

SIL-20A/AC Autosampler



Into the varied landscape of HPLC autosamplers, the Prominence Series autosampler enters built on a solid foundation. Following the principle of Kaizen*, the SIL-20 incorporates and improves on many of the features that made its predecessors leaders in the market. Use of unique coatings and materials in critical areas, state-of-the-art electromechanical components, and innovative control through a Web browser ensure the SIL-20 will continue to set the standard that others will strive to match. Whatever you require – near-zero carryover, fast cycle times, or exceptional reproducibility – the Prominence autosamplers will meet your need.

Carryover Elimination

Eliminating sample carryover or cross contamination in HPLC analysis has become a significant challenge in recent years for a number of reasons, most notably the increased sensitivity of detectors – especially mass spectrometers.

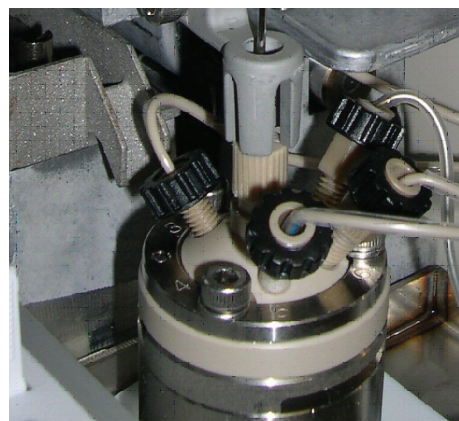
Traditional materials used in autosamplers can be a source of carryover: Vespel, used in injection valve rotor seals and needle seals, shows an affinity for extremely basic compounds; Stainless Steel, used for sampling needles and transfer tubing, has active sites that interact with certain ionic species. Another contributor to carryover is any unswept area in the flow path, injection port, or injection valve. Building on the performance and properties of the popular SIL-HT and its superior carryover performance, Shimadzu designed the SIL-20 with the following enhancements to reduce carryover:

Injection Valve

The rotor seal is made from PEEK, a very inert material with a useable pH range of 1 – 14.

Injection Port

A one-piece injection port/needle seal machined from PEEK is installed directly on the injection valve. Along with taking advantage of the inertness of PEEK, mounting the injection port directly on the valve eliminates the need for a sample transfer line and possible contributions to carryover arising from unswept areas in the tubing connections.

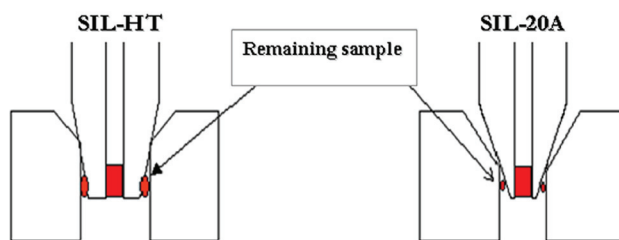


SIL-20A 6-port valve showing integrated PEEK injection port.

* The principle of perpetual improvement.

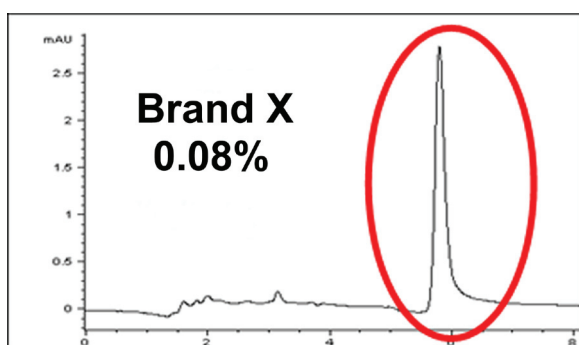
Needle

The stainless steel needle has been specially treated to reduce ionic interactions in two ways. First, the inner surface has been highly polished to minimize active sites. Second, the external surface of the needle, shown by MS studies to be a major factor in carryover, is treated in a proprietary process to mask active sites by applying a 1 micron layer of Platinum.



Thinner needle with a revised angle at the tip reduces the amount of trapped sample between the needle surface and the injection port during the injection cycle.

Additionally, the needle has been reduced in diameter and the interface between the needle and needle port seal has been optimized to eliminate unswept areas. Studies with Chlorhexidine, a very basic antibiotic compound, have shown the SIL-20 to be more than 100 times better than other commonly available commercial autosamplers.



The chromatograms on this page were generated under the following analytical conditions. Only the autosampler was changed.

Mobile phase:

- A = 10mM Phosphoric acid buffer solution (pH=2.6) containing 100mM Sodium Perchlorate 45%
- B = Acetonitrile 55%

Flow rate: 0.2 mL/min

Column: Shim-pack VP-ODS (2.0 X 150 mm)

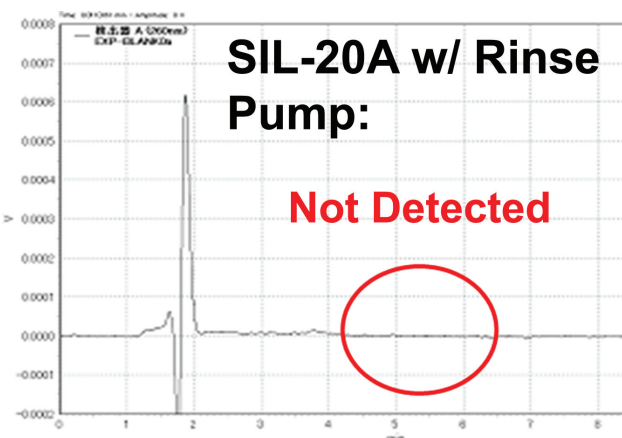
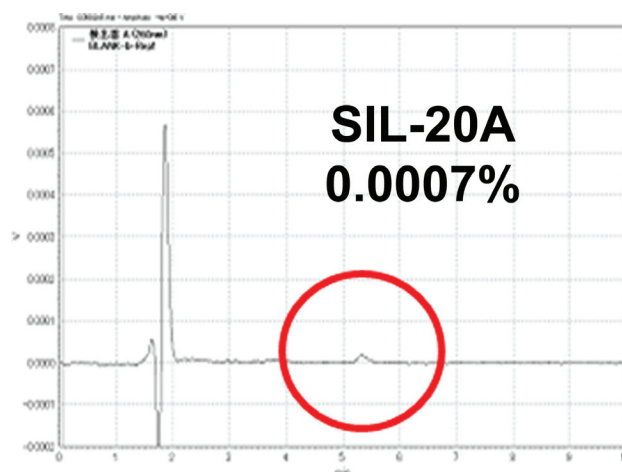
Temperature: 40°C

Inj volume: 2 uL - using a standard autosampler

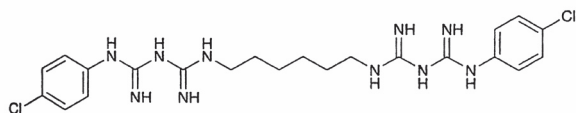
Wavelength: 260 nm (with semi-micro cell)

Sample: 1.2 mg/mL Chlorhexidine (dissolved in mobile phase)

Rinse Phase: Methanol with 0.05% formic acid



Should one need even better carryover performance, an optional active rinse pump is available. This pump allows multiple rinse solvents to be utilized to wash the outside of the needle in a wide variety of user selectable routines.



Structure of chlorhexidine.

Outstanding Reproducibility

	<u>Injection</u>	<u>Uracil</u>	<u>Toluene</u>	<u>Napthalene</u>	<u>Biphenyl</u>
% RSD	1-10	0.091	0.22	0.124	0.119
Values	11-20	0.141	0.282	0.17	0.209
	21-30	0.101	0.091	0.061	0.064
	31-40	0.051	0.128	0.067	0.099
	41-50	0.112	0.059	0.073	0.048
	51-60	0.064	0.267	0.113	0.086
	61-70	0.089	0.128	0.071	0.069
	71-80	0.069	0.073	0.034	0.063
	81-90	0.11	0.047	0.084	0.087
	91-100	0.054	0.112	0.059	0.079
Average RSD for 100		0.088	0.141	0.086	0.092

The metering pump used for sample aspiration has a 6 nL/step resolution to provide accurate and reproducible injections from 0.1 to 100 μ L. An extended sample loop is available for injection volumes up to 2 mL. The proven needle-in-flow-path design lessens carryover and ensures no sample loss injections.

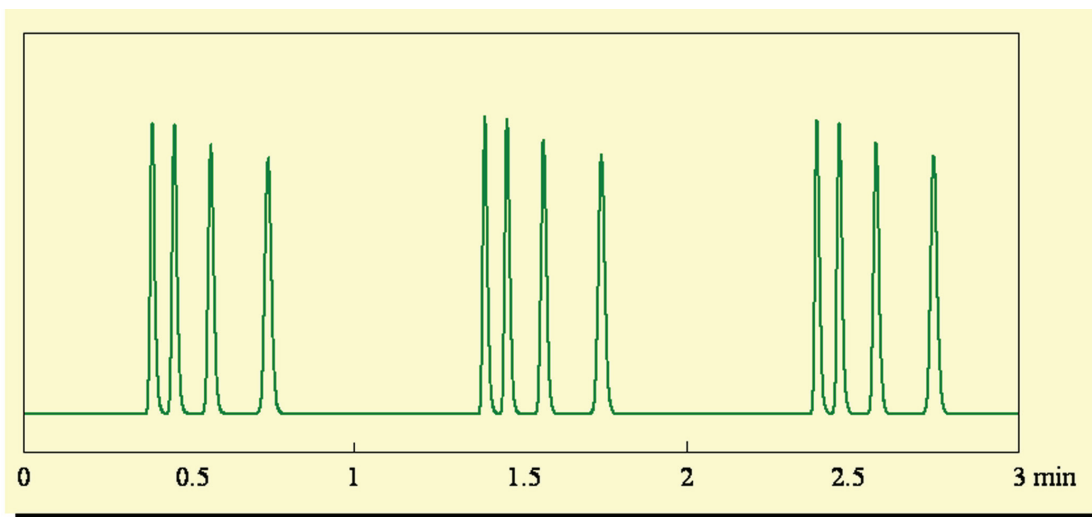
Conditions: Four component test mix on 4.6 x 50 mm C18 column. 70:30 MeOH: H₂O at 1 mL/min. 5 μ L injection volume, 254 nm UV detection.

Reduced Cycle Times – Increased Capacity

Everyone has heard the adage “Time is money”. It applies to analytical laboratories everywhere and Shimadzu is conscious of it. Capable of 10-second cycle times, the SIL-20A autosamplers are the world’s fastest. Fully optimized, the time between injections can be less than 5 seconds – perfect for flow injection MS analysis. With increased speed comes the need for increased capacity, and the Prominence series has that covered as well. If 175 vials (8X40 mm, 1 mL) or two microtiter plates are not enough, the optional Rack Changer can accommodate 12 standard or deep-well microtiter plates.



There is no need to worry if you have sensitive samples as both the Autosampler and Rack Changer are available in temperature-controlled models encompassing 4-40°C. These units contain additional Peltier units that act as a cold finger to dehumidify the sample compartment and reduce condensation, a potential source of cross contamination.



Fast cycle time means greater sample throughput: Three 4-component separations in under 3 minutes.

Standalone or Part of a System

The SIL-20 and Rack Changer are fully capable of being run from the front panel keypad of the SIL-20. Or, for the most convenience, connect it to Shimadzu's innovative CBM-20 controller and take advantage of its industry exclusive web-based control. This means you can monitor and control the autosampler and any other components connected to the CBM from anywhere in the world through your web browser. The CBM also acts as the conduit between the HPLC and the controlling software, whether it is a Shimadzu CDS package, MS control package, or any other software package that contains Shimadzu control.



SPECIFICATIONS

	SIL-20A	SIL-20AC
Injection Method	Metering pump, variable volume, no sample loss	
Injection Volume	0.1 to 100 μ L (std), 1 to 2,000 μ L (opt)	
Sample Capacity	105 1.5 mL vials (incl. std.); Control Rack: 10 1.5 mL vials	70 1.5 mL vials (incl. std.); Control Rack: 10 1.5 mL vials
Optional Sample Racks for:	175 1 mL vials 50 4 mL vials 2 96 well MTP (std or deep well) 2 384 well MTP	
Injection Volume Accuracy	\pm 1% (50 μ L, n=10)	
Injection Volume Precision	RSD < 0.3% (10 μ L)	
Carryover	0.005% (Chlorhexidine)	
Sample Aspiration Rate	0.1-15 μ L/sec (0.1 μ L steps)	
Rinsing Rate	1-35 μ L/sec (1 μ L steps)	
Rinsing Options	Before Aspiration, After Aspiration, Before and After Aspiration, or None (Optional rinse pump for multiple solvent wash available)	
Temperature Control	N/A	4°-40°C w/ built-in dehumidifier
pH Range	1 to 14	
Operating Temperature	4°C to 35°C (non-condensing atmosphere)	
Dimensions & Weight	260W x 415H x 500D, 27kg	260W x 415H x 500D, 30kg
Power Requirements	AC110-120V, 100VA, 50/60Hz	AC110-120V, 300VA, 50/60Hz

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