

Nexera

Ultra High Performance Liquid Chromatograph

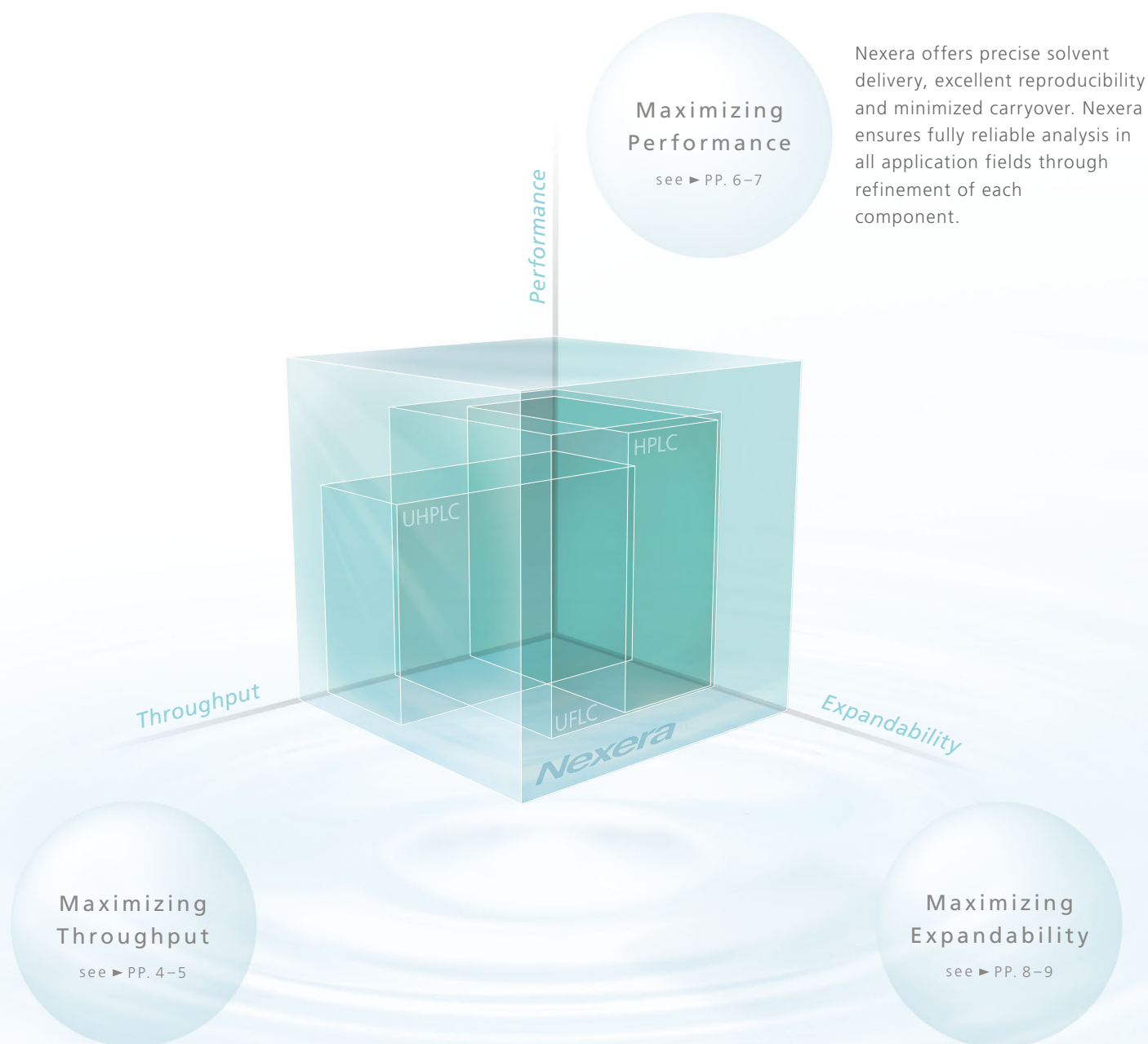


The Only No Compromise

Best UHPLC for the Next Era

Nexera is revealed as the next generation Shimadzu LC, achieving a new greater level of performance.

Nexera hardware meets all analysis requirements: conventional / high speed / ultra-high speed / high resolution / high temperature, with no compromise in data integrity.



With a pressure range up to 130 MPa, high-speed injection, overlapping injection and highly-efficient gradient mixing, Nexera enables ultra-high speed and ultra-high resolution analysis.

The Nexera column oven, autosampler and the modular flexibility expand the application range. These applications include high temperature analysis, green LC, auto-sample pretreatment and multidimensional LC separation.

UHPLC System



Nexera

Ultra High Performance Liquid Chromatograph



"Each Nexera component has undergone core improvements to achieve unmatched system performance. In an era when a higher standard of performance is expected, Nexera responds to our customers' needs in all analysis fields: conventional / high speed / ultra-high speed / high resolution / high temperature / green LC / multi-dimensional LC. The UHPLC system that meets the needs of a wide range of applications is none other than Nexera."

Maximizing Throughput

What is true high throughput? True high throughput is defined as the total cycle time, which includes not only the data collection time but all the time involved in analysis – sample injection, column equilibration, and autosampler rinsing.

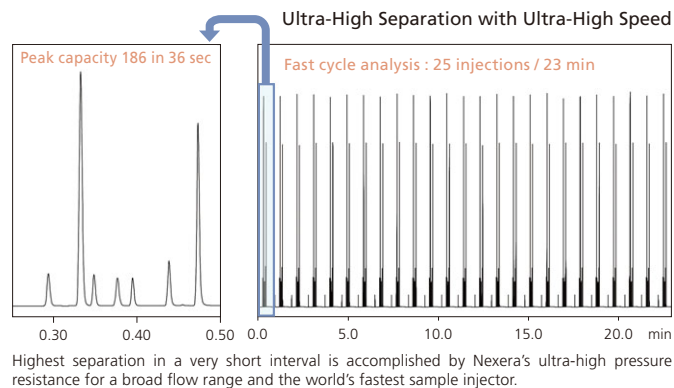


Realize True High Throughput

To achieve true high throughput, each Nexera component has undergone core improvements. The SIL-30AC autosampler is not only the world's fastest sample injector but now includes the function of overlapping injection as standard. A low-volume (20 μ L) efficient mixer and an optional loop injection method configuration absolutely minimize dead volume.

Realize Ultra-High Separation

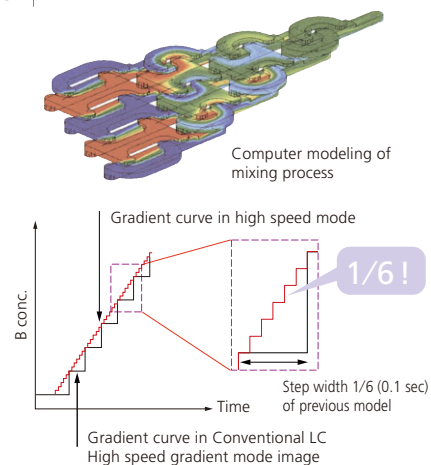
Nexera achieved a perfect balance between the highest separation and highest speed. Ultra-high pressure (up to 130 MPa) fluidic modules can utilize all high separation columns. Nexera facilitates the use of long, small particle columns to analyze trace-level compounds in a complex samples, as well as short columns for high-speed analysis.



Finest Reproducibility under Ultra-High Speed

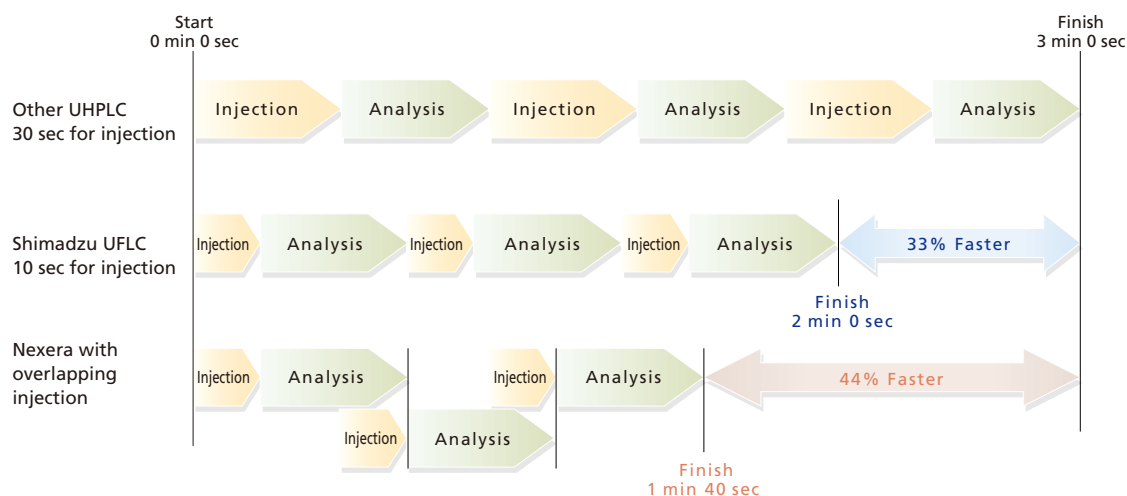
High-throughput analysis still requires precise reproducibility of separation and retention time.

A new mixer (MiRC) conceived from study of micro reactor technologies delivers efficient, low-volume mixing for even the most difficult analysis, such as those using TFA, thereby minimizing gradient delay. A micro volume pre-heater in addition to the overall system configuration further enhances the reduction of delay volume. Moreover, the LC-30AD pump features an automatic pulsation-correction mechanism and a high-speed parallel micro plunger design to provide pulse-free solvent delivery and excellent retention time reproducibility even in ultra-high speed gradient conditions.



Cutting Down the Total Analysis Time

The Prominence UFLC (ultra fast LC) autosampler allows for rapid injection (10 sec). The Nexera builds upon this by providing the fastest injection speed with its patented engineering. In addition, overlapping injection is provided to further reduce total analysis time for the utmost in high-throughput.



Further Minimized System Delay-Volume with Optional Loop Injection Method

The SIL-30AC autosampler can be re-configured to provide the absolute lowest system delay volume by conversion to a loop injector. This configuration is simple and requires only changing a few plumbing connections.

Large Sample Capacity for High Throughput Sample Analysis



New Rack Changer II

Running thousands of analyses per day is not unusual today. In such demanding laboratories the maximum sample number for the unattended operation is as important as the analysis speed. Nexera Rack Changer II accommodates up to 12 sample plates (96well, 384well, vial plates) to allow up to 4608 samples to be continuously analyzed unattended.

Rack Changer II incorporates fine temperature control with a cooling function (4 to 40°C) to minimize sample degradation during the process.

Maximizing Performance

Shimadzu Nexera is a genuine all-around HPLC that enables various types of analysis including conventional LC, ultra fast LC and ultra high-pressure LC up to 130 MPa without compromising performance and data quality. The maximized pressure, minimized delay volume and fast injection enable ultra-high speed cycle time along with maximizing peak capacity. Nexera is useful for a wide variety of applications such as high temperature analysis and green HPLC with its newly designed column oven. The pretreatment autosampler extends the application range for full automation and maximum performance.

Superior Performance for Every Application



The micro plunger-driven precision solvent delivery control can keep up with the demanding flow rate changes required during the rapid concentration shifts in fast gradient programming. Nexera also offers a ultra-low volume mixer based on micro reactor technology and a micro-volume preheater to minimize band broadening in high temperature conditions. The precise solvent delivery control, high-efficient mixer and micro volume preheater combine to ensure accurate and precise chromatography with excellent retention time reproducibility, resulting in secure detection of target compounds in complex matrices.

Precise Sample Injection Regardless of Volume

The SIL-30AC autosampler achieves excellent injection volume reproducibility for even 0.1 µL injections through use of a high-resolution metering system (6 nL/step) and a precision-engineered valve. The autosampler meets reliability requirements in all analyses from micro to conventional.

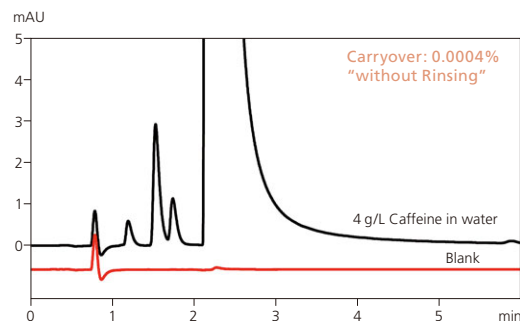
Peak Area Reproducibility

Injection Vol. [µL]	Reproducibility (%RSD, n=6)
0.2	0.281
0.4	0.237
1	0.111
2	0.039
5	0.031
10	0.043
20	0.044

Near-zero Carryover

Shimadzu continues to improve its low carryover reputation with the Nexera autosampler. With reduction of the needle contact area, special coatings, surface treatments and a new needle seal, the SIL-30AC autosampler reaches a new level of low carryover performance.

In addition to minimizing the fundamental causes for compound adsorption, Nexera offers multiple rinse modes with multiple rinse solvents to eliminate carryover of even the most stubborn of compounds. Active rinsing of all contact surfaces can be selected.



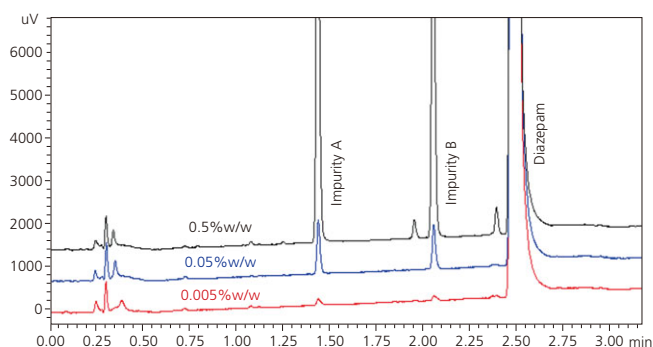
Absorbance Detectors with Excellent Stability and Sensitivity

Trace-level analyses, such as impurities analysis, require a wider dynamic range and lower baseline disturbances. With a temperature-controlled flow cell and a stray-light correction function, both the SPD-20A UV and SPD-M20A Photo Diode Array detectors offer a high level of stability, sensitivity and linearity for confident analysis.

The 100 Hz sampling of the SPD-20A/M20A ensures peak information can be captured without loss of separation and exploits the full potential of ultra-fast LC columns.



SPD-20A



[Analytical Conditions]

Column : ODS (100 mm L. × 2.1 mm I.D., 1.8 μm)
 Mobile phase : A: water B: acetonitrile
 Gradient : B 25%→40% (0.1 min)
 →70% (3.0 min)
 Flow rate : 0.8 mL/min
 Column temp.: 30°C
 Detection : 240 nm

Fluorescence Detectors with World-Leading Sensitivity

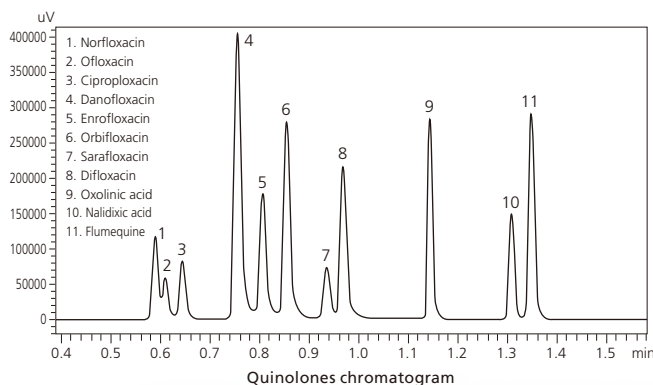
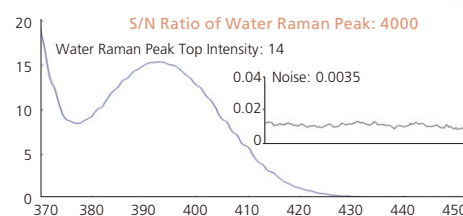
Sensitivity is the most important factor for fluorescence detection. With a newly designed optical system, RF-20A/20Axs offer world-leading levels of sensitivity. A water Raman S/N ratio of at least 2000 for RF-20Axs or 1200 for RF-20A makes these detectors powerful tools for analyses that demand the detection of trace-level components.

RF-20Axs features a temperature-controlled cell with a cooling function. It maintains a constant detector cell temperature, even if the room temperature fluctuates significantly, to ensure superb reproducibility with no drop in sensitivity.

The 100 Hz sampling of the RF-20A/20Axs permits ultra fast LC analysis with no loss of separation.



RF-20A / 20Axs



Quinolones chromatogram

[Analytical Conditions]

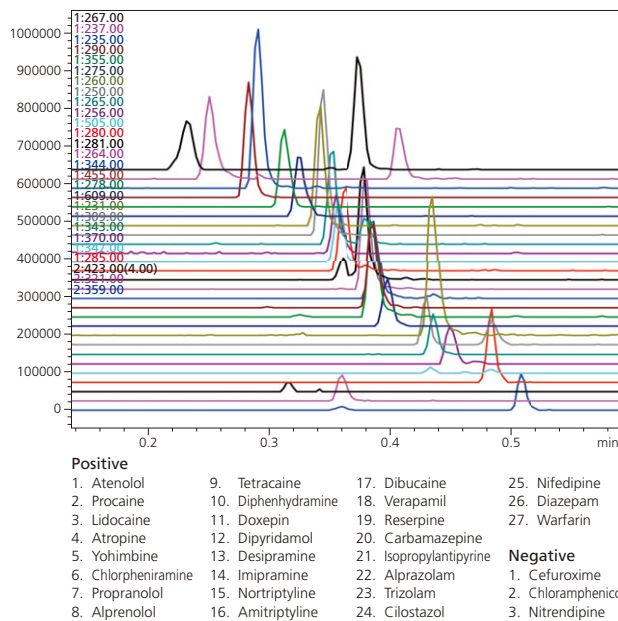
Column : ODS (50 mm L. × 3 mm I.D., 1.8 μm)
 Mobile phase : A: 0.05% formic acid
 B: 0.1% formic acid in acetonitrile
 Gradient : B 8%→16% (0.75 min)→36% (1–1.5 min)
 →95% (2 min)
 Flow rate : 2.0 mL/min
 Column temp.: 55°C
 Detection : Ex. 295nm, Em. 455nm (0–1.05 min)
 Ex. 325nm, Em. 365nm (1.05–3 min)

Maximizing Expandability

Best UHPLC as a Front-end for Mass Spectrometers

The fastest gradient cycle time is achieved with innovative hardware technology. The total system delay volume has been reduced to less than 42 μL with an ultra-low volume (20 μL) mixer, optional loop injection kit with 5 μL loop and micro-volume pre-heater.

Because of the high sensitivity analysis of complex samples, the front-end component for LC/MS/MS is required to decrease its background noise and carryover to zero. The SIL-30AC autosampler offers excellent LC/MS/MS analysis with near-zero carryover and when necessary can utilize its multi-rinse functionality incorporating up to 4 different rinse solutions.



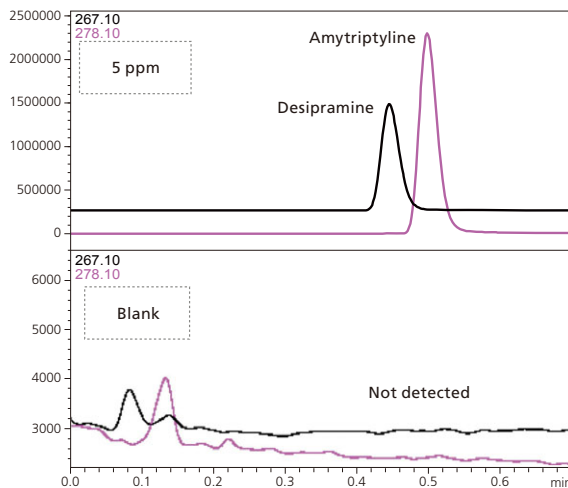
Simultaneous Analysis with Shimadzu LCMS-2020

[Analytical Conditions]

Column : ODS (50 mm L. $\times$ 2.1 mm I.D., 1.8 μm)
 Mobile phase : A: 0.1% formic acid in water
 B: 0.1% formic acid in acetonitrile
 Gradient : B 3% $\rightarrow$ 95% (0.50 min)
 Flow rate : 1.8 mL/min
 Column temp.: 50°C
 Detection : LCMS-2020, ESI (+/-)
 Scan speed : 15000 amu/sec



Nexera and LCMS-2020



Complete Reduction of Sample Carryover by Multi-Rinse Functionality

[Analytical Conditions]

Column : ODS (50 mm L. $\times$ 2.1 mm I.D., 2.2 μm)
 Mobile phase : A: 0.1% formic acid
 B: acetonitrile
 Flow rate : 1.5 mL/min
 Gradient : B 25% $\rightarrow$ 50% (0.75 min) $\rightarrow$ 90% (0.76 min)
 Column temp.: 40°C
 Detection : LCMS-2020, ESI (+)
 Rinse solution : R0: 0.1% formic acid in acetonitrile
 R1: 0.1% formic acid in methanol
 Sample : desipramine, amytriptyline (each 5 $\mu\text{g/mL}$)
 Injection vol. : 5 μL

①: Needle Dip Rinse ②: Needle Pump Rinse

	Desipramine	Amytriptyline
①+②*	Not Detected ($<0.0042\% = 1.2 \text{ pg}$)	Not Detected ($<0.0027\% = 0.68 \text{ pg}$)
①*	0.01%	0.01%
no rinse	0.05%	0.05%

*In case "①+②" or "①", rinse solution for dip rinse is 0.1% formic acid in acetonitrile

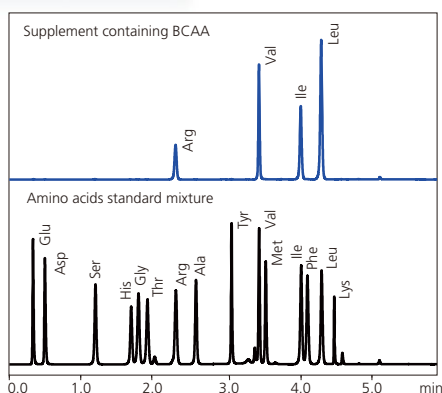


Automated Sample Pretreatment



SIL-30AC Autosampler

The SIL-30AC autosampler incorporates pretreatment functionalities such as dilution, addition of internal standard and pre-column derivatization schemes. These new features provide unattended operation for increased accuracy, precision and speed for high-throughput work.



Analysis of o-phthal aldehyde using SIL-30AC automatic pretreatment function.

[Analytical Conditions]

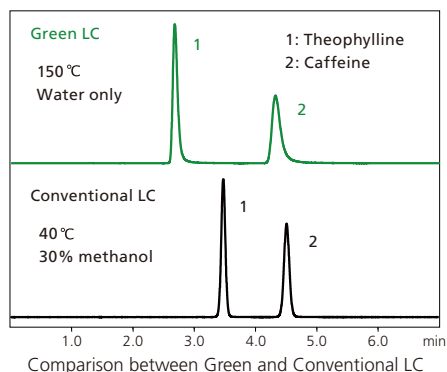
Column : ODS (50 mm L. × 3.0 mm I.D., 2.2 μm)
 Mobile phase : A: 20 mmol/L Potassium Phosphate
 B: Acetonitrile
 Flow rate : 1.2 mL/min
 Column temp.: 40°C
 Detection : Fluorescence at Ex 350 nm, Em 450 nm

Green Chromatography at 150°C



CTO-30A Column Oven

Green chromatography requires stable and reliable temperature control at high temperature. The CTO-30A column oven provides precise temperature control up to 150°C with a newly designed solvent pre-heater, a proprietary Intelligent Heat Balancer (IHB) and post-column solvent cooling. The solvent preheater and IHB ensure uniform column temperature even at high flow rates.



[Green LC]

Column : Polymer-based ODS (150 mm L. × 3 mm I.D., 3 μm)
 Mobile phase : Water only
 Flow rate : 0.5 mL/min
 Column temp.: 150°C

[Conventional LC]

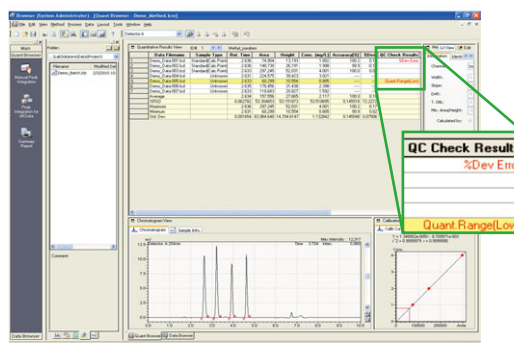
Column : ODS (150 mm L. × 4.6 mm I.D., 5 μm)
 Mobile phase : Methanol/Water (30/70)
 Flow rate : 1.0 mL/min
 Column temp.: 40°C

LabSolutions makes analysis workflow from HPLC analytical operation to data management more efficient thanks to improved usability and enhanced functionality. LabSolutions supports automation of all LC workflows from auto startup, HPLC control, post-run analysis, data management and report output to auto shutdown. LabSolutions also offers data browsing for review and post-run analysis of single or batch HPLC data with complete data management under regulated environments.

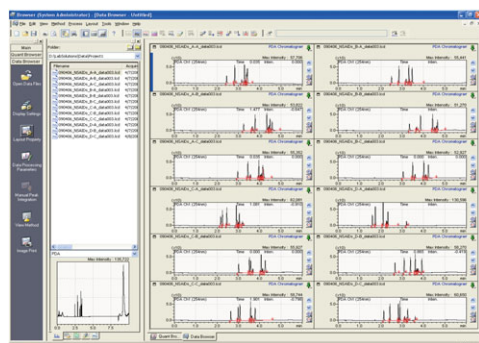
Comprehensive quantitative results window

The quantitative results window in LabSolutions can list peak information, quantitative results, and statistic calculations of a series of data. Also, the window can show results of data based on acceptance criteria. For example, you can extract data of the control samples from a series of data in a batch.

The chromatogram, calibration curve and quantitative results are all shown in a single window. Modification of integration and calibration parameters is also available within this view.



Chromatogram browser function to accelerate method development process

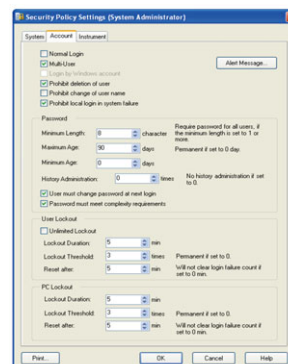


The Data Browser function offers an optimum environment for review of separations and peak shape between multiple chromatograms. The display scale of the chromatogram can be linked between multiple chromatogram windows, allowing the user to identify subtle separation differences between multiple chromatograms. The Data Browser is also able to manipulate chromatograms from multiple detectors.

Regulatory compliance (security policy)

LabSolutions offers a complete and innovative answer to fulfill regulatory compliance. It includes audit trails, log browser, ER/ES support*, and notice of unauthorized access. Administrators can easily set system policy, user management and access authority to systems and data.

* CLASS-Agent manager is required.



Specifications

System Controllers



	CBM-20A (228-45012-XX)	CBM-20Alite (228-45011-38)
Connectable units	Solvent delivery units: 4 max, Autosampler: 1, Column oven: 1, Detectors: 2 max, Fraction collector: 1 Sub-controllers: 2 max	Solvent delivery units: 4 max, Autosampler: 1, Column oven: 1, Detectors: 2 max
Number of connectable units	8 (expansion possible up to 12)	5 (including the unit incorporating the system controller)
Data buffering	Approx. 24 hours for an analysis (at 500 ms sampling rate; available only with LabSolutions)	
Event I/O	4 inputs, 4 outputs	2 inputs, 2 outputs
Analog board	Up to 2 boards can be mounted.	Mounting not supported.
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) × 140(H) × 420(D) mm, 5.5 kg	120(W) × 20(H) × 100(D) mm, 0.5 kg
Power requirements	AC 110 V, 230V, 100 VA, 50/60 Hz	Supplied from the unit

Solvent Delivery Unit



	LC-30AD (228-45162-XX)
Solvent delivery method	Micro-volume double plunger pump
Plunger capacity	10 µL
Flow-rate setting range	0.0001–3.0000 mL/min (to 130 MPa) 3.0001–5.0000 mL/min (to 80 MPa)
Flow-rate accuracy	±1 % (under specified conditions)
Flow-rate precision	Less than 0.06%RSD or 0.02 minSD whichever is the greater
Gradient type	High-pressure mixing
Gradient mixing accuracy	±0.5 % (under specified conditions)
Plunger rinsing mechanism	Equipped with an automatic rinsing kit
Safety measures	Liquid-leakage sensor, high-pressure/low-pressure limits
Available pH range	1 to 9
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) × 140(H) × 500(D) mm, 11.8 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz

On-Line Degassers



	DGU-20A5 (228-45019-32)	DGU-20A3 (228-45018-32)
Number of degassed solvents	5	3
Degassed flow-line capacity	380 µL	
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) × 70(H) × 420(D) mm, 5.2 kg	260(W) × 70(H) × 420(D) mm, 5 kg
Power requirements	Supplied from LC-30AD	



Column Oven – Block Heating



	CTO-30A (228-45160-XX)
Type	Block heating system
Temperature setting range	4°C to 150°C in 1°C steps
Temperature control precision	± 0.05°C
Temperature control range	5°C above room temperature to 150°C
Column size and capacity	150 mm L. x 4.6 mm I.D. column x 2
Devices that can be accommodated	Gradient Mixer, High-Pressure Flow Switching Valves (2), Post Column Cooler etc.
Functions	Linear temperature programs supported
Safety measures	Solvent sensor, Liquid-leakage sensor, temperature fuse, temperature upper limit
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) x 210(H) x 500(D) mm, 10 kg
Power requirements	AC 110 V, 230 V, 300 VA, 50/60 Hz

Column Ovens – Forced Air Circulation



	CTO-20A (228-45009-XX)	CTO-20AC (228-45010-XX)
Type	Forced-air circulation	
Cooling method	None	Electronic cooling
Temperature setting range	4°C to 85°C in 1°C steps	
Temperature control precision	0.1°C max. (typically 0.04°C max.)	
Temperature control range	10°C above room temperature to 85°C	10°C below room temperature to 85°C
Storage capacity	220 (W) x 365 (H) x 95 (D) mm	
Devices that can be accommodated	Manual Injectors (2), Gradient Mixer, High-Pressure Flow Switching Valves (2), etc.	
Functions	Linear temperature programs supported	
Safety measures	Solvent sensor, temperature fuse, temperature upper limit	
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) x 415(H) x 420(D) mm, 20 kg	260(W) x 415(H) x 420(D) mm, 23 kg
Power requirements	AC 110 V, 230 V, 500 VA, 50/60 Hz	

High-Pressure Flow-Line Selection Valves



	FCV-32AH (228-45166-91)
Valve type	2-position / 6-port rotary valve
Maximum operating pressure	130 MPa
Operating pH range	1 to 14
Operating temperature range	4°C to 35°C
Dimensions, weight	110(W) x 110(H) x 250(D) mm, 4 kg
Power requirements	Supplied from the unit

Specifications

Autosampler



	SIL-30AC (228-45157-XX)
Injection method	Standard: Total sample injection, variable injection volume Option: Loop injection, adjustable or fixed volume loop injection (option)
Maximum operating pressure	130 MPa
Injection-volume setting range	Total volume injection: 0.1 to 50 µL Loop injection: 0.1 to 20 µL (select the loop from 5 µL and 20 µL) (0.1 to 9.9 µL in 0.1 µL increments, 10 to 50 µL in 1 µL increments)
Number of processed samples	175 (w/1 mL sample vials), 105 (w/1.5 mL sample vials), 50 (w/4 mL sample vials), 192 (w/2 microtiter plates each with 96 wells), 768 (w/2 microtiter plates each with 384 wells), 192 (w/2 Deep well MTP each with 96 wells), 768 (w/2 Deep well MTP each with 384 wells) Also, ten 1.5 mL vials in addition to each of the above.
Injection-volume accuracy	±1% (total volume injection, under specified conditions)
Injection-volume precision	RSD ≤ 0.25 % (total volume injection, under specified conditions)
Cross-contamination	0.0015 % or less (total volume injection, without rinsing, under the specified conditions)
Needle rinsing	Set freely before and after sample injection, outer and inner of needle, 4 solvents max.
Sample cooler	Block cooling/heating, used together with dehumidifying function, 4°C to 40°C
Safety measures	Liquid-leakage sensor
Operating pH range	1 to 9 (1 to 14 option)
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) × 415(H) × 500(D) mm, 30 kg
Power requirements	AC 110 V, 230 V, 300 VA, 50/60 Hz

Rack Changer II



	Rack Changer II (228-45164-XX)
Compatible plates	96-well MTP, 96-well DWP, 384-well MTP, 384-well DWP, 1.5mL vial plate (54 vials)
Number of processed plates	12
Sample cooler	Block cooling/heating, used together with dehumidifying function, 4°C to 40°C
Operating temperature range	4°C to 35°C
Dimensions, weight	425(W) × 415(H) × 500(D) mm, 32 kg
Power requirements	AC 110 V, 230 V, 350 VA, 50/60 Hz

UV-VIS Detector



	SPD-20A UFLC version (228-45130-XX)
Light source	Deuterium (D2) lamp
Wavelength range	190 to 700 nm
Bandwidth	8 nm
Wavelength accuracy	± 1 nm max.
Wavelength precision	± 0.1 nm max.
Noise	1.2 × 10 ⁻⁵ AU (with standard semi-micro cell, under specified conditions) < 0.5 × 10 ⁻⁵ AU (with conventional cell, under specified conditions) > *1
Drift	2 × 10 ⁻⁴ AU/h (with standard semi-micro cell, under specified conditions) < 1 × 10 ⁻⁴ AU/h (with conventional cell, under specified conditions) > *1
Linearity	2.5 AU (with standard semi-micro cell, ASTM)
Cell temperature setting range	9°C to 50°C in 1 °C step
Cell temperature range	5°C above room temperature to 50°C
Cell	Standard semi-micro cell: Optical path length: 5 mm, Capacity: 2.5 µL, Pressure: 12 MPa Optional conventional cell: Optical path length: 10 mm, Capacity: 12 µL, Pressure: 12 MPa
Functions	Dual-wavelength detection, ratio-chromatogram output, wavelength scanning
Safety measures	Liquid-leakage sensor
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) × 140(H) × 420(D) mm, 13 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz

*1: Conventional cell is optional



Photo Diode Array Detector



	SPD-M20A (228-45005-XX)
Light source	Deuterium (D2) lamp, tungsten (W) lamp
Number of diode elements	512
Wavelength range	190 nm to 800 nm
Slit width	1.2 nm (high-resolution mode), 8 nm (high-sensitivity mode)
Wavelength accuracy	± 1 nm max.
Wavelength precision	± 0.1 nm max.
Noise	0.6 x 10 ⁻⁵ AU (under specified conditions)
Drift	5 x 10 ⁻⁴ AU/h (under specified conditions)
Linearity	2.0 AU (ASTM standard)
Cell temperature setting range	9°C to 50°C in 1 °C step
Cell temperature range	5°C above room temperature to 50°C
Cell	Standard conventional cell: Optical path length: 10 mm, Capacity: 10 µL, Withstand pressure: 12 MPa Optional semi-micro cell: Optical path length: 5 mm, Capacity: 2.5 µL, Withstand pressure: 12 MPa
Functions	Contour output, spectrum library, MAX plotting
Safety measures	Liquid-leakage sensor
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) × 140(H) × 420(D) mm, 12 kg
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz

Fluorescence Detectors



	RF-20A (228-45147-XX)	RF-20Axs (228-45148-XX)
Light source	Xenon lamp	Xenon lamp, low-pressure mercury lamp (to check wavelength accuracy)
Wavelength range	200 nm to 650 nm	200 nm to 750 nm
Spectral bandwidth	20 nm	
Wavelength accuracy	± 2 nm	
Wavelength reproducibility	± 0.2 nm	
S/N	Water Raman peak S/N >1200	Water Raman peak S/N >2000
Cell temperature setting range	—	4°C to 40°C in 1 °C step
Cell temperature control range	—	10°C below room temperature to 40°C
Cell	Standard conventional cell: Capacity: 12 µL, Pressure: 2 MPa Optional semi-micro cell: Capacity: 3 µL, Pressure: 2 MPa	
Functions	Dual-wavelength detection, wavelength scanning	
Safety measures	Liquid-leakage sensor	
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) × 210(H) × 420(D) mm, 16 kg	260(W) × 210(H) × 420(D) mm, 18 kg
Power requirements	AC 110 V, 230 V, 400 VA, 50/60 Hz	



JQA-0376

Founded in 1875, Shimadzu Corporation, a leader in the development of advanced technologies, has a distinguished history of innovation built on the foundation of contributing to society through science and technology. We maintain a global network of sales, service, technical support and applications centers on six continents, and have established long-term relationships with a host of highly trained distributors located in over 100 countries. For information about Shimadzu, and to contact your local office, please visit our Web site at **www.shimadzu.com**



SHIMADZU CORPORATION. International Marketing Division

3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan

Phone: 81(3)3219-5641 Fax. 81(3)3219-5710

URL <http://www.shimadzu.com>