



C196-E067A

Prominence UFLCXR

Shimadzu
Ultra Fast Liquid Chromatograph



Prominence
ULTRA FAST LIQUID CHROMATOGRAPH

UFLCXR

New Prominence UFLC Series Line-up **Prominence UFLCxR**

In Pursuit of Higher Separation and Sensitivity

**Committed to basic performance
To provide complete satisfaction**

The Prominence UFLCxR is an ultra-high-speed LC that achieves both ultra-high-speed analysis and ultra-high separation, based on high analysis precision and reliability. In addition to shortening analysis times, thereby heightening analysis efficiency and conserving solvent, this instrument supports reliable separation and detection of trace materials in a variety of fields. These include the evaluation of trace residual agricultural chemicals to ensure the safety of foods, and the evaluation of trace impurities to further improve product quality in the areas of pharmacology and chemistry.

CXR



Excellent Basic Performance Supporting High-precision Analysis Data

Prominence UFLCXR provides higher-quality ultra-high-speed analysis data, realized through ultra-high separation and the superior basic performance cultivated in the Prominence series. This includes excellent repeatability from trace injection quantities, low carryover, low noise levels, and excellent linearity.

Shim-pack XR-ODS II-Achieving Ultra-high Separation

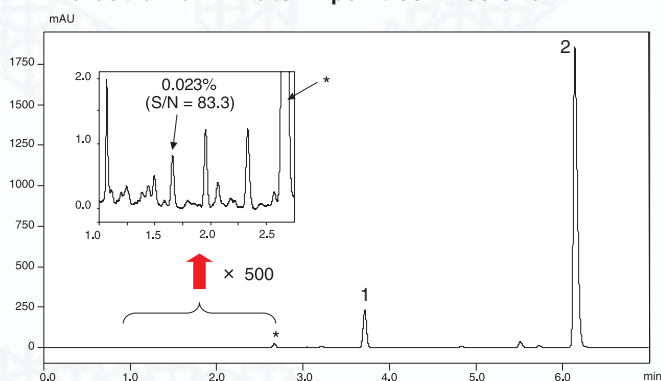
The Shim-pack XR-ODS II is an ultra-high-speed, and high-separation column. It features a refined design (2.2 μm particle size) optimal for the filler developed with the Shim-pack XR-ODS, and a pore size and column withstand pressure optimized for ultra-high separation, which is achieved through combination with Prominence UFLCXR.

For higher resolution and higher sensitivity

The balance between an appropriately small particle-sized column media and the length of a column is an important factor to improving column performance. For true high-resolution analysis, a number of conditions must be met. These include finding a balance between increased column pressure and a smaller particle size; developing a system durable enough to handle the pressure; using a detector with high sensitivity and a wide dynamic range; and optimizing the flow path for minimal diffusion.

Prominence UFLCxR provides high-pressure endurance by utilizing the technological advancements and knowledge developed during the ongoing refinement of the Prominence series. Our aim has been to make high-speed analysis compatible with high resolution, not simply to perform high-speed analysis with a smaller particle-sized column. The Prominence UFLCxR achieves this goal.

Evaluation of minute impurities in cefazolin



A larger theoretical plate number is achieved with a 150 mm length Shim-pack XR-ODS II column than with a commonly used 250 mm length, 5 μ m particle column. In addition, very minute peaks of minor impurities can be clearly separated and detected without missing peaks due to the wide dynamic range of the SPD-20A UV detector, as shown in the figure to the left.

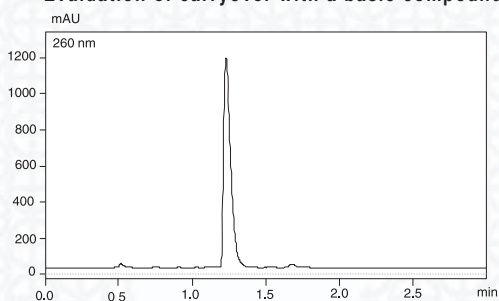
Detection	: UV 245 nm; SPD-20A UFLC
Column	: Shim-pack XR-ODS II (150 mmL. x 3 mmI.D.)
Mobile phase	: A) 20 mmol/L (Sodium) phosphate buffer pH2.5 B) Acetonitrile B.Conc. 15% (0 min) \rightarrow 30% (4 min) \rightarrow 50% (9 min)
Flow rate	: 0.9 mL/min
Temperature	: 40°C
Injection vol.	: 4 μ L

- Peaks
 1. 5-Methyl-1,3,4-thiazole-2-thiol (major impurity)
 2. Cefazolin (main peak)

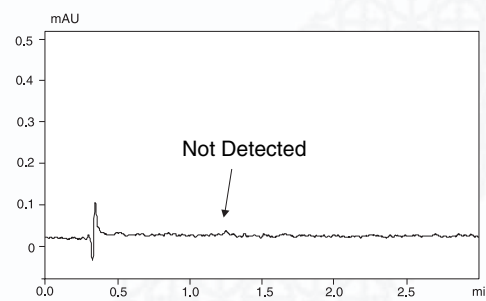
Outstanding basic performance supports highly precise analysis

Excellent reproducibility and minimal carryover, two fundamental performance features of an HPLC, are the most important factors among the specifications required for an analytical system. Shimadzu has surged ahead of other vendors in wrestling with these two issues through the development of a high-performance solvent delivery pump, an autosampler that delivers high reproducibility from a small injection volume, an injection mechanism for near-zero carryover, and other technological excellence. The Prominence UFLCxR proves this excellence by reconciling high performance and high resolution with sufficient performance for high-sensitivity analysis using both a UV detector and a liquid chromatograph mass spectrometer.

Evaluation of carryover with a basic compound



1.2 mg/mL of chlorhexidine chloride, 2 μ L injection



Blank analysis just after the chlorhexidine chloride

Two high-pressure resisting models, the SIL-20AxR and SIL-20ACxR, have joined the SIL-20A(C) family of proven autosamplers.

As before, no carryover is detected, even with chlorhexidine, a typically adsorptive compound. Additionally, less than 0.3%RSD of injection reproducibility was achieved at a very low injection volume. The SIL-20A(C)xR autosampler truly combines outstanding hardware performance with high-pressure endurance.

Evaluation of reproducibility

Injection volume	Peak area	
	Average	%RSD
1 μ L	37596	0.148
2 μ L	75249	0.097
5 μ L	188382	0.026
10 μ L	375846	0.021

20mg/L of caffeine, n=6

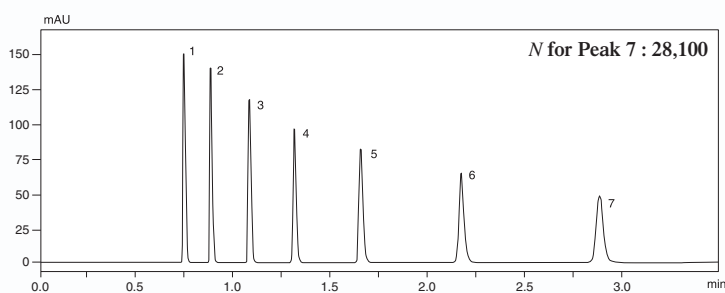
XR-ODS II : The solution for your high-resolution application

The Shim-pack XR-ODS II joins the XR-ODS family of columns, which includes the Shim-pack XR-ODS series that is focused on high-speed analysis under regular column pressure conditions, in order to accomplish high-speed and, high-resolution analysis under a wide array of analytical conditions, including higher-resolution requirements with a longer column or using mobile phase containing methanol. Shim-pack XR-ODS II is the most suitable column choice for the Prominence UFLCxR system since it can be used in conditions up to 60 MPa column pressure. As with the Shim-pack XR-ODS series, Shimadzu strictly controls the quality of each column based on criteria specified on the certificate of compliance that comes with each column. This guarantees manufacturing uniformity.

Analysis of 7 alkylphenones with a 150 mm column

Greater column performance than with a 250 mm (5 µm) column

Theoretical plate number exceeds 28,000 (Octanophenone)



Shim-pack XR-ODS II

Detection	: UV 245 nm; SPD-20A UFLC	1. Acetophenone
Column	: Shim-pack XR-ODS II (150 mmL. x 3 mmI.D.)	2. Propiophenone
Mobile phase	: Water / Acetonitrile = 3/7 (v/v)	3. Butyrophenone
Flow rate	: 1.3 mL/min	4. Valerophenone
Temperature	: 40°C	5. Hexanophenone
Injection vol.	: 4 µL	6. Heptanophenone
		7. Octanophenone

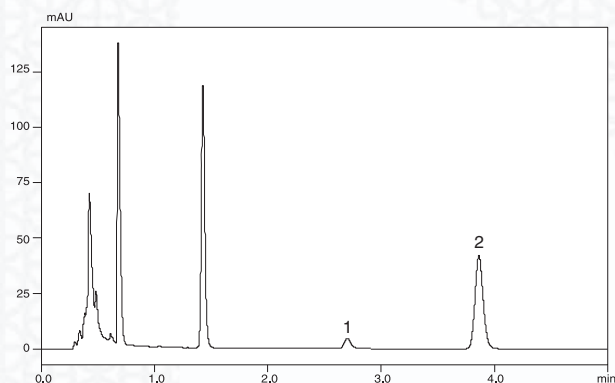
Inner diameter (mm)	Length (mm)
2.0	75 / 100 / 150
3.0	75 / 100 / 150

Particle size : 2.2 µm
Pore size : 8 nm
Maximum pressure : 60 MPa

Applicable to a wider range of applications

Through the use of a longer column, mobile phase containing methanol, analysis under a slightly lower room temperature and other easy-to-prepare conditions, Prominence UFLCxR provides enhanced resolution. Furthermore, the analytical methods you currently use can easily be transferred to high-speed, high-resolution conditions.

Analysis of food additives with a mobile phase containing methanol




High-speed analysis can be performed, even when using mobile phase that contains methanol, by using a Shim-pack XR-ODS II column optimized for ultra high-pressure durability up to 66 MPa on the Prominence UFLCxR. Column pressure would be approximately 43 MPa using a 3 mm inner diameter, 75 mm length column at 1 mL/min flow rate.

Detection	: UV 250 nm; SPD-20A UFLC
Column	: Shim-pack XR-ODS II (75 mmL. x 3 mmI.D.)
Mobile phase	: 40 mmol/L (sodium) acetate buffer pH4.0 / Methanol = 4 / 1 (v/v)
Flow rate	: 1.0 mL/min
Sample	: soft drink
Temperature	: 40°C
Injection vol.	: 4 µL


Peaks
1. Aspartame
2. Benzoic acid

Specifications

CBM-20A/20Alite


	CBM-20A (228-45012-xx)	CBM-20A lite (228-45011-38)
	Connectable units	Solvent delivery units: 4 max, Autosampler: 1, Column oven: 1, Detectors: 2 max, Fraction collector: 1
	Number of connectable units	8
Data buffering	Approx. 24 hours for an analysis (at 500 ms sampling rate; available only with LCsolution)	
Event I/O	4 inputs, 4 outputs	2 inputs, 2 outputs
Analog board	Up to 2 boards can be mounted	Not supported
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) x 140(H) x 420(D) mm, 6 kg	120(W) x 20(H) x 100(D) mm, 0.5 kg
Power requirements	AC 110 V, 230V, 100 VA, 50/60 Hz	Supplied from the unit.

LC-20ADxR


	LC-20ADxR (228-45137-xx)	
	Solvent delivery methods	Parallel-type double plunger
	Plunger capacity	10 µL
	Flow-rate setting range	0.0001 - 3 mL/min (1.0 to 66 MPa) 3.0001 - 5 mL/min (1.0 to 44 MPa)
	Flow-rate accuracy	No more than ±1% or ±2 µL/min, whichever is greater (0.01 to 3 mL/min) ^{*1} No more than ±2% or ±2 µL/min, whichever is greater (0.01 to 3 mL/min) ^{*2} ^{*1} (1.0 to 40 MPa, water, at constant room temperature from 20 to 30°C) ^{*2} (40 to 60 MPa, water, at constant room temperature from 20 to 30°C)
	Flow-rate precision	No more than 0.06%RSD or 0.02 min SD, whichever is greater
	Pulsation	0.08 MPa max. (Typical value, water at 1 mL/min with 7 MPa)
	Gradient method	High-pressure gradient
	Gradient mixing accuracy	0.15 %RSD max.
	Constant-pressure solvent delivery	Supported
	Plunger rinsing mechanism	Automatic rinsing kit as standard equipment
	Safety measures	Liquid-leakage sensor, high-pressure/low-pressure limits
	Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) x 140(H) x 420(D) mm, 10 kg	
Power requirements	AC 110 V, 230 V, 150 VA, 50/60 Hz	

For gradient operation, use a gradient mixer with high pressure specification such as the mixer 100µL HP (228-35830-93)

DGU-20A₃

	DGU-20A ₃ (228-45-18-32)	
	Number of degassed solvent	3
	Degassed flow-line capacity	380 µL
	Operating temperature range	4°C to 35°C
	Dimensions, weight	260(W) x 70 (H) x 420 mm (D), 5 kg
	Power requirements	Supplied from LC-20ADxR

Rack Changer

	Rack Changer C (228-45030-xx)	
	Compatible plates	96-well MTP, 96-well DWP
	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	420(W) x 415(H) x 500(D) mm, 32 kg
	Power requirement	AC 110V, 230V, 350 VA, 50/60 Hz

SIL-20A_{xR} / 20AC_{xR}



	SIL-20A _{xR} (228-45135-xx)	SIL-20AC _{xR} (228-45136-xx)
Injection method	Total-volume sample injection, variable injection volume	
Applicable pressure	66 MPa max.	
Injection volume setting range	0.1 to 50 µL (standard), 1 to 100 µL (option)	
Number of processed samples	175 (1 mL vials) 105 (1.5 mL vials) 50 (4 mL vials) 192 (two 96-well MTP/DWP) 768 (two 384-well MTP/DWP) also, ten 1.5 mL vials in addition to each of the above.	175 (1 mL vials) 70 (1.5 mL vials) 50 (4 mL vials) 192 (two 96-well MTP/DWP) 768 (two 384-well MTP/DWP) also, ten 1.5 mL vials in addition to each of the above.
Injection volume accuracy	±1% max.	
Injection volume precision	RSD: 0.3% max.	
Cross-contamination	0.005% or less (under specified analytical conditions, typical value 0.0035% or less without needle rinsing)	
Number of repeated injections	1 to 30 times/sample	
Needle rinsing	Set freely before and after sample injection	
Sample cooler	None	Block cooling/heating, used together with dehumidifying function, 4°C to 40°C
Operating pH range	pH 1 to pH 14	
Operating temperature range	4°C to 35°C	
Dimensions, weight	260(W) x 415(H) x 500(D) mm, 27 kg	260(W) x 415(H) x 500(D) mm, 30 kg
Power requirements	AC 110 V, 230 V, 100 VA, 50/60 Hz	AC 110 V, 230 V, 300 VA, 50/60 Hz

CTO-20A/20AC



	CTO-20A (228-45009-xx)	CTO-20AC (228-45010-xx)
Temperature control method	Forced-air circulation	
Cooling method	None	Electronic cooling
Temperature setting range	4°C to 85°C	
Temperature control precision	0.1°C max. (Typical value 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	
Time program	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), 20 kg	260(W) x 415(H) x 420(D), 23 kg
Power requirements	AC 110 V, 230 V, 500 VA, 50/60 Hz	

SPD-20A



	SPD-20A UFLC version (228-45130-xx)
Light source	Deuterium (D2) lamp
Wavelength range	190 to 700 nm
Bandwidth, slit width	8 nm
Wavelength accuracy	1 nm max.
Wavelength precision	0.1 nm max.
Noise	1.2 x 10 ⁻⁵ AU (with standard semi-micro cell, under specified conditions) < 0.5 x 10 ⁻⁵ AU (with conventional cell, under specified conditions) > ^{*1}
Drift	2 x 10 ⁻⁴ AU/h (with standard semi-micro cell, under specified conditions) < 1 x 10 ⁻⁴ AU/h (with conventional cell, under specified conditions) > ^{*1}
Linearity	2.5 AU
Functions	Dual-wavelength detection, ratio-chromatogram output, wavelength scanning
Cell	Standard semi-micro cell: Optical path length: 5 mm, Capacity: 2.5 µL, Withstand pressure: 12 MPa Optional conventional cell: Optical path length: 5 mm, Capacity: 12 µL, Withstand pressure: 12 Mpa
Cell temperature range	5°C above room temperature to 50°C
Operating temperature range	4°C to 35°C
Dimensions, weight	260(W) x 140(H) x 420(D) mm, 13 kg
Power requirements	AC 110 V, 230 V, 150 AV, 50/60Hz

*1: Conventional cell is optional