

Thermo Scientific TriPlus Autosampler



Flexible Sampling Solutions



Delivering unprecedented laboratory automation



Unparalleled precision



Flexible automation of liquid, headspace, and SPME techniques



Extend productivity across two GCs

Thermo Scientific TriPlus Autosampler

Three movements from liquid to headspace

The Thermo Scientific TriPlus Autosampler is the evolution of autosamplers based on three dimensional space movements of the syringe holder (XYZ). Besides conventional injections of liquids or headspace, this new platform delivers unique "Pluses" conceived to increase your lab's efficiency and productivity.

- Flexibility Plus...
- Control capabilities Plus...
- Ease of use Plus...

...other important characteristics turning this instrument into a unique, all-round, top performing system.

Flexibility Plus...

The TriPlus™ Autosampler is available in multiple configurations: TriPlus AS, TriPlus HS, TriPlus Duo, and TriPlus SPME* ... "Plus" rapid upgrading from Liquid to Headspace and vice-versa!

TriPlus AS accomplishes liquid injections in a completely automated and reliable manner, regardless of the matrix or the selected technique. Combine with any injector, syringe size, needle length and parameter settings to properly carry out any type of injection technique.

The **TriPlus HS** is a versatile and high-performing solution for automatic introduction of gases. The HS features the following:

Unattended analysis of up to 108 samples. High performing proprietary gastight heated syringe. Multiple position incubation oven with progressive mode capability, agitation, and heating. Sequential injection for sample enrichment.

The **TriPlus DUO** combines both liquid and headspace versions. Two snap-on turrets can be interchanged in three movements. Each technique-dedicated turret perfectly matches its respective syringe or sampling (liquid or gas) requirement. The DUO provides a powerful solution, combining the best of both techniques.

The **TriPlus SPME*** option allows for automated sample preparation using solid phase microextraction (SPME). Sample productivity and throughput is enhanced by automating a complete SPME cycle from fiber conditioning to desorption, thereby eliminating tedious conventional sample prep processes.

* Sold under license from Supelco®



Control Capabilities Plus...

RS232, LAN and Pocket PC for global networking and local control.

... "Plus", a new approach to enhance your lab's requirements for efficiency and budget consciousness!

The TriPlus is able to serve two adjacent gas chromatographs. It can handle two communication ports, permitting independent and simultaneous control, thus virtually "cloning" the autosampler.

TriPlus is therefore capable of injecting into two different GCs using two different sampling methods and/or data systems, exactly as if there were two individual TriPlus autosamplers.

Ease of Use Plus...

Pre-configured injector positions and type for smooth start-up.

... "Plus" total automatic self-recognition functionality!

The TriPlus is able to automatically detect the type and position of any installed accessory. Any sample tray, syringe type or volume, washing station, incubation oven or additional accessory can be mounted in virtually any point along the X axis for easy handling, regardless the platform's configuration. Once set-up is completed the information is transferred by default to the data system, eliminating manual, error-prone steps.



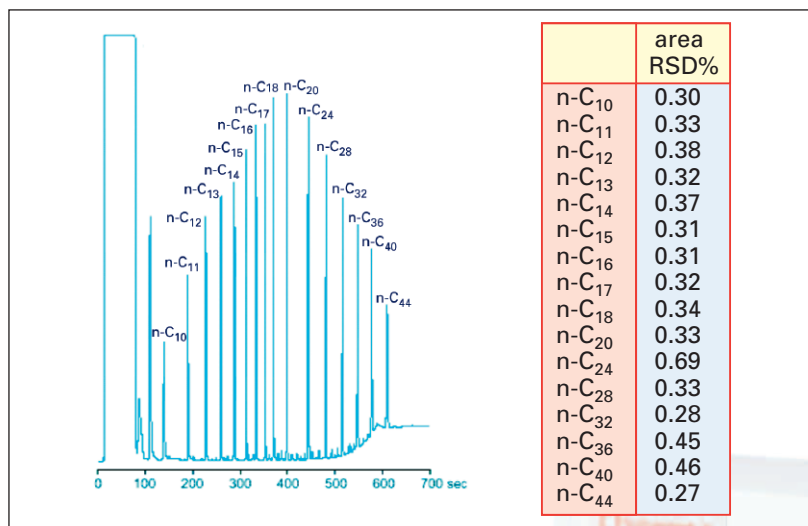
Thermo Scientific TriPlus AS

Towards New Frontiers in Liquid Injection

Characterized by a dedicated turret, this version for liquid sampling is conceived to fulfill the highest standards in terms of sampling performance and flexibility. Granting full compatibility with even the latest most demanding analytical requirements, the TriPlus Autosampler is conceived as an open, evolving platform: the ideal investment with no limitations to future technologies.

Completely Simple

The TriPlus Autosampler design combines system completeness with maximum simplicity. Any injection technique, along with a wide range of accessories, is handled through optimized method set-up capabilities and completely automated, unattended identification procedures.



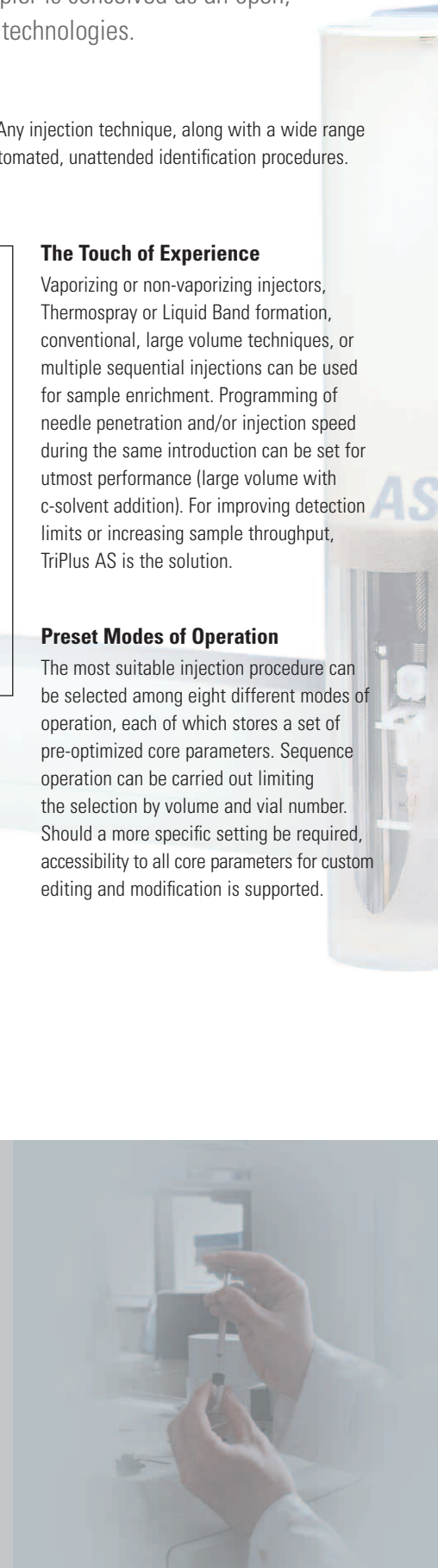
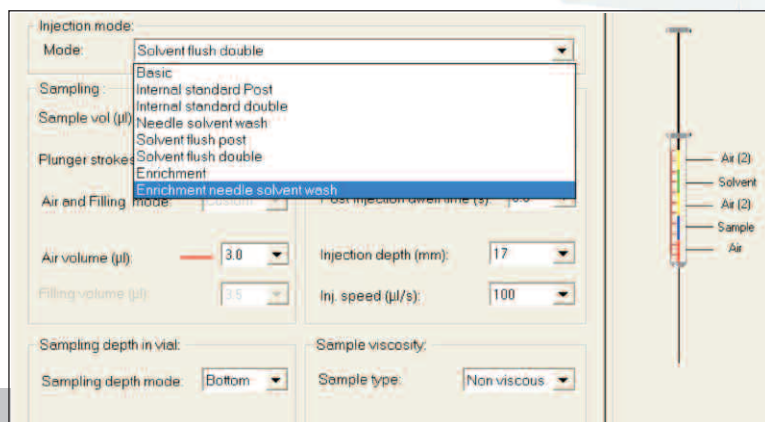
Typical repeatability of 1 μ L injection of 4 ppm C10-C44 solution in hexane (10 repetitions)

The Touch of Experience

Vaporizing or non-vaporizing injectors, Therospray or Liquid Band formation, conventional, large volume techniques, or multiple sequential injections can be used for sample enrichment. Programming of needle penetration and/or injection speed during the same introduction can be set for utmost performance (large volume with c-solvent addition). For improving detection limits or increasing sample throughput, TriPlus AS is the solution.

Preset Modes of Operation

The most suitable injection procedure can be selected among eight different modes of operation, each of which stores a set of pre-optimized core parameters. Sequence operation can be carried out limiting the selection by volume and vial number. Should a more specific setting be required, accessibility to all core parameters for custom editing and modification is supported.



Syringe ID Recognition

The syringe is installed on the AS turret with a snap-on type connection for fast and safe replacement. No syringe re-alignment or calibration procedure is required. Regardless of needle length, switching from nanovolume (0.5 μL) to conventional (5 or 10 μL) or large volume (100 to 500 μL) compatible syringes is as smooth as possible. For utmost precision, quantities can be finely selected in steps of 0.1 μL .

Unprecedented Workload Capacity

For conventional volume injections, up to two sample trays for a maximum capacity of 300 vials (1, 2, 2.5 mL) can be housed on the same unit. Alternatively, up to 108 vials (10 or 20 mL) can be loaded on two 54 position trays, whenever large volume sampling or effective in-vial extraction techniques are required. The two tray types can be combined to carry out both sampling methods either on a single or two adjacent GCs.

Zero Carryover

Combined solvent cleaning capability allows any possible 4-solvent combination sequence to be programmed. This feature eliminates syringe carryover and/or cross contamination, especially when using highly polar or persisting solvents. Up to 4 x 10 mL vials for routine applications or up to 2 x 100 mL bottles can be housed for real solvent capacity.



Rapid Mode for Ultra Fast GC

Analysis times of 1-2 minutes - typical for Thermo Scientific UltraFast GC - can turn a 1-minute syringe preparation phase, otherwise negligible, into a significant increase in the overall run-to-run time. The "Rapid Mode" allows this intermediate step to be carried out during the analytical run. This ability perfectly integrates the TriPlus AS with the unique characteristics of the Thermo Scientific TRACE GC Ultra in terms of speed and accuracy.

Cooled/Heated trays

These optional trays feature temperature control from 4 to 70 $^{\circ}\text{C}$ for accurate sampling of very volatile solvents, unstable compounds, or extremely viscous samples.



Thermo Scientific TriPlus SPME

Automation of complete SPME cycle

This TriPlus version further increases laboratory productivity by offering a one-step process for SPME (solid phase microextraction), effectively replacing conventional multi-step sample preparation procedures involving the use of hazardous solvents. Targeted to environmental and toxicology laboratories, as well as food and fragrances industries, this option automates the complete SPME cycle, from fiber pre-conditioning to sample adsorption and desorption phases. The ability to uniquely combine gentleness and efficiency in the extraction process minimizes mechanical stress on the fiber during sample agitation, resulting in a more reliable and robust SPME process. The SPME option is also available as an upgrade kit for existing units.

- Variable fiber penetration depth, suitable for both liquid and headspace extraction
- Optional 2-port, inert gas purged, Fiber Conditioning Station.
- 2 X 54-position sample trays
- Oven incubation range 40 to 150 $^{\circ}\text{C}$ in 1 $^{\circ}\text{C}$ steps, with optimal sample agitation
- Geometry to extend fiber lifetime



Thermo Scientific TriPlus HS

The effective solution for gentle and efficient Headspace analysis

Proprietary gastight heated syringe, straightforward selection of sampling volume, and zero bench space requirement added to unprecedented sample throughput capabilities: TriPlus HS is able to effectively combine the potentials of an efficient syringe-based static headspace injection with powerful sample handling.

Practically Accurate

TriPlus HS provides top level analytical results by using inert, diffusion-free heated syringes for sample transfer. The elimination of any exposure to active surfaces, responsible for sample degradation or adsorption, allows both simple and demanding components to be analyzed with uncompromised qualitative and quantitative results (i.e. Diketones in beer). Completely unobstructed accessibility to all inlets for manual calibration injections or routine maintenance delivers a high degree of accuracy.

Intelligent Sample Incubation

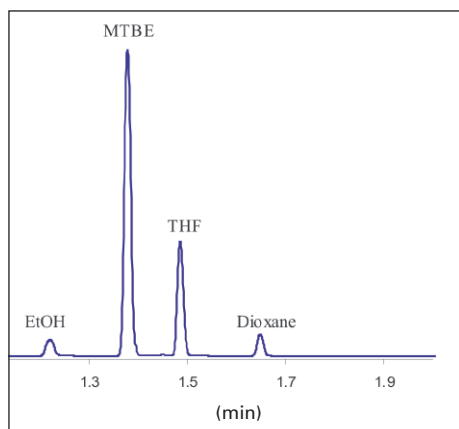
The incubation oven is able to accommodate up to 6 x 10 or 20 mL vials. Dramatically decreasing the sample's gas/liquid equilibration time, its unique design heats and shakes uniformly in order to grant maximum homogeneity for utmost repeatability and reproducibility.

When the analytical run time is shorter than the incubation time, the use of the built-in "overlapping" mode automatically optimizes the incubation sequence timing, minimizing the sample preparation phase.

Reliable Quantitation

The use of 1, 2.5, or 5 mL capacity syringes, automatically detected, allows injected amounts to be fine tuned in 0.1 mL steps over a broad volume range. Proper volume selection can therefore be programmed for both high or low concentration samples simply through software parameter setting. Syringe flushing with inert gas allows thorough rinsing of the barrel after each injection.

The complete elimination of cross contamination allows sequential injections even of samples featuring highly dissimilar characteristics. On top, the uniformed heat distribution along the barrel prevents cold spots from forming. Quantitation can thus be consistently carried out in an easy and reliable fashion.



10 ppm of each component in water. 2 mL sample in a 20 mL vial.

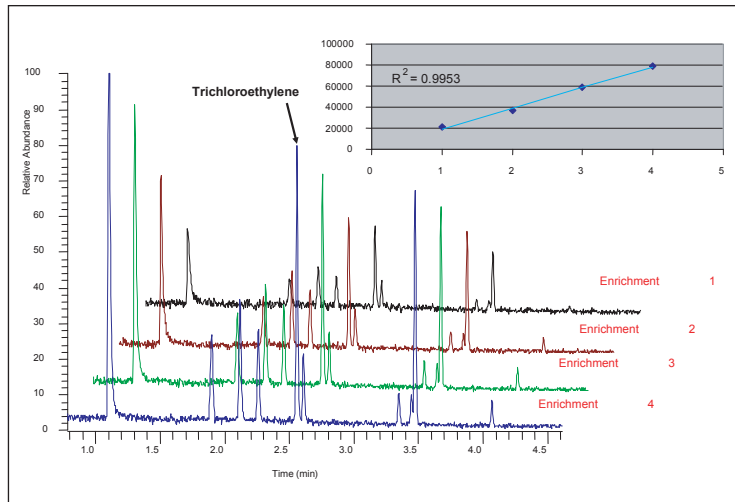
Repeatability of Headspace analysis of solvents in water (7 runs).

Oven 70 °C (inc time 50 min, agitation 30 sec on, 30 sec off)
Syringe 120 °C, 1 mL headspace injected

	ETOH	MTBE	THF	DIOXANE
	585805	8293631	2919184	538229
	576243	8261296	2939842	527843
	580386	8026631	2889706	530884
	573839	8025647	2867534	525765
	573065	8179238	2904440	525183
	572173	8253048	2879742	524895
	584948	8033903	2916050	536534
Average	578065	8153342	2902357	529905
SD	5680	121501	25047	5522
RSD%	0.98	1.49	0.86	1.04

Maximized Throughput

The two 54 position trays available allow the TriPlus HS to load a maximum of 108 sample vials to perform long term, through-the-weekend unattended operations. On top, the compatibility with either 10 or 20 mL vials allows for the selection of the most appropriate equilibration volume for enhanced system flexibility and performance.



5 mL of 5 ppb water solution of Halogenated Volatiles Mix 551A.
From 1 to 4 Enrichments

Smart Sample Enrichment

Exploiting the autosampler's capability of handling multiple sequential injections, the cold trap becomes a natural complement of the TriPlus HS for demanding environmental analyses, greatly extending sensitivity.

TriPlus Accessories

Multiple Headspace Extraction

The Multiple Headspace Extraction (MHE) device allows multiple progressive injections from the same vial. This stepwise gas extraction is performed through vial flushing with selectable venting times. Extrapolation by regression of the areas obtained eliminates the requirement for exhaustive extraction.

PDA for Local Control

This device is the ideal solution for fast and efficient local sampler set-up, control or simple status retrieval. Method transfer among autosamplers can be handled by a single PDA through download of the same method to multiple units.

Bar Code Reader

This accessory is used for complete vial-related information tracking, as requested by some highly regulated environments. The presence of a rotating vial holder permits reading of the bar code, regardless the orientation of the vial in the tray. Finally, the resistance of the vial's labels to high and subambient temperature makes its utilization suitable also with headspace vials.



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In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.

Africa-Other

+27 11 570 1840 • analyze.sa@thermo.com

Australia

+61 2 8844 9500 • analyze.au@thermo.com

Austria

+43 1 333 50 34 0 • analyze.at@thermo.com

Belgium

+32 2 482 30 30 • analyze.be@thermo.com

Canada

+1 800 530 8447 • analyze.ca@thermo.com

China

+86 10 8419 3588 • analyze.cn@thermo.com

Denmark

+45 70 23 62 60 • analyze.dk@thermo.com

Europe - Other

+43 1 333 50 34 0 • analyze.emea@thermo.com

Finland / Norway / Sweden

+46 8 556 468 00 • analyze.se@thermo.com

France

+33 1 60 92 48 00 • analyze.fr@thermo.com

Germany

+49 6103 408 1014 • analyze.de@thermo.com

India

+91 22 6742 9434 • analyze.in@thermo.com

Italy

+39 02 950 591 • analyze.it@thermo.com

Japan

+81 45 453 9100 • analyze.jp@thermo.com

Latin America

+1 608 276 5659 • analyze.la@thermo.com

Middle East

+43 1 333 50 34 0 • analyze.emea@thermo.com

Netherlands

+31 76 579 55 55 • analyze.nl@thermo.com

South Africa

+27 11 570 1840 • analyze.sa@thermo.com

Spain

+34 914 845 965 • analyze.es@thermo.com

Switzerland

+41 61 716 77 00 • analyze.ch@thermo.com

UK

+44 1442 233555 • analyze.uk@thermo.com

USA

+1 800 532 4752 • analyze.us@thermo.com

www.thermo.com

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