

Liquid Chromatograph Mass Spectrometer

LCMS-8050

UFMS
ULTRA FAST MASS SPECTROMETRY



Speed and



Sensitivity Beyond Comparison

Continuing the evolution of Shimadzu's UF technology, Shimadzu introduces the LCMS-8050 triple quadrupole mass spectrometer, offering unparalleled measurement speeds and high-sensitivity performance.

High-sensitivity quantitation delivered at high speed
Multi-component analysis performed more rapidly
Simultaneous qualitative and quantitative analyses

The high performance of the LCMS-8050 defies expectations, redefining high-sensitivity, high-speed analysis.



Experience a New Realm of High-Sensitivity & High-Speed Performance



UFsensitivity

Combining Speed and High Sensitivity

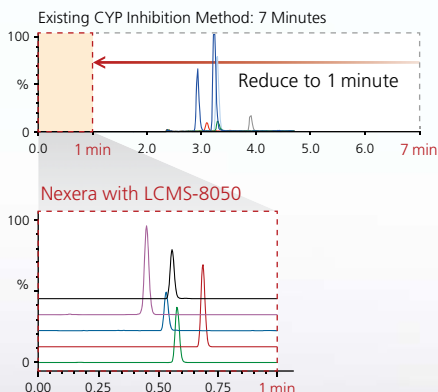
UFswitching

■ High-Sensitivity & High-Speed Positive/Negative Ionization Switching in 5 msec

Just One Minute per Analysis

A Case Study Using High-Speed Positive/Negative Ionization Switching

When performing simultaneous positive/negative ion measurements of multiple components, the proper acquisition of sharp UHPLC peaks depends on rapid polarity switching. The LCMS-8050 minimizes losses due to polarity switching and ensures the collection of sufficient data points for even the narrow peaks obtained with UHPLC, recording accurate peak shapes and allowing excellent reproducibility.



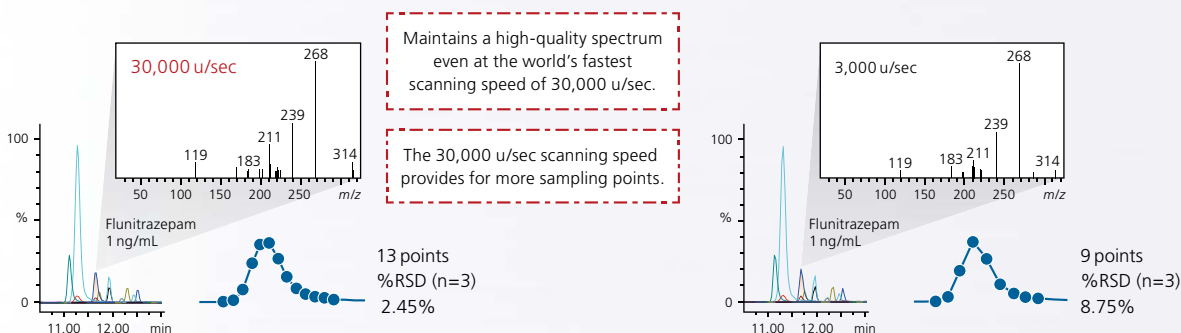
- Easily obtains over 20 points per peak with UHPLC.
- Achieves excellent reproducibility even at the lowest calibration level.
- Features a wider dynamic range than other available triple quads.

Compound	Polarity	Legacy HPLC Method 7 min			Nexera with LCMS-8050 1 min		
		Dynamic range (nmol/L)	Points/peak	%RSD 0.6 nmol/L (n=4)	Dynamic range (nmol/L)	Points/peak	%RSD 0.6 nmol/L (n=4)
Resorufin	+	0.6-300	19	4.66	0.6-1000	21	4.30
1'-Hydroxy Bufuralol	+	0.6-300	21	2.39	0.6-1000	24	1.82
(+/-)-4'-Hydroxy Mephenytoin	+	0.6-300	20	2.75	0.6-1000	23	2.18
Oxidized Nifedipine	+	0.6-300	19	5.58	0.6-1000	23	5.07
Hydroxy Tolbutamide	-	0.6-300	20	5.68	0.6-1000	23	2.96

UFscanning ■ High-Sensitivity & High-Speed Scanning at 30,000 u/sec

Simultaneous Quantitative and Qualitative Analysis Simultaneous High-Speed Screening of 12 Toxicological Drugs

The LCMS-8050 is capable of simultaneously obtaining both qualitative and quantitative information in a single analysis. Acquisition occurs so rapidly that MS/MS scans and MRM measurements can be performed concurrently while maintaining quantitative accuracy. MS/MS scans are usable and reliable because even at 30,000 u/sec, Shimadzu uses a 0.1 u scan step.

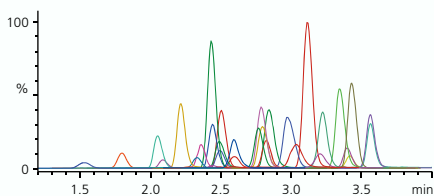


MRM Triggered Product Ion Scanning of a Mixture of 12 Benzodiazepines (1 ng/mL each)

UF-MRM ■ High-Sensitivity & High-Speed MRM at 555 ch/sec

Detect Target Compounds at Trace-Level Concentrations Simultaneous Analysis of 29 Pesticides for Water Quality Analysis

The LCMS-8050 is capable of simultaneously acquiring 555 MRM transitions per second while maintaining accuracy and precision. Sufficient data points can be collected for quantitation ions, reference ions, and internal standard ions even in chromatographic regions with unresolved peaks. The high sensitivity of the LCMS-8050 allows for trace-level analysis, such as pesticides in drinking water, without the need for sample pre-concentration. This high sensitivity is maintained even when monitoring numerous MRM channels.



MRM Chromatogram of 29 Pesticides for Water Quality Analysis (100 pg/mL each)

LCMS-8050 has achieved LOQs that fulfill the 1/100 target value without sample pre-concentration.

No.	Compound	LOQ pg/mL	1/100 of target pg/mL*	No.	Compound	LOQ pg/mL	1/100 of target pg/mL*
1	Thiuram	2.0	200	16	MPP oxon sulfoxide	4.2	10
2	Bentazone	3.9	2000	17	MPP oxon sulfone	5.7	10
3	Carbofuran	1.6	50	18	Dymron	0.65	8000
4	2,4-D	46.7	300	19	Methomyl	2.3	300
5	Triclopyr	45.3	60	20	Probenazole	5.2	500
6	Iprodione	1.7	3000	21	Diuron (DCMU)	0.7	200
7	Asulam	2.3	2000	22	Bensulfuron-methyl	4.4	4000
8	Bensulide	4.8	1000	23	Tricyclazole	2.7	800
9	Mecoprop (MCPP)	6.1	50	24	Azoxystrobin	2.7	5000
10	Carbaryl (NAC)	2.3	500	25	Halosulfuron-methyl	0.52	3000
11	Carpropamid	1.3	400	26	Flazasulfuron	0.47	300
12	Fenthion (MPP)	3.1	10	27	Thiodicarb	3.4	800
13	MPP sulfoxide	1.7	10	28	Siduron	0.82	3000
14	MPP sulfone	5.1	10	29	Fipronil	4.7	5
15	MPP oxon	4.9	10				

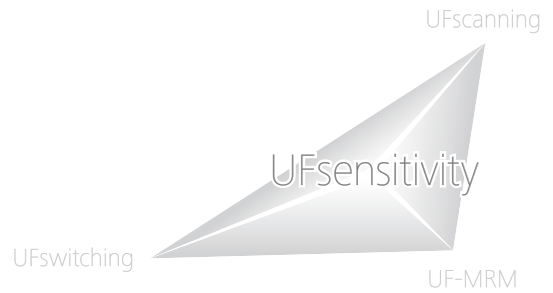
*Note: Official analytical methods require detection to 1/100th of regulatory targets.



UFsensitivity

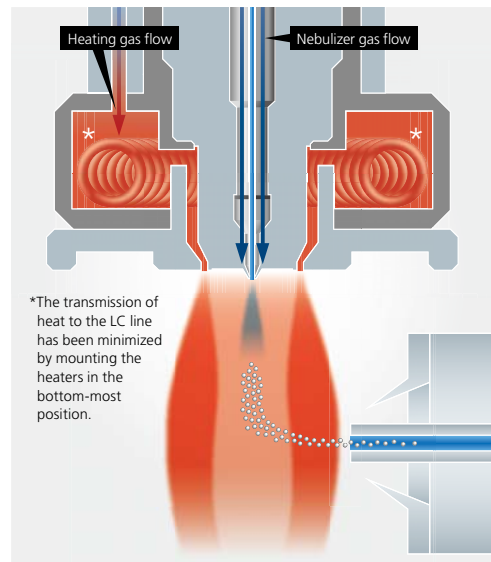
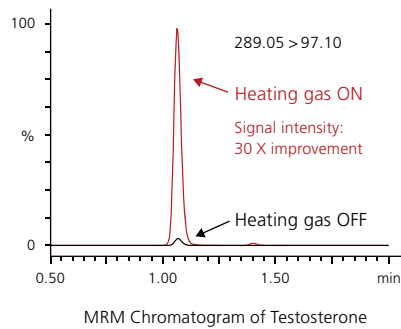
High Sensitivity for Trace Quantitative Analysis

Scientists who demand trace-level quantitation will benefit from a newly designed heated ESI probe and a new high-efficiency CID cell, the UFsweeper III. These technological improvements combined with Shimadzu's patented ion optics system deliver durable high-sensitivity performance.



■ Heated ESI Probe

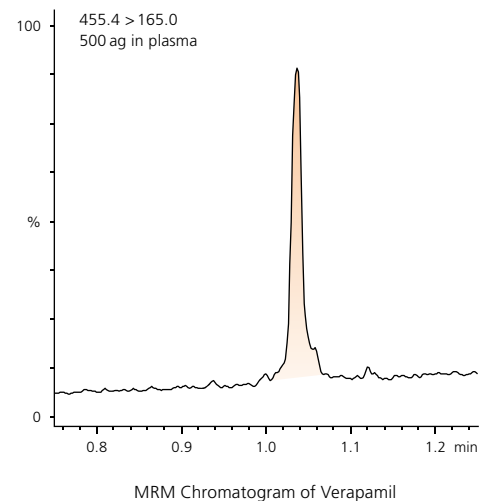
In order to improve desolvation efficiency, the newly developed heated ESI probe combines a high-temperature gas with the nebulizer spray, assisting in the desolvation of large droplets and facilitating ionization. This development allows for high-sensitivity analysis of a wide range of target compounds.



■ Excellent Reproducibility Even at Attogram (ag) Levels

Both sensitivity and reproducibility are essential when establishing low limits of quantitation. High-precision quantitative results obtained with the LCMS-8050 in the analysis of Verapamil in blood plasma at levels between 500 ag and 50 pg are shown below. Excellent reproducibility with a % RSD of 2.77 % was obtained when analyzing just 500 ag of Verapamil. The LCMS-8050 demonstrates optimal performance for quantitative analysis of even trace components of a complex matrix.

Concentration actual ng/mL	Calculated concentration ng/mL	% RSD (n = 6)	Accuracy (%) (n = 6)
0.000500	0.000501	2.77	100.2
0.00500	0.00496	3.98	99.2
0.0500	0.0506	1.21	101.2
0.500	0.493	1.31	98.6
5.00	4.89	1.81	97.8
50.0	51.6	0.65	103.2

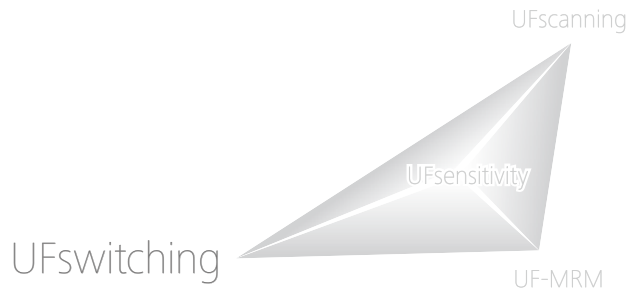




UFswitching

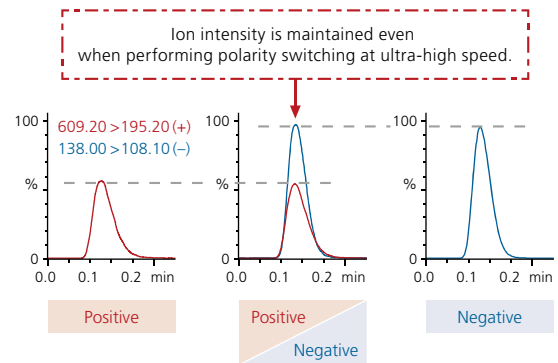
Polarity Switching Technology with No Compromise in Quality or Sensitivity

Ultra-high speed positive/negative ionization switching technology [UFswitching] maintains constant quality and sensitivity with no loss of quantitative accuracy. Laboratories can now use a single method for both positive and negative ions, increasing sample throughput and saving method development time.



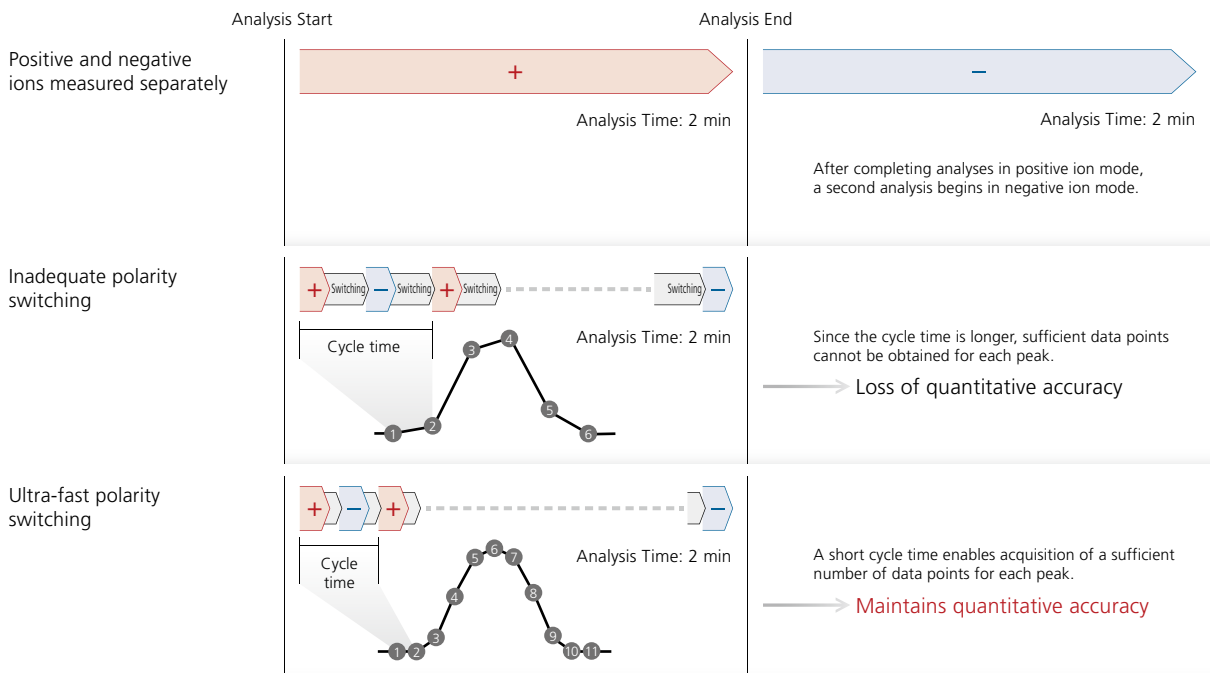
■ Only 5 msec to Achieve Stable Quantitative Accuracy with Positive/Negative Ionization Switching

The LCMS-8050 uses unique high-voltage power supply technology to achieve an ultra-high-speed positive/negative ionization switching time of just 5 msec. The LCMS-8050 is also the only instrument of its type to maintain ion intensity even when performing polarity switching at ultra-high speed, yielding consistent, reproducible data. Excellent quantitative results can be obtained from UHPLC peaks no more than 2-3 seconds wide, even when multiple components are eluted simultaneously.



Comparison of measurement using the ultra-fast polarity switching (5 msec) and individual measurement of positive and negative ions.

■ Outstanding Throughput and Quantitative Accuracy

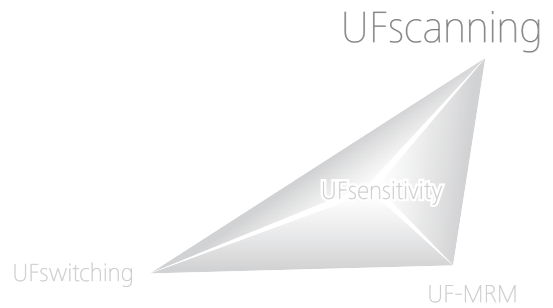




UFscanning

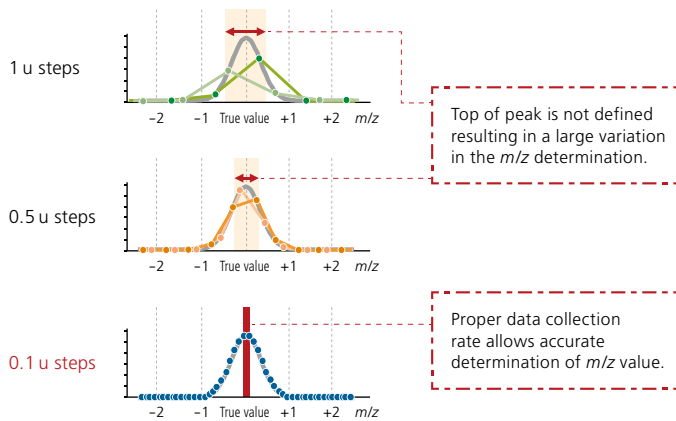
Simultaneous, Highly Reliable Quantitative and Qualitative Analysis

Employing ultra-high-speed scan technology [UFscanning], the LCMS-8050 maintains spectrum quality at any scan speed. Perform quantitative and qualitative analysis simultaneously with a high-speed scan rate of 30,000 u/sec.

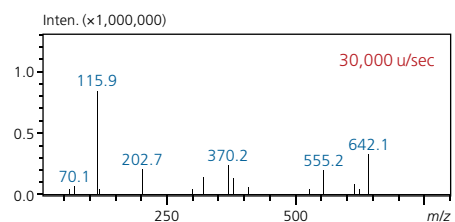
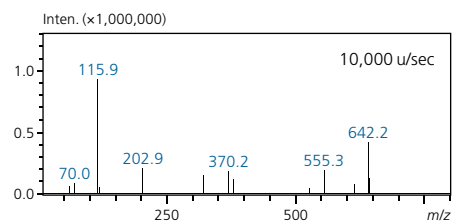
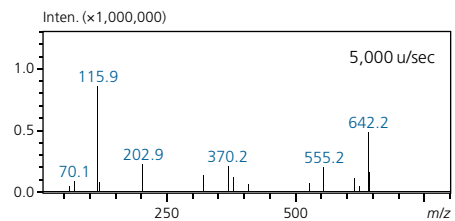


■ Maintain Sensitivity and Mass Accuracy Even at 30,000 u/sec

By controlling the voltage applied to the quadrupoles according to scan speed and m/z , the LCMS-8050 achieves superior ion transmission at any scan speed. And because Shimadzu maintains data collection at 0.1 u intervals, high-quality mass spectra are obtained without loss of sensitivity or mass accuracy.



Variation in m/z Caused by Different Sampling Intervals for Spectral Data



Bradykinin (MW 756.4) Product Ion Scan Spectrum
Precursor Ion m/z 379.4

■ Efficient Qualitative Analysis Using Synchronized Survey Scan

The Synchronized Survey Scan (SSS) function allows MRM acquisition to be combined with a variety of other scan modes. It is extremely useful for obtaining more detailed qualitative information on components detected during multi-analyte quantitative acquisition.

One thousand events can be registered within a single method. It allows setting of optimum collision energies for each component in order to obtain only the required qualitative information.

Type	Event#	+/-	Compound Name	m/z	Time (6.647 min - 14.137 min)
MRM	1	+	zolpidem M-1	338.15>265.10	
- Product Ion Scan	2	+	zolpidem M-1	100.00 > 50.00/340.00	
MRM	3	+	7-aminofluzepam	282.10>121.05	
- Product Ion Scan	4	+	7-aminofluzepam	100.00 > 50.00/260.00	
MRM	5	+	7-aminoclonazepam	286.05>121.20	
- Product Ion Scan	6	+	7-aminoclonazepam	100.00 > 50.00/290.00	
MRM	7	+	N-desmethylzopiclone	316.20>245.10	
- Product Ion Scan	8	+	N-desmethylzopiclone	100.00 > 50.00/380.00	
MRM	9	+	7-aminofluzepam	284.10>135.10	
- Product Ion Scan	10	+	7-aminofluzepam	100.00 > 50.00/290.00	

An Example Method for Performing an MRM-Triggered Product Ion Scan

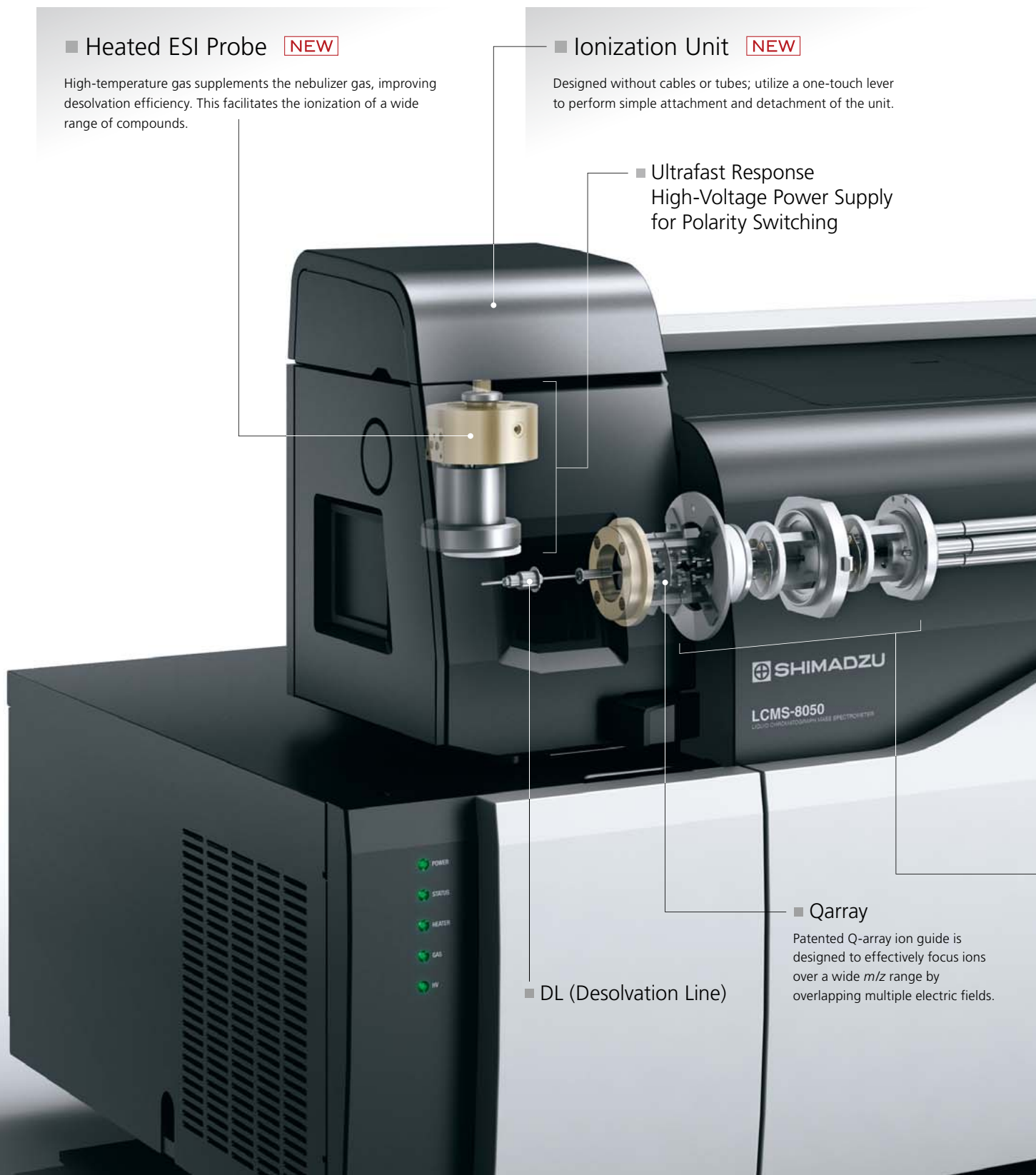
UF Technologies Combine Sensitivity and High Speed

The LCMS-8050 combines the following technologies to ensure highly sensitive, high-speed performance:

[UFsensitivity] achieves high-sensitivity performance utilizing a new heated ESI probe and new UFsweeper III collision cell.

[UFswitching] high-speed positive/negative ionization switching and high-speed MRM [UF-MRM] maintain data quality and sensitivity.

[UFscanning] high-speed scan rate obtains high-quality mass spectra, even during high-speed analysis.



■ Heated ESI Probe **NEW**

High-temperature gas supplements the nebulizer gas, improving desolvation efficiency. This facilitates the ionization of a wide range of compounds.

■ Ionization Unit **NEW**

Designed without cables or tubes; utilize a one-touch lever to perform simple attachment and detachment of the unit.

■ Ultrafast Response High-Voltage Power Supply for Polarity Switching

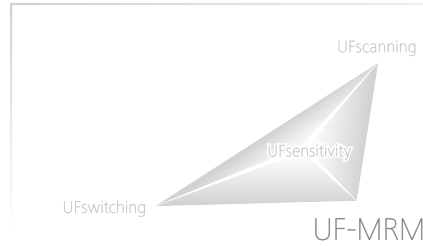
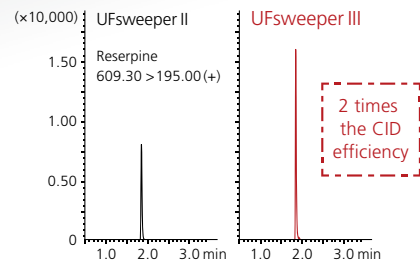
■ DL (Desolvation Line)

■ Qarray

Patented Q-array ion guide is designed to effectively focus ions over a wide m/z range by overlapping multiple electric fields.

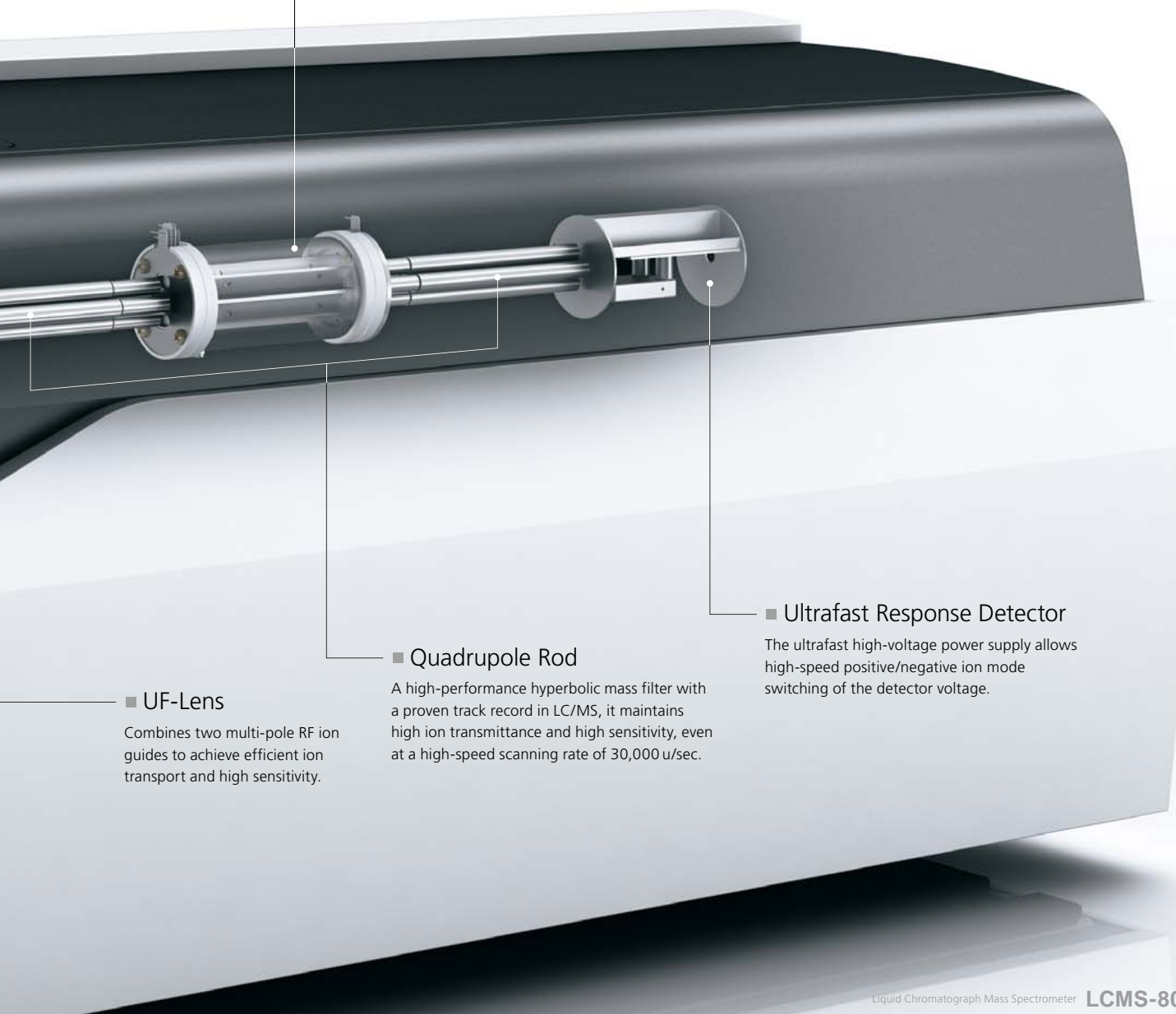
■ UFsweeper III Collision Cell **NEW**

A high-sensitivity, high-speed collision cell, the proprietary UFsweeper III accelerates ions out of the collision cell without loss of momentum. Achieving fast sweeping on successive scans, it offers twice the CID efficiency of UFsweeper II, maintains signal intensity, and suppresses crosstalk, even for high-speed or simultaneous multi-component analysis.



UF-MRM

UFsweeper III high-speed ion transport technology minimizes ion loss even at a dwell time of 0.8 msec. High-speed MRM transitions up to 555 ch/sec accelerate laboratory throughput for simultaneous multi-component analyses.



■ UF-Lens

Combines two multi-pole RF ion guides to achieve efficient ion transport and high sensitivity.

■ Quadrupole Rod

A high-performance hyperbolic mass filter with a proven track record in LC/MS, it maintains high ion transmittance and high sensitivity, even at a high-speed scanning rate of 30,000 u/sec.

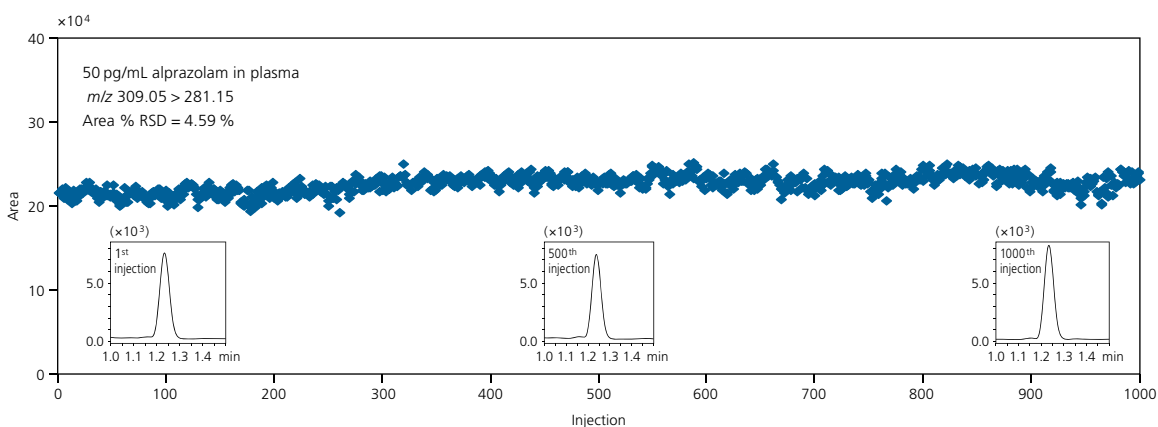
■ Ultrafast Response Detector

The ultrafast high-voltage power supply allows high-speed positive/negative ion mode switching of the detector voltage.

Engineered for Robustness and Easy Operation/Maintenance

■ Maintains High Sensitivity Even During Successive Demanding Analyses

In addition to speed and sensitivity, Shimadzu designed the LCMS-8050 for robustness to meet the most demanding laboratory requirements and most difficult matrices. The figure below plots the area results from 1000 consecutive analyses of a deproteinized blood plasma sample spiked with alprazolam. The LCMS-8050 achieves excellent reproducibility with a 4.59 % RSD for the area results over the 1000 analyses.



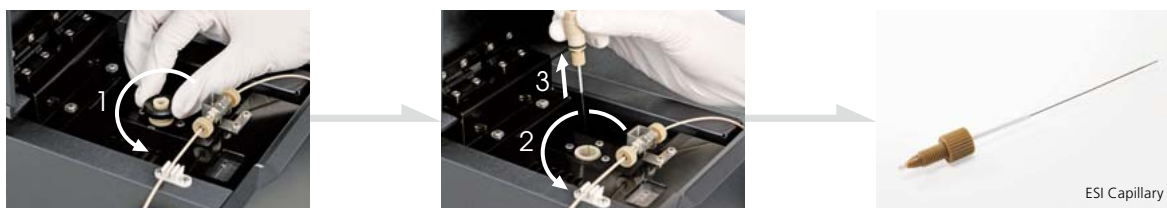
■ Easy System Maintenance Reduces Downtime

As with Shimadzu's other triple quad systems, maintaining the LCMS-8050 is simple. Replacing the desolvation line (DL) and ESI capillary is quick and easy. Additionally, the design allows users to replace the DL without breaking vacuum, providing greater uptime and usability.

● Steps for DL Replacement



● Steps for ESI Capillary Replacement



■ Newly Designed Ionization Unit

Designed without cables or tubes, removing the new ionization unit is simple: release a one-touch lever to open the unit and lift it out. In addition, no tools are needed to detach the needles fitted in APCI and DUIS units, allowing for easy maintenance.



ESI-8050 (standard)



APCI-8050 (optional)



DUIS-8050 (optional)



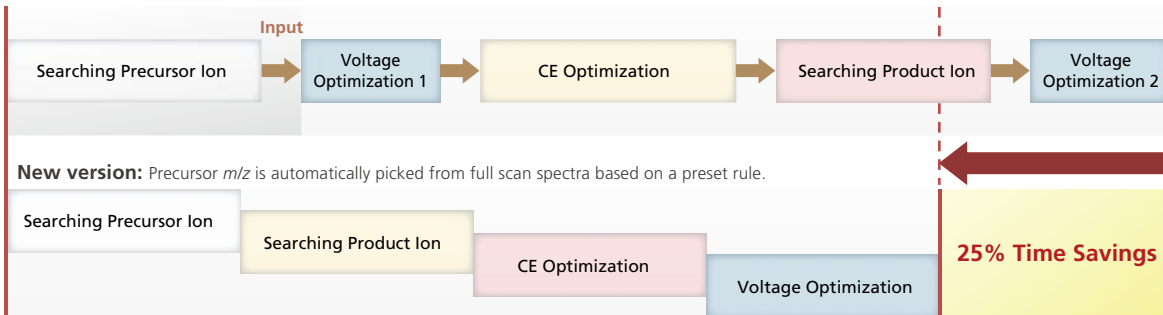
LabSolutions LCMS

Shimadzu's data acquisition software provides a single point of control for LC and MS parameters. In addition, by incorporating critical input from customers, Shimadzu provides laboratories with software tools to address specific laboratory workflows and improve productivity.

■ Fully Automated MRM Optimization

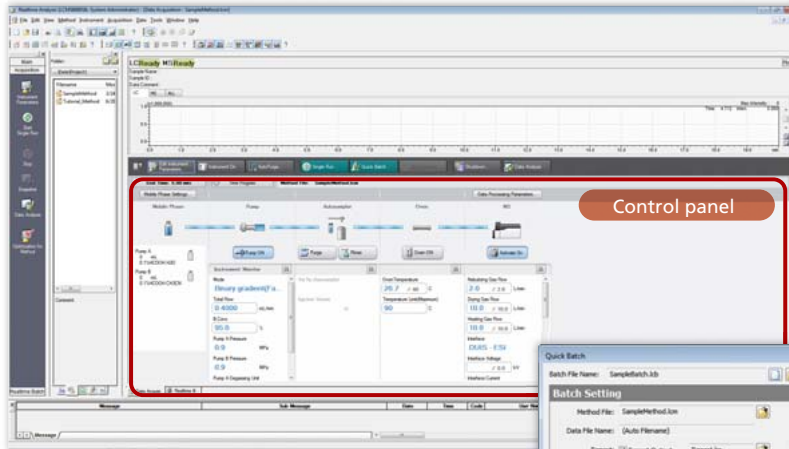
It's faster and easier to optimize quantitative parameters with updated software that reduces MRM optimization time by 25%.

Previous version: Before starting voltage optimization, precursor m/z must be input.



■ Intuitive User Interface

A new approach helps simplify the user experience for high-throughput laboratories. Quick batch makes it easier to perform routine LC/MS/MS analyses and changes to the Control Panel help method development.



Method development

An updated Control Panel makes it easier to change LC/MS/MS methods.

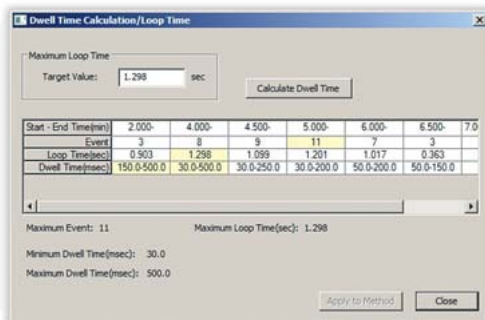
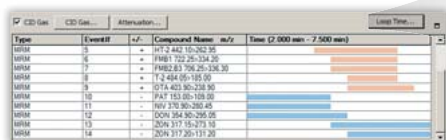
Quick Batch

Streamlines sample submission. A simple color-coded autosampler graphic offers quick visualization of the sample queue. Three color codes have been designed for standards (sky blue), unknowns (purple) and controls (yellow).



Automatic Calculation of Dwell Time

The optimum dwell time is calculated automatically from the number of overlapping MRM channels and maximum loop time, thereby obtaining the necessary data points for the entire analysis.



Optional Software Programs

Shimadzu offers numerous options to address specific customer requirements. Combining LabSolutions LCMS with these programs improves workflow efficiency.

LC/MS/MS Method Packages and MRM Libraries

A variety of method packages and MRM libraries, which include analysis conditions such as MRM parameters, enable efficient implementation of simultaneous multi-component analyses. The method parameter list included in these packages can be used to create methods that analyze targeted components only. These packages can save laboratories a great deal of method development time.

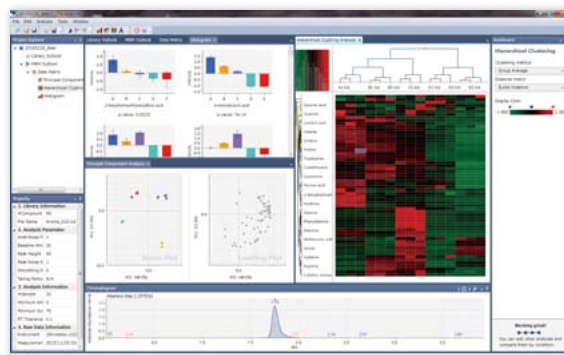


	Description	Flyer code
Method Packages	Residual Pesticides	C146-E160
	Veterinary Drugs	C146-E161
	Water Quality Analysis	C146-E180
	Drugs of Abuse	C146-E181
	Rapid Toxicology Screening	C146-E224
	Primary Metabolites	C146-E227
	Lipid Mediators	C146-E225
MRM Libraries	Cell Culture Profiling	C146-E279
	Metabolic Enzymes in Yeast	C146-E275
	Phospholipid Profiling	C146-E314

Note: Optimization of analysis parameters will be necessary in some cases when using the LCMS-8050.

Traverse MS

Multivariate Analysis Software Supports MRM Data
Traverse MS data analysis software is intended for high-speed processing of MRM data acquired with Shimadzu triple quadrupole LCMS systems in the field of targeted metabolomics. Using multiple samples and multiple components, the software is able to create graphical and statistical analysis for metabolic pathway analysis.



Brochure: C146-E308

Multi-analyte Quantitation Software

LabSolutions Insight

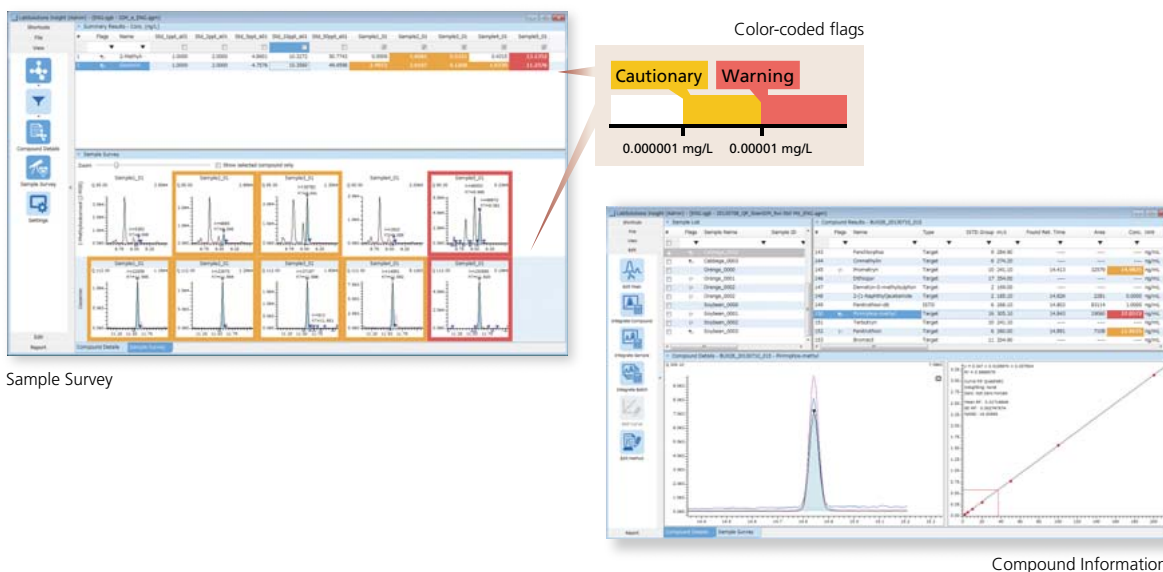
Laboratory efficiency is driven by highly automated mass spectrometry platforms delivering large volumes of high quality data and yet manual data review can limit sample turnaround times and reduce productivity. LabSolutions Insight has been designed to drastically simplify the review process and transforms data processing.

■ Multi-Analyte Data Review

Results can be re-integrated and re-quantified directly from LabSolutions Insight.

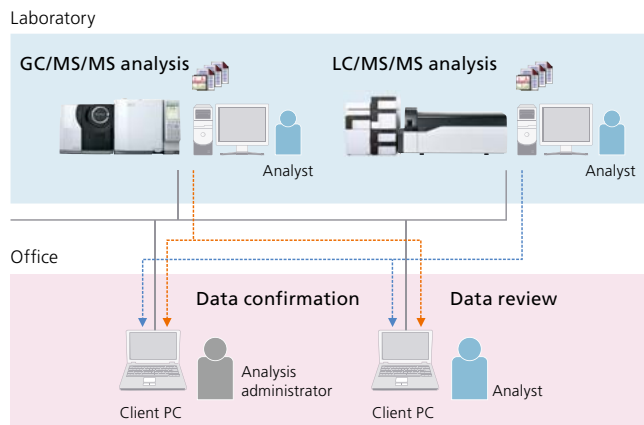
■ Color-coded QA/QC Flags

In LabSolutions Insight, quantitative results can be compared to established criteria, and any outliers are color-coded for easy identification and further review. Color-coded criteria levels can be defined, making it easy to determine which data points are outliers, and which specific QC criteria were not met. Any changes made to calibration curves or manual peak integration are immediately reflected in the color-coded flags.



■ Multiple Workspaces

Insight supports data review over a network creating new opportunities in remote data review and enables multiple pane display for 2 monitors.



Nexera UHPLC

Our unique approach to delivering high-quality, high-speed LC/MS/MS analysis is combining the Nexera UHPLC and LCMS-8050 as a seamlessly integrated system.



Key elements of Nexera and LCMS-8050 performance to maximize your productivity

Nexera

- The fastest gradient cycle and sample injection time
- Eliminates carryover even with high sensitive LC/MS/MS
- Solvent blending, and sample preparation are possible

LCMS-8050

- 0.8 msec dwell time and 1 msec pause time
- 5 msec polarity switching speed
- No signal loss even at lower dwell time by UFsweeper technology

■ Nexera X2



Brochure: C196-E079

■ Nexera XR



Brochure: C196-E082

■ Nexera MP



Brochure: C193-E030

■ Nexera-i



Brochure: C196-E084

■ Nexera UC On-line SFE-SFC-MS System

It is a revolutionary system that combines on-line SFE and SFC in a single flow path. Target compounds are extracted from solid samples and then automatically transferred to SFC/MS so that no human intervention is required. The Nexera UC on-line SFE-SFC system reduces the time for pretreatment of samples and acquires highly accurate data.



Brochure: C190-E185



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