

Liquid Chromatography / Mass Spectrometry

Key Features:

- Automated sample enrichment to meet ultra-low detection limit specifications
- Outstanding sample preparation reproducibility
- Software controlled switching between Direct Injection and online SPE mode



The Perfect Complement to the QSight LX50 UHPLC System – Delivering the Sensitivity and Specificity Needed for the Most Demanding Detection Limits

To improve sensitivity, the SP50 online SPE system utilizes the addition of online solid phase extraction (SPE), coupled to LC/MS/MS for sample enrichment. This approach allows for significant and efficient analyte concentration, obviating the need for elaborate and time-consuming sample preparation

procedures. Owing to the enrichment, large sample volumes (~ ½ liter) are no longer needed to reach part per trillion levels for estrogen monitoring in river water.

Based on the proven QSight® LX50 technology, the QSight SP50 Automated Sample Handler – a high-precision UHPLC autosampler – is designed to accurately introduce samples from a variety of vial formats, and coordinate the flow switching required for online SPE. Complementing this, the QSight SP50 High Pressure Dispenser™ (HPD) is responsible for performing the accurate delivery of conditioning, washing, and loading solvents at controlled flow rates at pressures of up to 300 bar. The HPD allows for the selection of up to nine solvents, allowing one to create the optimal sample preparation method. Complete the system with the QSight LX50 solvent delivery module, and the QSight LX50 column temperature module, to create the ultimate high-performance UHPLC-SPE system.

System Overview

The QSight SP50 online SPE system delivers four key technologies to help optimize your workflow, and enable even higher levels of productivity:

- **Precision Sampling Module** Online SPE is accomplished through the addition of two six-port valves on the autosampler. The valves are controlled through Simplicity 3Q™ software, allowing users to quickly and easily switch from traditional UHPLC analysis, to accommodating the increased productivity and sensitivity benefits of fully automated, online solid phase extraction and sample preconcentration.
- **Solvent Delivery Module** The self-cleaning Solvent Delivery Modules use a rugged linear drive to deliver extremely precise UHPLC gradient changes at 1300 bars. Four pump heads are individually motor-driven and controlled, providing high-accuracy flow control and pulse reductions. The system is self-priming and self-purging in minutes – allowing your scientists to concentrate on the job at hand.
- **Column Stability Module** The system's Column Stability Module maintains a precise, consistent temperature for the column and mobile phases, enabling reproducible retention times, enhanced selectivity, improved peak shape, and shorter analysis times. Elevated temperatures reduce column back pressure, allowing for higher solvent flow rates regardless of column and particle size.
- **High Pressure Dispenser** SPE solvent delivery is provided by the High Pressure Dispenser, allowing for accurate volume dispensing at controlled flow rates, independent of SPE cartridge backpressure.

QSight SP50 Precision Sampling Module

The QSight SP50 Precision Sampling Module is based on the QSight LX50 autosampler. The key differentiators are:

- The addition of two UHPLC six-port valves enabling the use of on an online SPE cartridge to clean-up and concentrate samples. As the valves are controlled through Simplicity 3Q software, switching between operating modes is quick and easy. Per Figure 1, valve A is dedicated to SPE, while valve B allows for the flexible switching from direct injection to online SPE mode.
- The SP50 autosampler is standard equipped with a large volume injection kit, which provides the ability to inject sample volumes up to 5 mL in stacked injection mode. The large volume injection kit consists of:
 - 1000 µL syringe
 - 2000 µL buffertubing
 - 1000 µL sample loop
- Predefined stainless-steel tubing is used to create a UHPLC compatible flow path. The use of narrow bore tubing and UHPLC valves minimizes additional peak dispersion.



Figure 1. QSight SP50 Precision Sampling Module.

QSight SP50 High Pressure Dispenser

The QSight SP50 High Pressure Dispenser (HPD) is a 2 mL high pressure syringe pump, which is used when the system is operating in SPE mode. The HPD is responsible for performing the accurate delivery of conditioning, washing, and loading solvents at controlled flow rates at pressures of up to 300 bar. Using positive pressure SPE will result in improved reproducibility, as each sample, even with different viscosity, is extracted at the same flow rate. The capability to automatically select between nine different SPE solvents for the SPE procedure helps to quickly switch between assays. To increase method development efficiency, the solenoid valve is designed to mix two individual solvents prior to the SPE steps. The mixing solvents and ratios can be programmed in the Simplicity 3Q software, resulting in decreased method development time.

Key Features:

- Accurate volume delivery at controlled flow rates at 0.1 – 10 mL/min
- Independent of backpressure up to 300 Bar
- Selects from nine solvents
- On-line solvent mixing



Figure 2. QSight SP50 High Pressure Dispenser.

Online SPE Flow Path

The QSight SP50 online SPE system comes with a predefined stainless-steel flow path (shown in blue in Figure 3). The 0.005" ID tubing is UHPLC compatible, minimizing peak dispersion. The layout of the flow path enables users to easily switch between direct injection and SPE mode, without changing the hardware.

The SPE cartridge is connected to the A valve and can easily be reached from the front of the autosampler. Depending on the application, any type of high pressure SPE cartridge can be used. However, PerkinElmer Brownlee Spheri-5 SPE cartridges are recommended for their superior flexibility and performance. Due to the unique high-capacity SPE cartridge and the high enrichment factor, large sample sizes are not required, saving time improving throughput, and reducing laboratory waste.

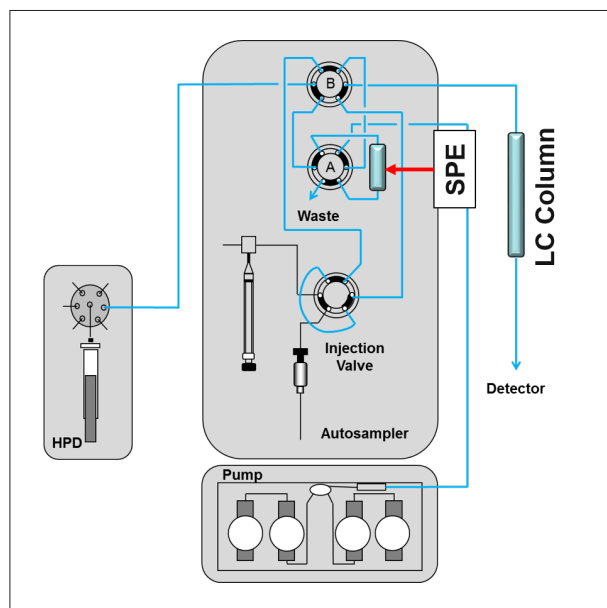


Figure 3. Online SPE Flow Path.

Simplicity 3Q Software

The QSight SP50 online SPE system can be controlled through Simplicity™ 3Q 1.7 and higher. With Simplicity 3Q software, it's all about achieving the best results – and insights – from your QSight system. The system is designed modularly for intuitive, straightforward operation, with wizards guiding you through the workflow, enabling efficient method development, results processing and reporting. Programming of the method is made easy, with only four SPE steps to be programmed:

- **Conditioning and Equilibration** Program the software to prepare the SPE cartridge for the next sample. The High Pressure Dispenser will dispense the selected solvents through the SPE cartridge, and are then directed to waste.
- **Loading** The sample is aspirated into the sample loop using the autosampler syringe, and is subsequently transferred via a load solvent from the loop to the SPE cartridge. Loading conditions, like flow and volume, can easily be optimized, ensuring maximum sample recoveries.
- **Wash** This step is used to remove any remaining sample matrix which might interfere with the analysis. Multiple wash steps can be programmed at different conditions.
- **Elution** Analytes are eluted off the SPE cartridge, and onto the analytical column using the LC gradient. There is no separate SPE elution step needed, as the focused analytes on the SPE cartridge are eluted right onto the analytical column, as part of the chromatographic run.



Figure 4. Simplicity 3Q Software - Home Page.

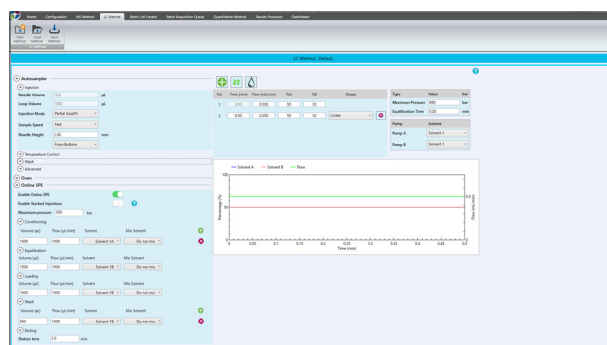


Figure 5. SP50 Method Editor.