## Electron Probe Microanalyzer EPMA-8050G



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  $\mu$ A. 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.

Elements analyzed	$^4\text{Be}$ (optional) and $^5\text{B}$ to $^{92}\text{U}$
X-ray spectrometer	Max. five high-sensitivity spectrometers
Max. sample size	100 mm square x 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

Brochure No. C143-E013

## 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 CeB<sub>6</sub> filament that allows EPMA analysis of sub-micron regions.

Secondary-electron image resolution	6 nm (EPMA-1720)	5 nm (EPMA-1720H)
Analyte elements range	$^4\text{Be}$ to $^{92}\text{U}$	
Number of X-ray spectrometers	2 to 5 channels	
X-ray take-off angle	52.5°	

Brochure No. C143-E012

## 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  $\mu$ m 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 $\mu$ m
Sensitivity	(monochrome X-rays, 0.48 eV FWHM Ag3d) Macro analysis: 400 kcps, 27 $\mu$ m 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  $\mu$ m-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 $\mu$ m max.
Sensitivity	(monochrome X-rays, 0.48 eV FWHM) Macro analysis: 250 kcps 15 $\mu$ m dia. analysis: 0.8 kcps

Scanning Probe Microscope/Atomic Force Microscope

# SPM-Nanoa

## Leading you into the nano world.

The SPM-Nanoa is a middle-range SPM that adopts a low-noise, high-sensitivity detection optical system equivalent to the high-end SPM-8100FM, further advancing automation of operations and high throughput. That means you can observe what you want to observe in more detail, more easily, and more quickly. Consequently, SPM-Nanoa microscopes provide powerful assistance for everything from observing the shape of micro areas to measuring their physical properties.

- **Automatic Observation**  
Adjusts laser beam, adjusts parameter settings during observation and performs image processing automatically
- **Extensive Functionality**  
Capture sharp images with optical microscopy to SPM microscopy modes
- **Saves Time**  
Various support functionality achieves fast observation

Observation mode	Standard: contact, dynamic, phase, lateral force (LFM), force modulation Optional: lateral force (MFM), surface potential (KPFM), current, piezoelectric force (PFM), STM
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

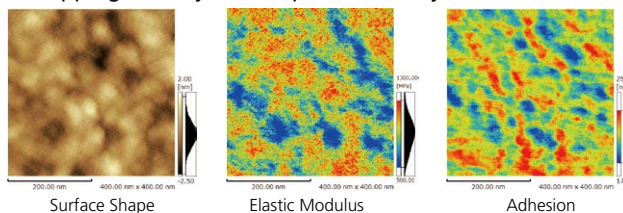
Brochure No. C147-E018



### Visualization of Nano-scale Elastic Modulus and Adsorption

The elastic modulus can be evaluated quantitatively by applying a theoretical model for calculating elastic modulus to the force curve obtained by measuring the micro-forces acting between the probe and sample. The force distribution can also be visualized in the vertical direction for nano-scale three-dimensional mechanical analysis.

#### ■ Mapping the Physical Properties of Polymer Films



Mapping polymer film surface properties clearly showed how elastic modulus and adhesive forces were distributed in patches several tens of nanometers in size.

(Sample source: MORESCO Corporation)

## High-Resolution Scanning Probe Microscope SPM-8100FM



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.

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

Brochure No. C147-E016

## 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

Brochure No. C147-E017

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

Total Organic Carbon Analyzer

# TOC-L

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.

Shimadzu TOC analyzers 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.

Model	High-sensitivity model		Standard 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	

Brochure No. C391-E079



Movies >



This product is certified as Shimadzu's Eco-Products Plus. Reduced power consumption by 36 % compared with conventional Shimadzu's products.

## 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



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

## 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)



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
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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.

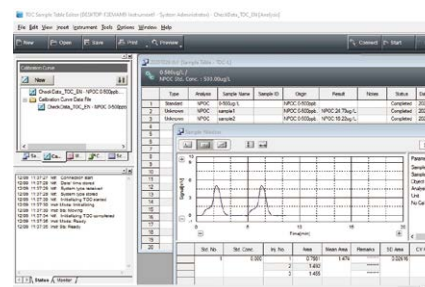
Wet Oxidation TOC Analyzers  
**TOC-VWP**



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

Detection limit	0.5 µg/L
Measured items	TC, IC, TOC, NPOC
Measurement range	TC 0 – 3,500 mg/L, IC 0 – 3,500 mg/L

Software for TOC-L  
**LabSolutions TOC**



While keeping the operation feeling that has been popular in the previous product TOC-Control L, security functions have been enhanced with full support for LabSolutions CS. LabSolutions TOC uses LabSolutions CS, a world-proven data management software, to centrally manage measurement results and audit trails with a common database and user ID across a variety of devices, including LCs and GCs. Lab administrators don't have to manage devices individually. LabSolutions TOC is equipped with a "Report Set function" that creates a report that links measurement data with related audit trails. By simply and securely reviewing measurement data, it also improves work efficiency.

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

## On-Line TOC Analyzers for Pure Water eTOC Series



TOC-1000e

Demands for highly purified water and its quality control are getting stronger in many industries, such as pharmaceutical, medical device, food/beverage, chemical, precision machinery, and semiconductor. eTOC has been designed to satisfy this demand. It has very high sensitivity and low detection limits, reaching 0.1 µg/L, making it perfectly suitable for ultra-pure water measurement.

Measurement Items	TOC, conductivity (or specific resistance), temperature
Measurement Principle	UV oxidation-conductivity method
Measurement Range	TOC: 0 to 2000 µg/L Conductivity: 0.023 to 206 µS/cm (without temperature correction) Temp.: 10 to 50 °C
Detection Limit	TOC: 0.1 µg/L
Dimensions, Weight	W270 × D140 × H180 mm, 2.88 kg

Brochure No. C391-E110

## On-Line Total Organic Carbon Analyzer TOC-4200 Series



TOC-4200

On-line TOC analyzer with 680 °C combustion oxidation and non-dispersive infrared gas detection (NDIR) method. The measurement range is wide, from 0 to 20,000 mg C/L f.s., and can optionally be used for high-sensitivity measurement of 0 to 1 mg C/L f.s. The reliable oxidizing power of the high-temperature combustion furnace, the NDIR detector that is not affected by interference components, and the fast measurement of the minimum 4 minutes cycle are effective not only for the final effluent but also for upstream monitoring.

Measurement Principle	680°C combustion catalytic oxidation / non-dispersive infrared gas detection (NDIR) method
Measurement Items (*Optional)	NPOC, TC, TOC (TC-IC)* TOC (NPOC+POC)*
Measurement Range	0-5 to 0-1,000 mgC/L f.s. (0 to 50,000 mgC/L f.s. with dilution function)
Measurement Cycle	4 minutes minimum (Using NPOC)
Repeatability	Within ±2% f.s.

Brochure No. C391-E083

## Transportable Gas Analyzers NOA-7100, CGT-7100



NOA-7100



CGT-7100

The portable all-in-one gas analyzer can be used for various purposes a variety of uses in various locations. All pretreatment parts required for measurement, such as the pump, filter, and electric cooler, are built-in. Gas concentration can be measured by simply introducing sample gas. The NOA-7100 supports NO<sub>x</sub> measurements for applications ranging from exhaust gas measurement of combustion equipment to combustion and denitrification research.

NOA-7100	Measurement components	Measurement range	Main application
Type 1	NO <sub>x</sub> , O <sub>2</sub>	NO <sub>x</sub> : 0 to 25/50/100/250/500/ 1,000/2,500/4,000 ppm O <sub>2</sub> : 0 to 5/10/25 vol%	Combustion equipment test / Research
Type 2 (Small flow measurement)	NO <sub>x</sub> , NO, NO <sub>2</sub>	0 to 100/250/500/1,000/2,500/ 4,000 ppm	Catalyst research

Brochure No. C391-E101

CGT-7100	Measurement components	Measurement range	Main application
Type 1	CO, CO <sub>2</sub>	CO : 0 to 1,000/5,000 ppm CO <sub>2</sub> : 0 to 5/15 vol%	Combustion equipment test / Research
Type 2	CO, CH <sub>4</sub>	CO : 0 to 5 vol% CH <sub>4</sub> : 0 to 20 vol%	Fuel cell research
Type 3 (Small flow measurement)	CO, CO <sub>2</sub>	CO : 0 to 10/20 vol% CO <sub>2</sub> : 0 to 10/20 vol%	Catalyst research

Brochure No. C391-E098

## Pretreatment Unit for Portable Gas Analyzers CFP-8000



The CFP-8000 is pretreatment unit that is used with NOA-7100/7000 or CGT-7100/7000. When performing continuous gas analysis, dust and moisture must be removed from the gas before sending to the analyzer. This essential preprocessing can be performed by this one device, and two lines of cleaned measurement gas can be used simultaneously. Light-weight and compact, the CFP-8000 is the perfect preprocessor for use with portable analyzers.

Intended use	Air and other gas samples
Permissible ambient temperature	5 to 40°C
Sampling quantity	Approx. 5 L/min (maximum)

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 NO<sub>x</sub>, SO<sub>2</sub>, and CO or CO<sub>2</sub>. An O<sub>2</sub> detector is also incorporated to allow measurement of a total of the five components simultaneously.

Application	Measurement of NO <sub>x</sub> , SO <sub>2</sub> , CO, CO <sub>2</sub> , and O <sub>2</sub> concentrations in exhaust gases from various boilers, industrial plants (petroleum refinery, steel, cement, etc.), incinerators, and thermal treatment furnaces.
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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: NO<sub>x</sub>, SO<sub>2</sub>, CO, and O<sub>2</sub>, and for measurement of these four components plus CO<sub>2</sub> 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 <sub>2</sub> : Magnetic wind method
Measurement range	It differs depending on the components measured, so inquire for details.

Flue Gas Nitrogen Oxide and Oxygen Analyzer  
**NOA-3030**



This high performance chemiluminescence system features a space-saving design and easy maintenance. Ideal for monitoring cogeneration system exhaust gases. Chemiluminescence enables highly accurate NO<sub>x</sub> measurements with minimal interference.

Measurement method	NO <sub>x</sub> : Atmospheric pressure chemiluminescence method O <sub>2</sub> : Magnetic wind method
Measurement range	NO <sub>x</sub> : Ranges from 0-to-50 to 0-to-2,500 ppm O <sub>2</sub> : 0 to 25 vol% (Optional: 0 to 10 vol%)

Flue Gas Nitrogen Oxide and Oxygen Analyzer  
**NOA-308Dx**



Chemiluminescence provides high sensitivity and superior zero point stability. Includes various functionality, such as automatic calibration, remote calibration, calculation processes, and alarms.

Measurement method	NO <sub>x</sub> : Atmospheric pressure chemiluminescence method O <sub>2</sub> : Magnetic wind method
Measurement range	NO <sub>x</sub> : Ranges from 0-to-10 to 0-to-2,500 ppm O <sub>2</sub> : 0 to 10/25 vol%

Flue Gas CO and O<sub>2</sub> Analyzer for Preventing Dioxin Emissions from Waste Incinerators  
**COA-3030**



This analyzer is specialized for monitoring waste incinerator compliance with waste processing laws and regulations and guidelines for preventing dioxin emissions. A ratio type infrared gas analyzer is used to measure CO and a magnetic wind type analyzer for O<sub>2</sub>.

Measurement method	CO: Non-dispersive infrared ray absorption method (ratio photometry) O <sub>2</sub> : Magnetic wind method
Measurement range	CO: 0 to 200/1,000 ppm O <sub>2</sub> : 25 vol%

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

**New** AUTOGRAPH Precision Universal Testers

# AGX-V2 Series

Industry's highest level of new precision universal testing machine

A motor-driven precision universal testing machine with high performance, operability and safety. By the guaranteed precision range to 1/2000 of full scale, a wide range of test forces can be measured with a single load cell. The autotuning function was further enhanced and strain control performance was improved.

Newly equipped with the world's first\* voice operation device "XV-Talk" as standard, it supports safe and correct testing in a conversational style. In addition to the standard models, we offer five models, including a "model with a large LCD touch panel" that improves testing efficiency, a "model with a wide testing space" that enables testing of large parts, and a "model with a separate control unit" that is useful for developing new materials.

\* As of February 2023, according to a Shimadzu survey

### Aggregation of Cutting-Edge Functions

The sampling speed has been improved to 10 kHz, which is twice as fast as the conventional product, enabling the test force to be collected 10,000 times per second. For tests using the strain control method specified in ISO 6892, the control cycle was increased by 10 times to improve responsiveness.

### New Operability with voice "XV-Talk"

The AGX-V2 responds to the operator's voice. The AGX-V2 operates in response to key phrases spoken by the operator. This frees the operator from frequently used buttons, such as "Start Test" and "Return".



Movies >

### Choose between Two Controllers

Two types of controllers with touch panel LCD screens are available. Choose from the large LCD "Operation Controller" with graph display and direct operation buttons, or the portable "Smart Controller".



AGX-10kNVD2



AGX-50kNVD2



AGX-100kNV2



AGX-600kNV2

Capacity	Table-top model 10 N to 50 kN, floor model 20 kN to 600 kN		
Testing speed	AGX-10kNVD2		0.0005 to 3,000 mm/min
	AGX-20/50kNVD2		0.0005 to 1,500 mm/min
	AGX-20/50kNV2, AGX-100kNV2		0.00005 to 1,500 mm/min
	AGX-250/300kNV2		0.00005 to 720 mm/min
	AGX-500/600kNV2		0.00005 to 540 mm/min
Test force measurement accuracy	High-accuracy type	10 N to 300 kN	Accurate to within $\pm 0.5\%$ of indicated test force (for forces ranging from 1/1000 to 1/100 of the load cell capacity rating) Accurate to within $\pm 0.3\%$ of indicated test force (for forces ranging from 1/100 to 1/1 of the load cell capacity rating)
		500 kN, 600 kN	Accurate to within $\pm 0.5\%$ of indicated test force (for forces ranging from 1/500 to 1/1 of the load cell capacity rating)
	Wide ranging type	50 N to 300 kN	Accurate to within $\pm 1\%$ of indicated test force (for forces ranging from 1/2000 to 1/1000 of the load cell capacity rating) Accurate to within $\pm 0.5\%$ of indicated test force (for forces ranging from 1/1000 to 1/100 of the load cell capacity rating) Accurate to within $\pm 0.3\%$ of indicated test force (for forces ranging from 1/100 to 1/1 of the load cell capacity rating)
		10 N to 300 kN	Accurate to within $\pm 1\%$ of indicated test force (for forces ranging from 1/1000 to 1/1 of the load cell capacity rating)
	Standard-accuracy type (Select one.)	10 N to 300 kN	Accurate to within $\pm 1\%$ of indicated test force (for forces ranging from 1/1000 to 1/1 of the load cell capacity rating)
		500 kN to 600 kN	Accurate to within $\pm 1\%$ of indicated test force (for forces ranging from 1/500 to 1/1 of the load cell capacity rating)



### 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 1,000 mm/min (Stepless)
Test force accuracy	Within $\pm 0.5\%$ of display test force (for 1/1 to 1/500 of load cell capacity)

Brochure No. **C224-E057**

### Table-Top Universal Testers EZ Test

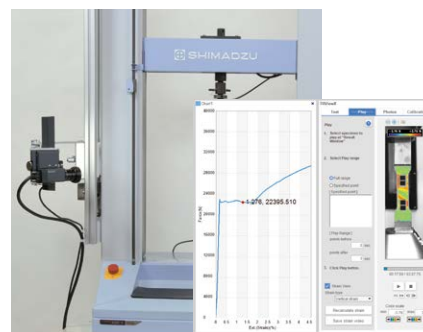


This easy-to-use, compact, stylish frame incorporates enhanced functions, enabling tests to be carried out with good efficiency.

	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	0.001 to 2,000 mm/min
Return speed	1,500 mm/min	3,000 mm/min	3,000 mm/min
Test force measurement accuracy	High-precision type	$\pm 0.5\%$ 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	$\pm 1\%$ 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	

Brochure No. **C224-E055**

### 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 $\pm 1.5\ \mu\text{m}$ or $\pm 1.5\%$ of indicated value (for camera field of view 240 mm or less and constant temperature measurement)

Brochure No. **C224-E052**

### 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 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)

### Automatic Extensometer SIE-560A/560SA

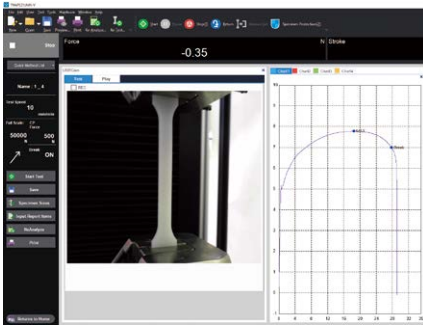


Provides high-precision measurement of the extension of metals, plastics, etc. from the elastic range (very small displacement) to failure (large displacement). All operations, such as automatic fitting and removal of the extension arm onto the specimen, automatic setting of the distance between standard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

Measurement range	Max. (560 - gauge length) (mm)
Measurement precision	560SA $\pm 1\ \mu\text{m}$ , 0.5 % (JIS B7741 0.5 class) 560A $\pm 2.5\ \mu\text{m}$ , 0.5 % (JIS B7741 1 class)
Gauge length	560SA 50 mm (variable with option) 560A 10 to 550 mm

Brochure No. **C224-E111**

## Operation Software for Material Testing TRAPEZIUM X-V



TRAPEZIUM X-V for Windows 10 provides a number of easy-to-use features, such as a data search function, condition setting through a visual wizard, and a quick condition list where you can select test conditions directly from the start-up screen. You can easily create a variety of test conditions, from simple test controls to controls with complicated patterns.

## Software for Autograph LabSolutions AG



The Autograph precision universal testing machines are now compatible with the latest in data integrity. Connecting TRAPEZIUM X-V to the LabSolutions system, which provides ER/ES regulatory compliance, enables confident, reliable data management. In addition to Autograph data, consolidated management is available for LC, GC, and UV data.

- Compatible with the AGX-V, AG-X, AGS-X and EZ-X
- Compatible with single software and control software

Brochure No. C224-E116

## Compact Thermostatic Chamber for Autograph TCE-N300A



The thermostatic chamber controls the temperature in the testing space, enabling tensile, bending, and compression tests under a variety of temperature conditions. You can discover new characteristics of materials by reproducing real-world temperature environments. The temperature can be set, and the temperature data from the thermostatic chamber can be recorded, using TRAPEZIUM X-V software.

Temperature usage range	-70 to +300 °C
Temperature increase rate	25 minutes from room temperature to 300 °C
Temperature decrease rate	25 minutes from room temperature to -70 °C

Brochure No. C224-E117

## Precision Universal Testing Machines Autograph X-V Retrofit New



Image after the Retrofit

The Autograph X-V Retrofit is a partial upgrade kit, consisting of a controller and software, for precision universal testing machines. Replacing the existing controller and software with this product significantly improves operation and safety with existing systems. The replacement provides comparable measurement capabilities to the Autograph AGX-V series, Shimadzu's premier systems.

Applicable systems	AG-D, AG-E, AG-G, AG-I, AG-IS, AG-X, AG-Xplus
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Brochure No. C224-E121

## 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.

Brochure No. C221-E010

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)

Brochure No. **C221-E012**

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

Brochure No. **C221-E012**

Micro Vickers Hardness Tester  
**HMV-G Series**

This micro hardness tester features 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 and models with color cameras are also included in the lineup.



HMV-G31 Series

Standardized automatic length measurement function using a digital camera built into a novel G frame



HMV-G31-FA Series

High efficiency, completely automatic measurements using the electric XYZ stage and special software



HMV-G30 Series

Turn it ON and start measuring immediately. Active in educational fields.



Electric micrometer kit (option)

Test force range	9.8 mN to 19.6 N
Reading method	Automatic (G31), Manual (G30)
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-G31ST, HMV-G31DT, HMV-G31-XY, HMV-G31-FA

Brochure No. **C227-E027**

Chromatography Systems

Mass Spectrometry Systems

Life Science Lab Systems

Spectroscopy Systems

X-ray and Surface Analysis Systems

Environmental Measurement Systems

Material Testing and Non-Destructive Inspection Systems

Physical Properties Measurement Systems

Dynamic Ultra Micro Hardness Tester  
**DUH-211/210S**



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)

Brochure No. **C227-E024**

Micro Compression Tester  
**MCT Series**



With 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

Brochure No. **C227-E020**

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

Brochure No. **C228-E008**

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

Brochure No. **C228-E009**



**New** Testing Machine Remote Monitoring System

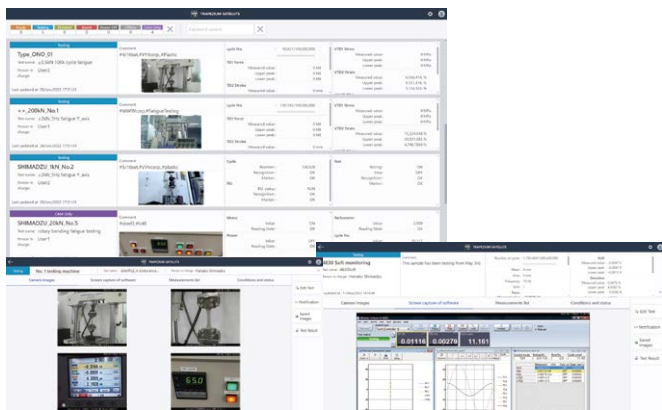
# TRAPEZIUM SATELLITE

TRAPEZIUM SATELLITE is a remote monitoring system for testing machines. It consists of a monitoring device, a USB camera, and software for remotely monitoring the operating status of fatigue testing machines using a web browser. The ability to monitor the operating status of equipment away from the laboratory increases the efficiency of testing work and reduces workloads.

Brochure No. C225-E040

**Check the Operating Status of Multiple Instruments**

The test status for each instrument is arranged vertically, so the status of multiple instruments can be assessed at a glance.



USB Camera Image Browsing Window

Windows Software for 4830 Browsing Window



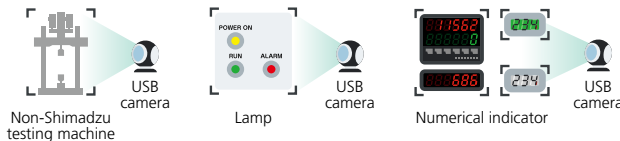
Putting the Machine Laboratory in the Palm of Your Hand



Movies >

**AI Monitoring Function Digitizes the Information**

AI image analysis can digitize and monitor indicator ON/OFF status and the numerical values from displays. Users are notified in real time of the status whenever it changes.



Servopulser Fatigue and Endurance Testing Machine  
**EHF-E 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, $\pm 10$ , $\pm 20$ , $\pm 50$ , $\pm 100$ , $\pm 200$ kN
Maximum amplitude	$\pm 25$ mm, $\pm 50$ 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).

Brochure No. C225-E029

Servopulser Overhead Actuator Type Fatigue and Endurance Testing Machine  
**EHF-U 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, $\pm 50$ , $\pm 100$ , $\pm 200$ 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).

Brochure No. C225-E029

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

## Servopulser Table-Top Fatigue and Endurance Testing Machine EHF-L 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, $\pm 5$ , $\pm 10$ , $\pm 20$ kN
Maximum amplitude	$\pm 25$ mm, $\pm 50$ mm
Waveform	Sine, triangular, rectangular, ramp, and haversine waves

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

Brochure No. C225-E029

## Electromagnetic Force Fatigue and Endurance Testing System Servopulser EMT Series



High-speed repeated load tests can be carried out with a maximum velocity of 2 m/s, and maximum stroke of  $\pm 50$  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	$\pm 1$ kN (static and dynamic tests)	
Stroke	$\pm 30$ mm	$\pm 50$ mm
Maximum speed	1 m/s	2 m/s
Maximum frequency	200 Hz	

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

Brochure No. C225-E029

## Compact Hydraulic Vibrator Force Simulator EHF-JF Series



This is a  $\pm 20$  kN  $\pm 100$  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	$\pm 5$ kN, $\pm 10$ kN, $\pm 20$ kN, $\pm 30$ kN (4 types)
Effective stroke	$\pm 50$ , $\pm 100$ , $\pm 150$ mm (selective)

Brochure No. C225-E029

## Electric Motor Driven Actuator NJ-SERVO



This is a  $\pm 10$  kN  $\pm 100$  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	$\pm 1$ kN, $\pm 5$ kN, $\pm 10$ kN, $\pm 20$ kN, $\pm 30$ kN
Effective stroke	$\pm 100$ mm ( $\pm 150$ mm)

Brochure No. C225-E030

## 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 <sup>Note 1</sup>	20 kHz $\pm$ 500 Hz
Test stress <sup>Note 2</sup>	180 to 900 MPa (in the case of a steel circular taper specimen)
Stress ratio	-1

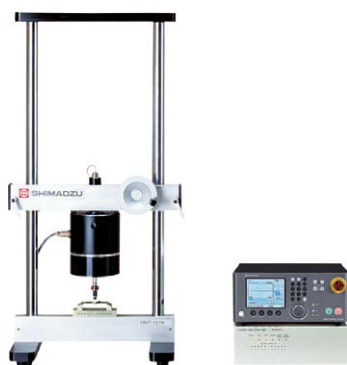
Note 1: The test frequency is determined from the resonance frequency of the sample.

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.

Brochure No. C225-E029

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	
Maximum frequency	60 Hz	100 Hz	
Power requirements	AC 100 V		

Brochure No. C225-E029

High-Speed Impact Testing Machines  
**HITS-X Series**



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.

Brochure No. C225-E037

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).

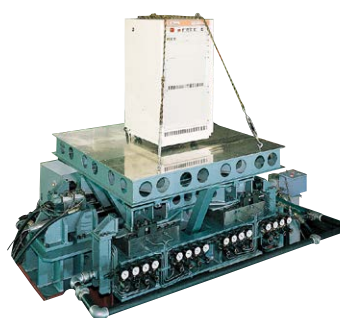
Test waveforms	Sine, triangular, rectangular, etc.
Amplifier	Test force, stroke
Control mode	Test force, stroke, virtual transducer
Power requirements	Single-phase 100 V, 300 VA

Note: A wide range of software is available.

Contact Shimadzu for details.

Brochure No. C225-E021

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

**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-Speed Video Camera  
**Hyper Vision HPV-X2**



The newly developed high-speed CMOS image sensor, FTCMOS2, combines the same shooting speed of up to 10 million frames per second as conventional products with the high sensitivity of ISO 16,000 (reference value), which is 6 times higher than conventional products. In addition, it delivers sharper high-speed images even when used in conjunction with high-magnification optical systems such as microscopes. It is also equipped with a synchronous shooting function using two cameras, allowing simultaneous 2-way shooting and 3D image analysis using commercially available software.

Resolution	100,000 pixels (400 (horizontal) × 250 (vertical)) (FP mode)
Recording speed	10 Mfps, 5 Mfps (fixed) (fps = frames per second)
Continuous recording capacity	256 frames max.

Brochure No. C220-E015

MAIVIS Ultrasonic Optical Flow Detector  
**MIV-X**

**New**



Ultrasonic optical flow detection refers to nondestructive inspection technology that uses ultrasound and light. The surface of the test object is excited using ultrasound, and the tiny changes in the surface produced by these vibrations are detected using laser irradiation and a camera. If peeling, cracks, or other flaws are present, ultrasound discontinuities (propagation disturbances) are detected. Ultrasonic optical flow detection enables the visualization of internal flaws (at a depth of about 1 mm) that are hard to find using conventional ultrasonic testing. The MIV-X can easily detect flaws in joints and bonding surfaces in research and development processes involving multi-materials, which are created by combining different materials to increase strength and reduce weight.

Minimum detection size	Approx. 1/100 of inspection area (depends on sample and inspection condition)
Camera distance	250 to 1000 mm
Inspection time	Approx. 25 seconds or less (Observation + Analysis)

Brochure No. C227-E029

**New** Bench-top X-Ray CT System

# XSeeker 8000

The XSeeker 8000 bench-top X-ray computed tomography (CT) system is equipped with a high-output X-ray generator and a high-resolution flat panel detector. Despite its compact size, it has a high X-ray output of 160 kV, enabling clear observations of molded plastic parts, aluminum die cast parts, and other metal parts. In addition, the newly developed XSeeker control software provides high operability and the highest throughput to date. With clear image quality and high throughput, it supports applications in a wide range of situations, from detailed observations in product development and quality evaluation to inspections at machining sites.

Target object	Plastics, light metals and foods, etc.
Maximum sample size	300 mm dia. × H: 320 mm, max. 10 kg max.
Field of view	100 mm dia. max.

Brochure No. C251-E042



Product >

**Compact, High-Output System**

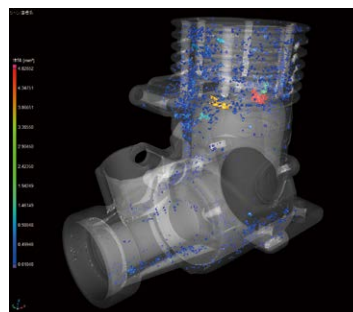
- Smallest, lightest bench-top CT system in its class
- High 160 kV output achieves high penetration ability

**Image Quality and Functionality on Par with High-End Models**

- High-resolution FPD enables visualization of microstructures
- High-functionality all-in-one viewer for intuitive observation

**Operation Optimized for Inspections**

- Easy 3-step scanning process
- Recurring inspection is possible at the push of a button



Defect Analysis of Aluminum Die Cast



VR Image of a Cup of Noodles (mini size)



Microfocus X-ray Inspection System

# Xslicer SMX-1010/1020

The Xslicer SMX-1010/1020 is a vertical emission X-ray system equipped with 90 kV microfocus X-ray generator and a high-resolution flat panel detector. Image quality has been significantly improved over the previous model (SMX-1000 Plus), and Shimadzu's renowned operability has advanced even further. In addition to operability improvements, the stage movement speed and detector acquisition speed have also increased, significantly shortening inspection times. The inspection process is now more efficient. The workflow has also been simplified for the CT unit (optionally available), and operability has been improved. With the Xslicer SMX-1010/1020, everything from X-ray fluoroscopic inspections of surface mounted circuit boards, sensors, and harnesses to 3D defect analysis using CT can be accomplished with a single unit.

Target object	Electronic parts, mounting boards, resin, etc.
Maximum sample size	W: 350 × D: 450 × H: 100 mm, max. 5 kg max.
Fluoroscopy FOV (on carbon plate)	SMX-1010: 1.9 mm (vertical) × 2.2 mm (horizontal) to 38 mm (vertical) × 43 mm (horizontal) SMX-1020: 2.2 mm (vertical) × 3.8 mm (horizontal) to 42 mm (vertical) × 76 mm (horizontal)

Brochure No. C251-E039

### New HDR Processing Function

Shimadzu's unique, proprietary image processing technique/algorithm allows fluoroscopic images with a higher dynamic range. Regions that are both easy and difficult to penetrate can be observed at the same time, which shortens inspection times.



Without HDR Processing

With HDR Processing

Microfocus X-ray Inspection System

## Xslicer SMX-6010



Xslicer SMX-6010 is a planer X-ray inspection system, featuring a micro-focus X-ray generator and a 3 megapixel flat panel detector. It delivers high-accuracy images with a wide dynamic range that enable detailed observations of internal structures and defects. In addition, the system switches smoothly between fluoroscopy and Computed Tomography (CT), enabling a variety of observations matched to the shape of the sample. This supports the inspection of various samples ranging from electronic parts with improved miniaturization to mounted boards with advances in high-density multilayer design.

Target object	Electronic parts, mounting boards, etc.
Maximum sample size	W: 470 × D: 420 × H: 100 mm, max. 5 kg max.
Fluoroscopic field of view size	0.75 (vertical) × 1.3 mm (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)

Brochure No. C251-E040

Microfocus X-ray CT System

## inspeXio SMX-225CT FPD HR Plus



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 large high-resolution flat panel detector mounted, 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.

Target object	Aluminum die castings, electronic circuit boards, electronic parts, composite materials, etc.
Maximum sample size	400 mm dia. × H: 300 mm max. 12 kg max.
X-ray detector	16-inch flat panel detector
Field of view	400 mm dia. max.

Brochure No. C251-E029

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

Dimensional X-ray CT System  
**XDimensus 300**



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.

Target object	Resins and light metals
Maximum sample size	300 mm dia. x H: 210 mm, max. 10 kg max.
Field of view	300 mm dia. max.
Accuracy (sphere distance error)	$\pm(3.8 + L/50) \mu\text{m}$

Brochure No. **C251-E035**

Phase-Contrast X-Ray CT System  
**Xctal 5000**

**New**



The Xctal 5000 is a new X-ray CT system that creates images of X-ray phase shifts. In addition to the X-ray absorption information detected by conventional X-ray CT systems, this system can detect X-ray scattering and refraction information. This enables observations of fine structure, including cracks and the flow of fiber bundles, across a wide field of view, and high-contrast observations of samples with no absorption differences. This is useful for research and development of fiber reinforced resins, composite materials, and biomaterials.

Target object	Fiber reinforced resins, composite materials, and biomaterials
Maximum sample size	150 mm dia. x H: 275 mm, max. 5 kg max.
X-ray detector	Flat panel detector
Field of view	100 mm x 100 mm max. (Fluoroscopy), 100 mm dia. max. (Fiber Orientation Fluoroscopy), 100 mm dia. x H: 100 mm max. (CT Scan), 85 mm dia. x H: 85 mm max. (Fiber Orientation CT Scan)

Brochure No. **C251-E043**

Differential Scanning Calorimeters  
**DSC-60 Plus Series**



DSC-60 Plus

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. 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	$\pm 150 \text{ mW}$
Baseline noise	0.5 $\mu\text{W}$ max. (rms, when held at 150 °C using blank)

Brochure No. **C160-E006**

TG-DTA Simultaneous Measuring Instruments  
**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 an 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)	$\pm 500 \text{ mg}$
Measurable range (differential thermal)	$\pm 1,000 \mu\text{V}$
Number of settable samples	24 per sample tray (DTG-60A/60AH)

Brochure No. **C160-E006**

Thermomechanical Analyzers  
**TMA-60/60H**

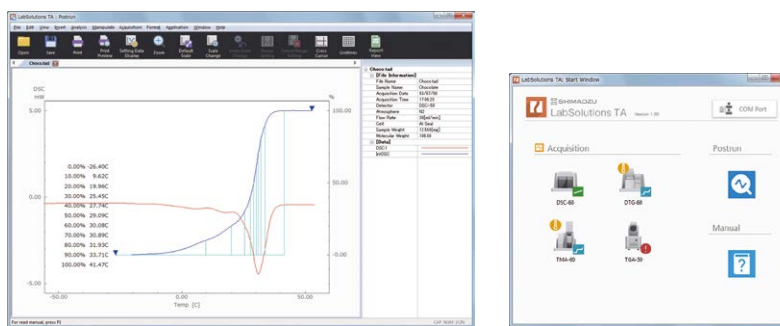


This analyzer can handle a wide variety of samples and measurement methods and a large temperature range to perform thorough measurement of the mechanical properties of materials. A high-precision digital sensor allows displacement measurement with a low drift in a wide range.

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	8 dia. × 20 mm, 5 × 1 × 20 mm (60 type)

Brochure No. C160-E006

Workstation Software for Thermal Analyzers  
**LabSolutions TA**



Features an updated design and extensive immediately understandable functionality. Consequently, the entire series of operations, from measurement to data analysis and outputting reports, can be performed intuitively. Compatible with LabSolutions networks.

**Convenient Operability**

Large icons for frequently used functions are arranged above graphs. Mouse wheel and dragging operations can be used to easily scroll vertically/horizontally or enlarge/reduce the graph.

**Improved Productivity**

Corrections and data analysis can be performed automatically using the template function. If specified before taking measurements using the acquisition program, data analysis and report preparation can be performed automatically.

**Improved Data Reliability**

Sophisticated security and user management functionality are provided to ensure data reliability and enable compliance with FDA 21 CFR Part 11, PIC/S GMP, and other ER/ES regulations.

Brochure No. C160-E006

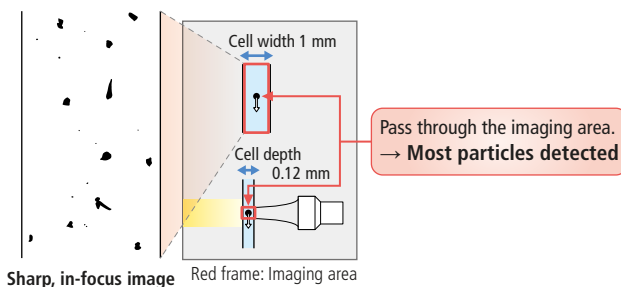
Dynamic Particle Image Analysis System

# iSpect DIA-10

The iSpect DIA-10 combines the particle measurement and image analysis technology that Shimadzu has developed over many years, and can perform particle image analysis, particle shape analysis, particle size distribution measurement, foreign matter detection, and number concentration measurement in as little as 2 minutes with one measurement. Offers functions such as particle counting, particle size measurement, and particle shape measurement in a single system.

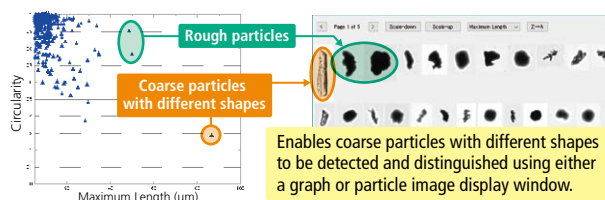
**Microcell Method Improves Image Acquisition Efficiency**

The microcell method, which increases image acquisition efficiency by passing particles through a narrow imaging area, results in fewer particles passing outside the imaging area (outside the area toward the left or right) and less blurring than the conventional method. Because most particles can be observed, it enables highly reliable particle detection and provides highly reproducible particle count concentration values.



**Detection of Coarse Particles in LIB Cathode Material**

This is an example of measuring powder used in LIB cathode material. It shows the system is able to detect trace quantities of coarse particles in the powder material, which can prevent decreased lithium-ion battery performance and safety.

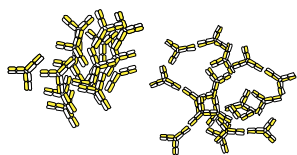


Particle size measurement range	5 to 100 µm
Particle count concentration reproducibility	CV ≤ 5 %
Measurement items	Equivalent circular area diameter, equivalent circular perimeter diameter, maximum length, length perpendicular to maximum length, vertical Feret diameter, horizontal Feret diameter, particle perimeter, envelope perimeter, circularity, aspect ratio, horizontal rectangular envelope aspect ratio, particle area, and mean brightness

Brochure No. C060-E016

Chromatography Systems  
Mass Spectrometry Systems  
Life Science Lab Systems  
Spectroscopy 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

Brochure No. C060-E010

## 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

Brochure No. C060-E009

## Laser Diffraction Particle Size Analyzer SALD-2300

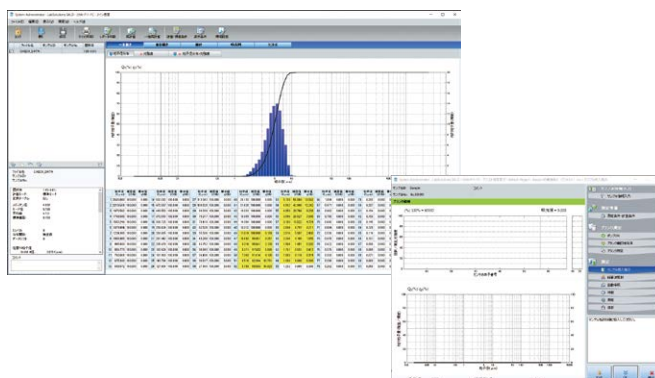


The new standard in the SALD series. While maintaining continuity and compatibility with respect to the data of the SALD-2000/2100/2200, which were popular, widely distributed models, this instrument is equipped with many new functions useful for evaluating changes (dispersion, aggregation, dissolution) 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

Brochure No. C060-E007

## Software for SALD-2300 LabSolutions SALD



LabSolutions SALD is dedicated software of LabSolutions Manager DB/CS. The SALD-2300 laser diffraction particle size analyzer is now compatible with data integrity requirements. Connecting LabSolutions SALD to the LabSolutions system, with its proven compatibility with ER/ES regulations, enables confident, reliable data management. In addition to SALD data, consolidated management is available for LC, GC, and UV data.

Brochure No. C060-E017



## Analytical Balances

## AP Series



AP225W-AD

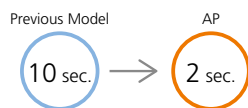
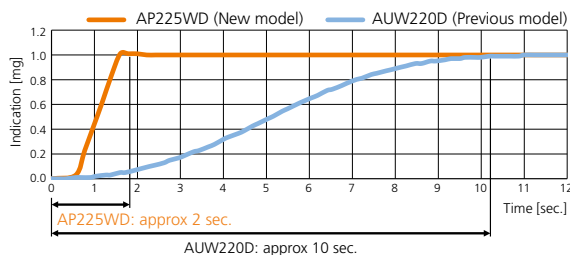


Movies &gt;

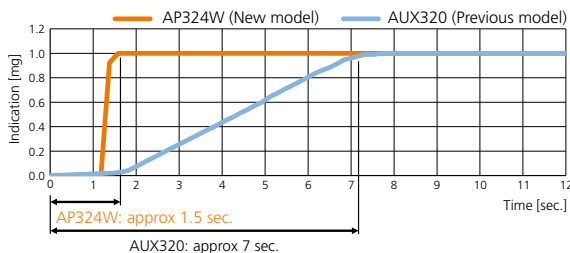
## Fast Response with UniBloc AP Technology

The response time is reduced to about 1/5 the time of previous models.

■ Response During Trace Measurements with the 0.01 mg Model  
(Equivalent to 1 mg / With Conditions Set by Shimadzu)



■ Response During Trace Measurements with the 0.1 mg Model  
(Equivalent to 1 mg / With Conditions Set by Shimadzu)

AP W-AD Series  
with Automatic Door

Provides High-Speed Response and High Stability  
New automatic door functionality makes weighing operations even more convenient

## Smart Automatic Door\* Improves Work Efficiency

The AP W-AD series features automatic doors. That means operators can continue working without setting down samples or spatulas, which can help shorten overall measurement times.

## Touchless Sensors\* Enable Hygienic Operation

It enables non-contact weighing operations without touching any operating keys. With the multi-function mode setting specified, a total of four different functions can be executed depending on how long hands are held over the left and right touchless sensors. That is perfect for ensuring safety by not contacting the unit when handling toxic substances and enables the balance to be operated smoothly while wearing gloves.



Checking the status of function settings by holding hands over both touchless sensors

## Equipped Standard with a STABLO-AP Ionizer\*

This ionizer eliminates the influence of static electricity to achieve reliable measurements without requiring tedious steps.

## W-AD Series (with built-in calibration weight)

Model	Capacity	Minimum Display
AP135W-AD	135 g	0.01 mg
AP225W-AD	220 g	0.01 mg
AP125WD-AD	120 g/52 g	0.1 mg/0.01 mg
AP225WD-AD	220 g/102 g	0.1 mg/0.01 mg
AP224W-AD	220 g	0.1 mg
AP324W-AD	320 g	0.1 mg

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

Model	Capacity	Minimum Display
AP135W	135 g	0.01 mg
AP225W	220 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

## 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

## Y Series

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

Brochure No. C054-E078

\* Smart Automatic Door, Touchless Sensors and equipped standard with a STABLO-AP Ionizer are only available in the AP W-AD series.

## 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.

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
AUW120	120 g	0.1 mg
AUW220	220 g	0.1 mg
AUW320	320 g	0.1 mg
AUX120	120 g	0.1 mg
AUX220	220 g	0.1 mg
AUX320	320 g	0.1 mg
AUY120	120 g	0.1 mg
AUY220	220 g	0.1 mg

Brochure No. C054-E032

## Analytical Balances

## AT-R Series



Even though they are low-cost models, the AT-R Series equipped with the same "UniBloc" technology found in high-end models. They feature highly stable performance, and are capable of highly reliable weight measurements even with extended use. Also equipped with a "smart setting" that can freely switch between responsiveness and stability during measurement, and two interfaces, RS-232C and USB device. The connectivity of external devices such as PCs has been further improved.

Model	Capacity	Minimum Display
ATX84R	82 g	0.1 mg
ATX124R	120 g	0.1 mg
ATX224R	220 g	0.1 mg
ATX324R	320 g	0.1 mg
ATY64R	62 g	0.1 mg
ATY124R	120 g	0.1 mg
ATY224R	220 g	0.1 mg
ATY324R	320 g	0.1 mg

Brochure No. C054-E032

## Electronic Balances

## UP Series

This is a top-loading balance with the world's fastest class reaction speed. With a cutting-edge digital control technology, their response time when measuring trace quantities has been shortened to approximately 1 second (1/9 of the conventional level), and it greatly increases the weighing operation efficiency. In addition, it uses a highly durable weight sensor "UniBlock" that has passed 1 million endurance tests (10 times the test standard under the Measurement Act), making it safe to use in various weighing situations. Models with a capacity of 2200 g or more are equipped with a newly designed "UP-Wind Break" as standard to reduce the effects of wind from air conditioners, etc. In addition, by attaching an optional animal bucket set and setting the main body to animal measurement mode, it can be used as an animal balance.



UP6202X



Bucket for small animals

## UP-X Series (with built-in calibration weight)

Model	Capacity	Minimum Display
UP223X	220 g	0.001 g
UP423X	420 g	0.001 g
UP623X	620 g	0.001 g
UP823X	820 g	0.001 g
UP1023X	1,020 g	0.001 g
UP2202X	2,200 g	0.01 g
UP4202X	4,200 g	0.01 g
UP6202X	6,200 g	0.01 g
UP422X	420 g	0.01 g
UP822X	820 g	0.01 g
UP4201X	4,200 g	0.1 g
UP8201X	8,200 g	0.1 g

## UP-Y Series

Model	Capacity	Minimum Display
UP223Y	220 g	0.001 g
UP423Y	420 g	0.001 g
UP623Y	620 g	0.001 g
UP823Y	820 g	0.001 g
UP1023Y	1,020 g	0.001 g
UP2202Y	2,200 g	0.01 g
UP4202Y	4,200 g	0.01 g
UP6202Y	6,200 g	0.01 g
UP422Y	420 g	0.01 g
UP822Y	820 g	0.01 g
UP4201Y	4,200 g	0.1 g
UP8201Y	8,200 g	0.1 g

Brochure No. C054-E076

## Electronic Balances

## TW-N/TX-N/TXB Series



TW-N/TX-N Series



TXB Series

One-touch operation enables easy adjustments for optimum stability. The product has various functions, including an Expanded Piece Counting function, Illuminated display, anti-theft options, and more.

Model	Capacity	Minimum display	Built-in calibration weight
TW223N	220 g	0.001 g	•
TW323N	320 g	0.001 g	•
TW423N	420 g	0.001 g	•
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	
TXB422L	420 g	0.01 g	
TXB622L	620 g	0.01 g	
TXB4201L	4,200 g	0.1 g	
TXB6201L	6,200 g	0.1 g	

Brochure No. C054-E032

## Precision Platform Balances

## BW-K/BX-K Series



Animal Balances

The BW-K/BX-K series are capable of measuring heavy objects and can be suspended for measurement by attaching optional hardware. Can be used as an animal balance by attaching a small plate or medium plate.

Model	Capacity	Minimum display	Built-in calibration weight
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	

Brochure No. C054-E032

## 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

Brochure No. C054-E067

## Electronic Moisture Balance

## MOC-120H



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%

Brochure No. C054-E053

## Static Remover (Ionizer)

## STABLO-AP



A high-voltage alternating current corona discharge is used to quickly remove static charge without wind within one second. Using an alternating current allows equal quantities of positive and negative ions to be emitted from a single probe. That means ionized samples can be kept electrostatically stable for long periods without applying an opposite charge. Because no wind is necessary for ion emission, there is no risk of scattering powder samples. It can be secured in a stand that is included standard, freely carried in a hand, or installed in an AP series analytical balance.

Static removal range	Approx. 50 to 400 mm from discharge electrode
Ozone concentration	0.06 ppm or less (at 150 mm from the outlet)
Weight	Approx. 710 g (Main unit: Approx. 395 g, Stand: Approx. 315 g)

Brochure No. C054-E032



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