



HT4000E

AUTOMATED SPE-HPLC AUTOSAMPLER

SPE CARTRIDGES: Normal Phase, Reversed Phase, Ion Exchange, Affinity, Immunoaffinity

SLE CARTRIDGES: Diatomaceous Earth Sorbent • FILTER CARTRIDGES

HT4000E is a flexible HPLC autosampler that can automate your Solid Phase Extraction routine. It is part of HTA's HT4000 series, which includes lab-automation-ready HPLC autosamplers (HT4000L) and sample prep workstations (HT4000A).

Designed to automate SPE-LC(MS) applications, it takes care of sample purification through Solid Phase Extraction **up to the collection of eluted sample in vials (offline mode) or can proceed further up to the direct injection**

into the HPLC or LC-MS analyzer (online mode). Therefore, **HT4000E** represents a valid alternative to the traditional HPLC autosampler, because it also includes the SPE functionality for only a little investment.

Solid Phase Extraction consists of multiple steps that require precise volumes, flow rates, timing and more that are not easy to achieve manually. Therefore, **automating SPE improves reproducibility and accuracy, reduces the costs** and delays associated with re-runs and

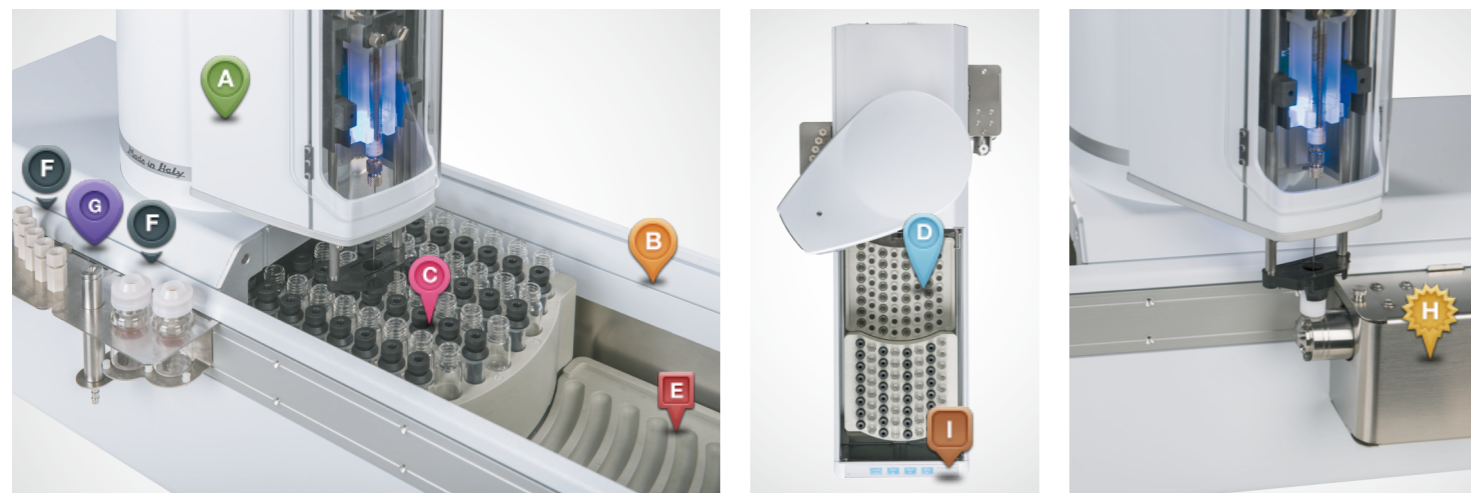
increases the overall throughput by running samples 24/7.

Sample preparation accounts for up to 85% of the time taken for an analytical process. Therefore, it is important to select the correct instrumentation to fully maximize the process to give optimum results: **HT4000E combining both SPE automation and HPLC autosampler capability is the perfect instrument to achieve your goals.**

KEY FEATURES:

- **Do more than any HPLC autosampler**
- **Easy SPE method design**
- **Robust cutting-edge technology**
- **Constant flow elution technology**
- **Improve reproducibility and throughput**
- **Reduce costs and delays**

HOW IT IS MADE



Limited lab space? **HT4000E** occupies less than 40cm of linear bench space: cutting-edge technology in a space-saving design.

- A** The **Tower** holds the syringe by which all liquid handling operations are carried out. It supports syringes from 500ul up to 10ml, while larger volumes can be handled by multiple aspiration/dispensation cycles.
- B** The **Tray** contains all the vessels that are needed for the sample prep routine. The objects are organized in multiple racks: sample rack, elution rack and cartridge waste rack. The tray can be moved in and out; while the sample rack can be moved automatically from on-top of cartridge waste rack to on-top of the elution rack in order to perform the different tasks that are needed.
- C** The **Sample rack** is positioned in the upper deck and includes the primary sample vessels and the SPE cartridges. The **HT4000E** uses standard SPE cartridges: it supports most SPE cartridges available in the market, therefore allowing for the widest selection of phases and the lowest cost of operations.
- D** The **Elution rack**, positioned in the lower deck, contains the elution vials and, in some of the configurations, some mixing vial positions.
- E** The **Cartridge waste rack**, also positioned in the lower deck, collects and discharges into a tank the liquids that pass through the cartridges and that don't need to be collected in the elution vials.
- F** **Solvent nozzles and solvent vials.** We have a wide capacity to accommodate the most challenging requests in terms of solvent variety and quantity. Solvents can be located in vials (for accurate micro-volume dispensing) or in bottles (for large-volume dispensing).
- G** **Waste.** HT4000E is equipped with an external needle cleaning module in order to provide the most efficient cleaning procedure that allows for both cleaning the syringe and the inside-outside needle surface.
- H** The **Injection Valve** for sample injection into the HPLC or LC-MS system. The valve is provided in most of the configurations; however it can be avoided if no direct LC injection is required. Moreover, transfer ports are also available to deliver samples to off-bed detection sources such as spectrophotometers for flow injection analysis
- I** The **Keypad**, located on the front of unit, allows the performance of operations that would have been inconvenient if performed by a PC interface such as loading/ unloading sample vessels and basic maintenance tasks.

HOW IT WORKS

The samples are processed sequentially: each sample can have a multiple-step methodology providing the flexibility required for complex processes. HTAPREP software supports the sample sequence so HT4000E also makes sense if you need to process small batches of a few samples that require several different methods.

A typical SPE method is composed of different steps: some of them may be not present in your routine. To provide a better understanding of HT4000E principles of working we provide a short description of each step.

Conditioning. The sample rack is aligned on top of the cartridge waste rack. The activation solvent is aspirated from the nozzle and dispensed into the cartridge; if multiple solvents are needed, this task is repeated for the additional solvents.

Loading the sample. The syringe aspirates the sample from the primary sample vessels and loads it onto the cartridge.

Washing. The washing solvent is aspirated from the nozzle and dispensed onto the cartridge.

Eluting. The sample rack is moved on top of the elution rack. The elution solvent is aspirated from the nozzle and dispensed onto the cartridge; the eluted sample is then collected in the elution vials.

Cartridge drying. During each step, whenever required, the cartridge may be dried with air by syringe inflating.

Injection. An aliquot of sample is taken from the elution vial and injected into the HPLC via the integrated valve; at the same time sample instant information is returned to the analyzer to allow for data acquisition. If necessary, a preliminary derivatization step may be performed in the elution vial or the sample may be transferred first to the mixing vial.



CONSTANT FLOW TECHNOLOGY

Thanks to Constant Flow Technology, washing and elution are performed at a **constant flow (no vacuum or gas pressure required)**, ensuring **constant elution times** for all the analyzed samples.

PTFE reusable and autoclavable plungers are inserted into the SPE cartridges to allow for the direct and accurate dispensation of samples and reagents onto the surface of the stationary phase.

The constant flow technology **eliminates the SPE cartridge lot-to-lot reproducibility issue** that is typical of systems based on constant pressure technology.

AUTOSAMPLER OPERATIONS

Besides purified samples, **you may need to: inject standards from vials, run samples without a purification step or re-inject a sample that was already purified in a previous session.**

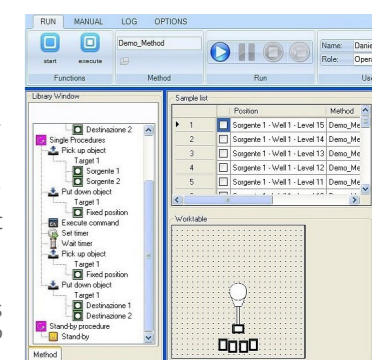
HT4000E answers these needs by also working as a standard HPLC autosampler. You may decide to locate your samples in the standard racks or substitute the racks with the dedicated racks for 2ml or 4ml vials to maximize the capacity. Moreover **HT4000E supports dilutions and derivatization**, answering the most common needs of HPLC sample preparation.

THE SOFTWARE

HTAPREP software controls HT4000E via LAN communication. It gets users up to speed quickly and allows you to start running samples on day 1. **The software supplied uses an intuitive powerful drag and drop interface** to allow the unit to control every individual aspect of the SPE process. This includes sample loading, washing, drying, flushing, elution, derivatization as well as full loop or partial loop injection.

The flexibility of the HT4000E software enables the unit to perform a wide variety of applications such as the collection of several fractions of an elution or the re-injecting of a sample into a different SPE tube if required.

Additional information is available in the HTAPREP brochure.



	Configuration: 01	Configuration: 02	Configuration: 03
Syringe	2.5ml	2.5ml	10ml
Sample Capacity	32 samples	32 samples	20 samples
Primary sample vial	4ml	8ml	20ml
SPE cartridge size	3ml	3ml	3ml
Elution vial	4ml	4ml	4ml
Mixing vial	2ml	2ml	2ml
Solvents	Five nozzle and two 10ml vials		
Waste	Infinite waste		
Valve	Valve HPLC F/SS/6-2/0.40mm Max Pressure: 40Mpa		
Loop	20ul SS loop		

Need a custom configuration for using different cartridges or vial capacities?
We can provide this on request.



TECHNICAL SPECIFICATIONS

General features

Syringe volume: 100, 250, 500µl and 1, 2.5, 10ml
Electrical control: LAN and TTL

Analytical performance¹

RSD: Full loop: ≤ 0.25% (typically 0.15%)
Partial loop: ≤ 0.5%
Linearity (r): ≥ 0.9999
Carry over²: ≤ 0.05% (with standard wash)
typically ≤ 0.01% (with int/ext needle wash)

Physical features

Dimensions (WxHxD): 310x630x690mm
Weight: 15kg
Power supply: 100-240±10%Vac; 50-60Hz; 55W

¹For volume ≥0.5µl; the values provided are for 10-1000µl syringes

²Tested with Uracile 100ppm in mobile phase 60% methanol : 40% water; Column C18; detector: UV fixed length



When it comes to designing and manufacturing robotics solutions, there's no company more dedicated, experienced and knowledgeable in the scientific industry than HTA. We offer an extensive collection of analyzer front-ends and sample preparation workstations designed to fit applications in analytical chemistry, life sciences and clinical laboratories; this even includes GC, LC and ICP autosamplers. HTA manufactures in Italy under a certified UNI EN ISO 9001:2015 and 13485:2016 quality management systems.

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