PromoChrom Technologies



# SPE-01 Solid Phase Extraction System

## For Automatic Cleanup of Food and Environmental Samples

### About PromoChrom

PromoChrom Technologies focus on development of sample preparation solutions for trace analysis. Since year 2005, PromoChrom have developed SPE-01 cleanup station, SPE-03 cleanup station, SPE-04 online/offline SPE, LC-04SP valve system and SPE-06 mini SPE. Each of the instruments are targeting specific applications. SPE-01 has been used for cleanup in analysis of pesticide residues and extractable petroleum pollutants in soil. SPE-03 has been used for water quality monitoring. LC-04SP has been used to build multi dimensional HPLC.

In 2011, PromoChrom developed flow-path-integration technique for liquid handling. The technique is based on ideas from integrated circuit and lab on a chip manufacturing. It combines various switching valves into one liquid handling module. The technique simplifies the structure of our instruments considerably, making the instruments more affordable and more reliable.

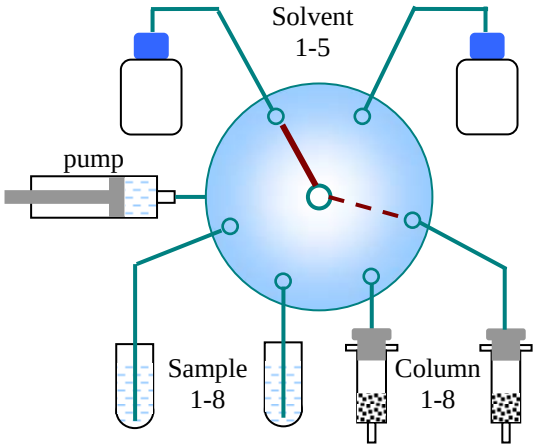
**SPE-01 solid phase extraction system** is designed for automatic sample cleanup in analysis of food and environmental samples. It can be used for pesticide residue and drug residue analysis in food samples and for analysis of pollutants in soil samples. SPE-01 can automatically fulfill all the necessary actions for solid phase extraction and column chromatographic cleanup, such as conditioning of columns, sample loading, washing, and fraction collection. By providing constant flow rate and well controlled elution procedures, SPE-01 helps to improve quality and efficiency of trace analysis and release chemists from tedious sample preparation routines.

SPE-01 provides two configurations to fit the sample throughput needs. SPE-01-I handles 8 samples one by one (single channel design), whereas SPE-01-II processes 8 samples in a parallel mode (8 channel design).

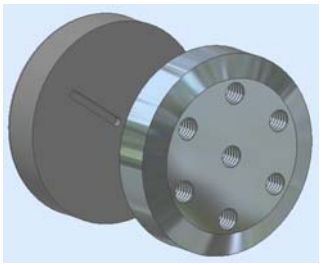
## 1. Working principle of SPE-01

The following diagram illustrates the working principle of SPE-01-I

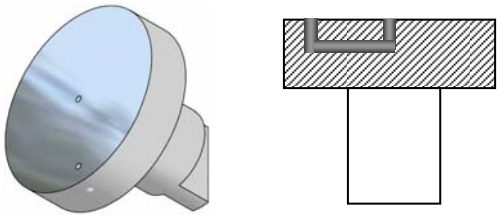
SPE-01-I use a stream selection valve and a syringe pump to transfer elution solvents or sample liquid to the SPE columns. Although all the samples share the same syringe pump and the valve, cross contamination is avoided as the flow path in the valve and the syringe pump are continuously washed during the elution procedures. Besides, the instrument has built in clean procedures to wash the tubing for samples and the flow path automatically, to make sure all the sample contacting surface is fully cleaned.




The flow path in the valve is specially designed so that the sample liquid has minimum contact with the stator surface when the valve is turning. This feature is very helpful for avoiding contamination of sticky compounds (such as benzopyrene) on the surface of the stator.

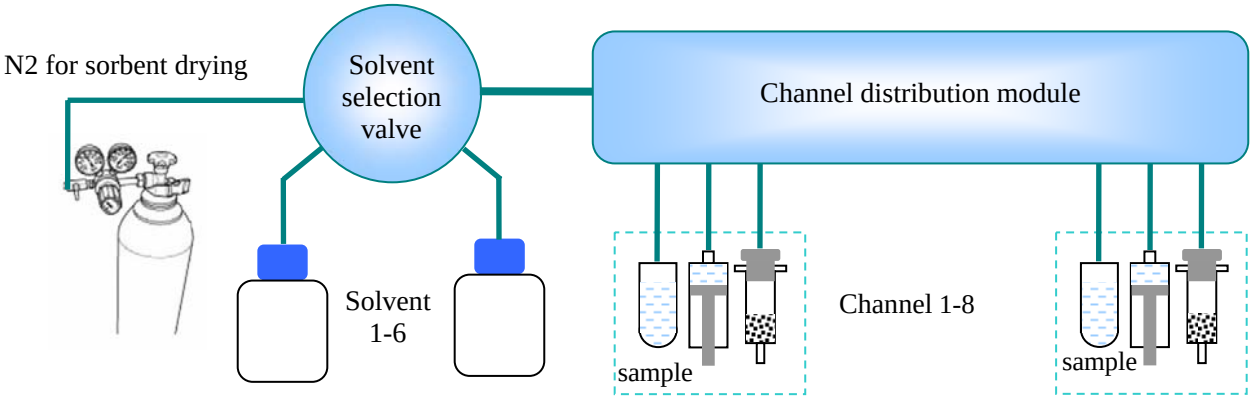


flow path in a Conventional selection valve



Flow path for the valve used in SPE-01

As shown in the below diagram，the major components of SPE-01-II are a stream selection valve and a channel distribution module. Each channel is arranged closely and each sample has isolated flow path, removing possibilities of cross contamination.



## 2. Features

### 2.1 Easy operation

SPE-01 uses built-in methods. They can be easily edited. The operation of instrument involves only 7 buttons. Below is a typical routine operation procedure:

- Place sample tubes and add samples
- Install columns and collection tray
- Select method
- Press the start/stop button.


The screen indicates samples 1to 4 are being processed using method 1. The total volume per sample is 150.0 mL and 140 mL has been processed. Currently the instrument is running the step of elution using solvent 2.

The instrument will process the samples automatically according to the selected method.

### 2.2 Column blockage detection and smart handling

The system can detect the blockage of SPE column and reduce the flow rate accordingly. If blockage still occur, the instrument will pause to wait for human attendance.

### 2.3 Small footprint and simple structure due to flow path integration technique

Normal automated SPE instruments involves many switching vales and complex tubing connections. A multi channel SPE is normally heavy and of large size. The tubing connection is also complex, making maintenance difficult.

Thanks to the flow-path-integration technique, the weight and dimension of SPE-01 are around half of other multi channel SPE instruments. The weight of a SPE-01-II is only 12 kg.

### 2.4 Adaption of various SPE columns

SPE-01 adopts an innovative general purpose adapter to deal with variations in diameter of SPE columns. The adapters can be easily adjusted when different type columns are used.

### 2.5 Automatic wash of sample tubing

To prevent cross contamination, function for cleaning of sample tubing is built into the methods. After loading sample then tubing will be washed automatically using solvent. It is followed by air purge to remove leftover

solvents. As the wash direction is opposite to the loading direction, the small particles accumulated on sample filters are effectively removed. As this function is in the methods, it is not necessary to wash the tubing separately after the extraction.

## 3. Specifications

| | SPE-01-I | SPE-01-II |
|---|---|---|
| Sample capacity | 8 per batch (one by one mode) | 8 per batch (parallel mode) |
| Volume of sample | 1 to 50 mL | 1 to 50 mL |
| Material of wetted parts | Teflon, 316 stainless steel, Pyrex glass | Teflon, 316 stainless steel, Pyrex glass |
| System control | Microcontroller with keypad data entry | Microcontroller with keypad data entry |
| Method | Permanent storage of three methods with instrument | Permanent storage of three methods with instrument |
| Method functions | Pre condition, load sample, elution with 5 solvents, wash of sample line, fraction collection. | Pre condition, load sample, elution with 5 solvents, wash of sample line, drying with nitrogen, fraction collection. |
| Pump flow rate | 0.5 to 85 mL/min | 0.5 to 85 mL/min |
| Pressure limit of pump | 6 bar | 6 bar |
| Pump reproducibility (C.V.%) | <1.5 | <1.5 |
| Power consumption | < 1.0 A at 24 VDC | < 1.5 A at 24 VDC |
| Weight (Kg) | 11.5 | 12.5 |
| Dimension (cm) | 34 x 34 x 45 (width x depth x height) | 34 x 34 x 45 (width x depth x height) |

## 4. Order information

| Part No. | Description | Price (US$) |
|---|---|---|
| SPE-01-01 | Includes SPE-01-I mainframe, 24V power supply, and user manual. | |
| SPE-01-02 | Includes SPE-01-II mainframe, 24V power supply, and user manual. | |

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