Thermo Scientific TriPlus RSH Autosampler

The Thermo Scientific™ TriPlus™ RSH Autosampler offers exceptional precision, flexibility, and productivity in robotic, sample-handling solutions. Compatible with Thermo Scientific GC and GC/MS systems, the autosampler sets new standards in automation and provides advanced liquid-handling cycles that enable automated functionality beyond traditional liquid, headspace, and solid-phase microextraction (SPME) injections.

Integrated sampling system

The TriPlus RSH Autosampler expands automated capabilities beyond sample injections to advanced sample-handling cycles. Automating the whole workflow, from sample preparation to injection, increases precision and reproducibility and enables unprecedented flexibility and productivity in GC and GC-MS sampling.

Ultimate productivity

Designed for expanded productivity, this integrated sampling system accommodates large sample capacities supporting full, unattended 24/7 operation. As an example, a maximum of 972, 2 mL vials combined with multiple 100 mL wash/waste bottles enable weekend long unattended operations – a goal not attainable with most other sampling systems currently on the market.

Unmatched flexibility

The TriPlus RSH robotic sample-handling system offers a multitude of configurations including, liquid, headspace and solid-phase microextraction. In addition to other capabilities, this sampling system delivers the precision you demand for achieving high quality results.

Scalable capabilities enable expanded GC and GC-MS application ranges and the best matching of techniques to sample types.

Seamless operation

Accurate automation of a multitude of traditionally manual tasks is enabled by the smart Automatic Tool Change capability (ATC). The ATC feature enables the user to set up a sequence using up to six different syringes, automatically loaded by the autosampler to accurately perform dilutions, standard additions, calibrations set-up, and sample injections. The ability to exchange syringes for different tasks enables accurate and highly precise sample-handling steps in a single, unattended sequence prior to automated sample injection.

TriPlus RSH configurations

The TriPlus RSH Autosampler is available in several base configurations for:

- Automated liquid sampling and injection
- Static headspace sampling and injection
- SPME Arrow sampling and injection
- Sample preparation routine workflows

All the configurations exist with standard or extended X-arm length. Additional upgrade kits, tools and accessories are available to extend the sample vial capacity or to add other sampling capabilities and transform any configuration into multi-technique platforms.

Features and technical specifications

Description	• XYZ robotic sample-handling apparatus with ATC capability, allowing different injection techniques executed within the same sample sequence in a fully unattended way • Up to six different tools can be managed at the same time, using two ATC stations • Using optional accessories and dedicated programed workflows, the system is also capable of automating the most common sample preparation steps and deliver the highest level of sample-handling flexibility
Communication	• Two independent LAN ports
Local user interface	• LED status indicators • Optional control panel with 4 keys, round knob and graphical LCD display
Instrument control	• Local controller for direct access to instrument configuration and movements (optional) • Thermo Scientific chromatography data systems integrated with Virtual Terminal software to completely mimic the local controller
Teaching functions	• Manual without using tools or external devices
Injector compatibility	• Compatible with on-column (COC), programable temperature vaporizing (PTV), packed (PKD), purged packed (PPKD), split-splitless (SSL) injectors
High throughput configuration	• Dual GC set-up with Double Pro and Confirmation modes: single TriPlus RSH serving two independent GC or GC/MS systems, for liquid, HS or SPME sample injection or for sample preparation, using the same or two different software systems. Two different sampling methods can be used (for liquid injection only) • Rapid Mode starts the syringe washing cycle during the current GC cooling phase
Barcode reader	• Two active laser scanners for all standard vials using 1-dimension barcodes in a horizontal orientation
Vortexer	• Intensive sample mixing with an agitation speed up to 2000 rpm. Compatible with 0.5, 0.7, 2, 5, 10, or 20 mL vials
Incubator/agitator	• Capacity 6 × 20 mL vials (compatible with 2 and 10 mL vials with adapters) • 30–200 °C temperature range • 250–750 rpm agitation speed
Temperature-controlled vial trays	• Heated and cooled trays expand the range of applications from sample injection to sample/standard preparation
Dilutor	• Single- or multi-solvent dispensing tool for single- or multi-solvent dilution • External solvent reservoirs for increased solvent capacity and longer unattended operations
Mounting kits	• Thermo Scientific™ TRACE™ 1300 Series GC, TRACE GC Ultra and FOCUS GC • Mounting kits for major GCs on the market also available
Sampling techniques	• Liquid, Static Headspace, SPME, SPME Arrow, ITEX-DHS
Advanced sample prep	• Dedicated PrepCycles are available to perform routine sample handling workflows • Tools such as Vortexer, Incubator/Agitator or Dilutor as well as multiple large volume syringes, large solvent station, µSPE option and the ATC can be used to automate routine sample preparation procedures, such as standard dilution, standard addition, sequential dilution, derivatization and sample clean-up
Sampling Workflow Editor software	• This software tool allows the user to easily program custom sample preparation workflows through an intuitive drag-and-drop visual programing interface

Liquid sampling

Vial volumes	• 300 µL fixed insert vials, 0.5, 0.7, 2, 2.5, 10, and 20 mL vials. 96/384 Microtiter or Deep Well plates with Automatic Foil Cutter to pierce alumina or plastic foils prior the needle penetration
Bottom sensing for vials	• Capable of liquid injection starting from small-volume samples. Capability to inject from samples as low as 5 µL into a vial. Possibility of performing up to three 1 µL injections from a 5 µL sample, depending on vial type
Height from vial bottom	• User selectable between 0.1 and 32 mm in 0.1 mm steps
Injection speed for liquid samples	• Selectable from 0.1 µL/sec up to 2000 µL/sec and fully programable
Sample capacity	• Depending on autosampler configuration – Up to 4608 well plates or 6912 well plates with extended X-arm – Up to 840 × 0.5/0.7 mL vials or 1260 × 0.5/0.7 mL vials with the extended X-arm – Up to 648 × 2 mL sample vials or 972 × 2 mL vials with the extended X-arm – Up to 240 × 10 mL or 20 mL vials or 360 × 10 mL or 20 mL vials with the extended X-arm
Syringes	• Capable of handling liquid volumes in the range 0.1 µL – 10 mL • Capable of using 0.5 µL, 1.0 µL, 5 µL, 10 µL (standard), 25 µL, 50 µL, 100, µL,250 µL, 500 µL, 1000 µL, 10000 µL syringes for sample injection and/or volume transfer • Needle lengths: 57 mm or 85 mm
Syringe cleaning	• Wash stations for up to 4 different solvents for a total of 40 mL (standard) • Optional large washing stations for up to 3 × 100 mL solvent bottles • Waste: 1 × 10 mL or drain to external waste bottle • Possibility to install multiple solvent stations to expand solvent and waste volumes
Injection volume	• Range from 0.1 to 10,000 µL in 0.1 µL steps up to 100 µL, and 1 µL steps between 100 µL and 10 mL
Liquid injection modes	• 8 fully customizable method-specific preset menus available: – Basic enrichment – Enrichment needle solvent wash – Internal standard double – Internal standard post – Needle solvent wash – Solvent flush double – Solvent flush post
Optional tools	• Peltier-controlled drawer for well plates, 300 µL fixed insert vials, 2 and 10 mL vials. Temperature selectable between 4 and 40 °C • Cooled tray holders for well plates, 300 µL fixed insert vials, 2, 10 and 20 mL vials. Temperature selectable between 4 and 70 °C. Requires external circulator bath • Large Solvent Station – 3 × 100 mL • Large Volume Wash Station – 2 × 100 mL and drain • Fast Syringe Washing module with two solvents – 2 × 1000 mL
Typical liquid injection repeatability	• <0.3 RSD % obtained under standard Thermo Scientific instrument conditions

Headspace sampling

Vial volumes	• Compatible with 2, 10 and 20 mL vials
Syringe sizes	• Gastight 1, 2. 5, and 5 mL
Needle lengths	• 65 mm, compatible with every injector port
Sample capacity	• Depending on autosampler configuration – Up to 180 × 10 or 20 mL vials or 300 × 10 or 20 mL vials with the extended X-arm
Injection volume range	• 0.1 to 5 mL in 0.1 mL steps, depending on syringe
Injection speed	• 1 to 100 mL/min, in 1 mL/min increments
Syringe temperature	• OFF or 40 °C to 150 °C in 1 °C steps
Incubation oven	• Capacity 6 × 20 mL vials (compatible with 2 and 10 mL vials with adapters) • 30–200 °C temperature range, in 1 °C steps • 250–750 rpm agitation speed
Incubation time	• 0.1 to 600.0 min in 0.1 min increments
Syringe flush capability	• With inert gas
Solvent syringe cleaning	• Optional washing stations (4 × 10 mL or 2 × 100 mL vials)
Multiple Headspace Extraction (MHE)	• Yes (optional accessory)
Enrichment sampling	• Yes with optional kit for cold trap
Optional tools	• Peltier-cooled tray holder for 300 µL fixed insert vials, 2 and 10 mL vials; temperature selectable between 4 °C and 40 °C • Cooled tray holders for 300 µL fixed insert vials, 2, 10 and 20 mL vials; requires external circulator bath; temperature selectable between 4 °C and 70 °C
Typical headspace injection repeatability	• <0.7 RSD % under Thermo Scientific standard conditions

Solid-phase microextraction (SPME)

Tool	• Includes fiber holder for standard SPME fibers, 23-gauge • Compatible with SSL and PTV injectors
Vial volumes	• Compatible with 2, 10 and 20 mL vials
Sample capacity	• Depending on autosampler configuration – Up to 648 × 2 mL sample vials or 972 × 2 mL vials with the extended X-arm – Up to 180 × 10 or 20 mL vials or 300 × 10 or 20 mL vials with the extended X-arm
Incubation oven	• Capacity 6 × 20 mL vials (compatible with 2 and 10 mL vials with adapters) • 30–200 °C temperature range, in 1 °C steps • 250–750 rpm agitation speed
Incubation time	• 0.1 to 600.0 min in 0.1 min increments
Vial penetration depth	• Standard or custom between 20 mm and 70 mm, suitable for headspace or direct immersion (DI) extraction
Fiber conditioning station	• Optional, 2-ports, 40–350 °C, inert gas purged • Suitable for both SPME and SPME Arrow fibers
Fiber types	• 10 mm fiber length • PDMS (7, 30, 100 µm, Polyacrylate (85 µm), Carbon WR/PDMS (95 µm), DVB/PDMS (65 µm), DVB/Carbon WR/PDMS (50-30 µm)

SPME Arrow

Tool	• Includes fiber holder for SPME Arrow fibers, 1.1 and 1.5 mm o.d. • Compatible with SSL injector
Vial volumes	• Compatible with 10 and 20 mL vials
Sample capacity	• Depending on autosampler configuration – Up to 180 × 10 or 20 mL vials or 300 × 10 or 20 mL vials with the extended X-arm
Incubation oven	• Capacity 6 × 20 mL vials (compatible with 2 and 10 mL vials with adapters) • 30–200 °C temperature range, in 1 °C steps • 250–750 rpm agitation speed
Incubation time	• 0.1 to 600.0 min in 0.1 min increments
Vial penetration depth	• Standard or custom between 20 mm and 70 mm, suitable for headspace or direct immersion (DI) extraction
Heatex-Stirrer	• For intensive heating and stirring during the extraction step, 40–200 °C, 0–1600 rpm
Fiber conditioning station	• Optional, 2-ports, 40–350 °C, inert gas purged. Suitable for both SPME and SPME Arrow fibers
Fiber types	• 20 mm fiber length • PDMS (100 um/1.1 mm o.d., 250 um/1.5 mm o.d.), Polyacrylate (100 um/1.1 mm o.d.) Carbon WR/PDMS (120 um/1.1 mm o.d.), DVB/PDMS (120 um/1.1 mm o.d.), DVB/Carbon WR/PDMS (120 um/1.1 mm o.d.)

In-Tube Extraction Dynamic Headspace (ITEX-DHS) option

Tool	• Includes sampling gas-tight syringe, focusing trap, built-in trap heating and cooling fan and trap cleaning capability
Temperatures	• Trap 30–350 °C • Syringe 40–150 °C
Extraction parameters	• Flow rate 10–1000 µL/s, stroke cycles 0-1000, volume 0-1300 µL, incubation time up to 600 min, water removal step
Vial volumes	• Compatible with 20 mL vials
Vial penetration depth	• Standard or custom between 10 and 35 mm
Sample capacity	• Depending on autosampler configuration – Up to 180 × 10 or 20 mL vials or 300 × 10 or 20 mL vials with the extended X-arm
Incubation oven	• Capacity 6 × 20 mL vials (compatible with 2 and 10 mL vials with adapters) • 30–200 °C temperature range, in 1 °C steps • 250–750 rpm agitation speed
Incubation time	• 0.1 to 600.0 min in 0.1 min increments
Traps	• Tenax TA 80/100 mesh as standard, other single- or multi-layer microtraps available for volatile and semi-volatile compounds enrichment

Dilutor tool

Tool	• Available for single- or multi-solvent dispensing (up to four), compatible with standard X-arm length only
Dispensing syringe size	• 100 µL, 1 mL, 5 mL, 10 mL
Dispensed volume	• From 10 µL to 1000 mL, depending on the syringe volume
Dilution cycle	• Dedicated PreCycles for in-batch single- or multi-solvent addition, optional pre- and post-washing step, optional mixing step (requires Vortexer module)

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Micro Solid-Phase Extraction (µSPE)

µSPE tool kit	• Includes hardware for µSPE handling, script, standard operation procedure and quick installation guide
Sample capacity	• 54 (standard)–108 × 2-mL sample vials, elution vials and µSPE cartridges
µSPE syringe volume	• 1000 µL for conditioning/elution solvent and raw sample
Liquid syringe volume	• 10 and 25 µL for ISTD/protectant addition and clean sample injection
Elution speed	• Optimized at 2 µL/s
Elution solvent capacity	• 3 × 100 mL
Washing solvent capacity	• 2 × 1000 mL
µSPE workflow	• Optimized QuEChERS extracts clean-up workflow with internal standard and analyte protectant addition (optional), µSPE cartridges conditioning (optional) and on-line GC injection

Find out more at **thermofisher.com/triplusrsh**

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