

GERSTEL

Thermal Desorber

TD 3.5+



Compact analysis system

Efficient Automation

Highly inert, no analyte loss or carry-over

For standardized methods

For 3.5" tubes including
GERSTEL Plus tubes

Thermal Desorber TD 3.5+



The Thermal Desorber TD 3.5+ is a flexible automated system for thermal desorption and thermal extraction. The TD 3.5+ fits on top of any modern GC without the need for additional bench space and it is perfectly suited for the analysis of solid materials and for thermal desorption of sorbent tubes used to sample whole air. The TD 3.5+ handles standard 3.5" tubes, as prescribed in several standard methods, in addition to GERSTEL plus tubes, which hold up to 30 % more sorbent for improved recovery.

The TD 3.5+ incorporates the latest advances in thermal desorption technology. Intelligently designed and based on a "Liner-in-Liner" concept it has no valve or transfer line. The TD 3.5+ is connected directly to the GERSTEL Cooled Injection System (CIS), which serves both as a cryo-focusing trap and as a temperature programmable GC inlet. Active sites are eliminated, reducing the risk of analyte loss, discrimination and memory effects to an absolute minimum.

The TD 3.5+ can be operated in single split, dual split or true splitless mode enabling it to cover the widest range of concentrations, to protect the column from water and contamination, and to achieve the lowest possible limits of detection. The TD 3.5+ low-flow split pneumatics provide improved flexibility and performance. For extreme sensitivity, the multi-desorption mode can be selected in MAESTRO, whereby multiple sorbent tubes are desorbed and the analytes concentrated into a single GC/MS run.

Techniques supported by TD 3.5+:

- Thermal desorption of adsorbent tubes used for air sampling
- Dynamic Headspace (DHS 3.5+) based on standard headspace vials
- DHS 3.5+ Large based on up to 1 liter sample containers
- Direct thermal extraction of solid samples in fritted TD tubes
- Stir Bar Sorptive Extraction (SBSE) using the GERSTEL Twister®
- Thermal extraction of liquids placed in μ -vials inside the TD tube

The TD 3.5+ supports manual operation and it can be removed in a few minutes to enable direct liquid sample introduction into the GERSTEL Cooled Injection System (CIS), a PTV-type universal GC inlet.

When configured with the GERSTEL MultiPurpose Sampler (MPS robotic), up to 40 samples are stored per tray in individually sealed sample positions. The system is easily scaled up by using up to three trays for a total of 120 samples per tray holder. The number of tray holders depends on size and configuration of the MPS robotic.

Important Features of the TD 3.5+ System:

1 Sample Introduction System for a Wide Range of Applications

- Analysis of solids, liquids and gases
- Temperature programmed desorption ensures optimal transfer conditions for all analytes
- Ideal trapping of unknowns, no need to select individual adsorbent traps for specific compounds
- Split and true splitless analyte transfer covers a wide concentration range
- Multidesorption mode for extreme sensitivity
- Extremely low detection limits
- Complete and uniform tube heating during desorption, best possible SVOC recovery
- Flexible refocusing options; cryogen-free with adsorbent bed or cryogenic to -180 °C
- Small footprint, mounts on top of GC

3 Liner-in-Liner Design

- No transfer line, no valve, excellent recovery of all analytes
- No active sites, no memory effects, clean base line for your next sample
- Chromatography performed using advanced EPC of GC inlet
- Improved reliability and easy maintenance

2 Highest Productivity and Throughput

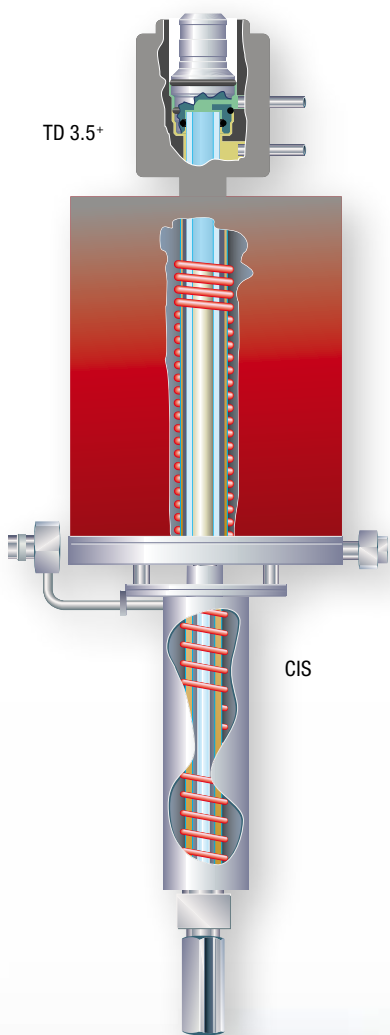
- Automated desorption of up to 480 samples
- Performs multiple techniques without reconfiguration
- Adsorbent tubes, Twisters, solids and liquids can be analyzed in one automated sequence
- Simultaneous desorption of multiple Twisters from sequential SBSE
- Automated addition of internal standard for improved quality and productivity

4 Sealed Sample Storage

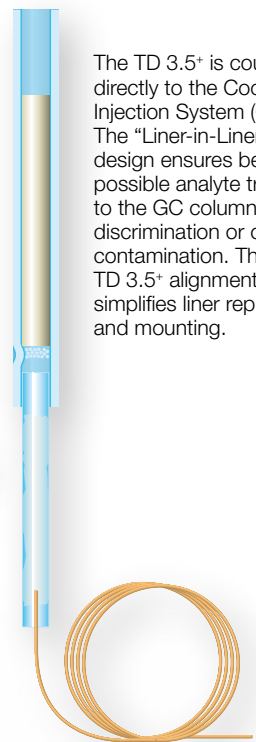
- Sample integrity ensured through individual, leak-tight storage
- Reliable results achieved by eliminating analyte loss, contamination from laboratory air and cross contamination

5 Easy Control through MAESTRO Software

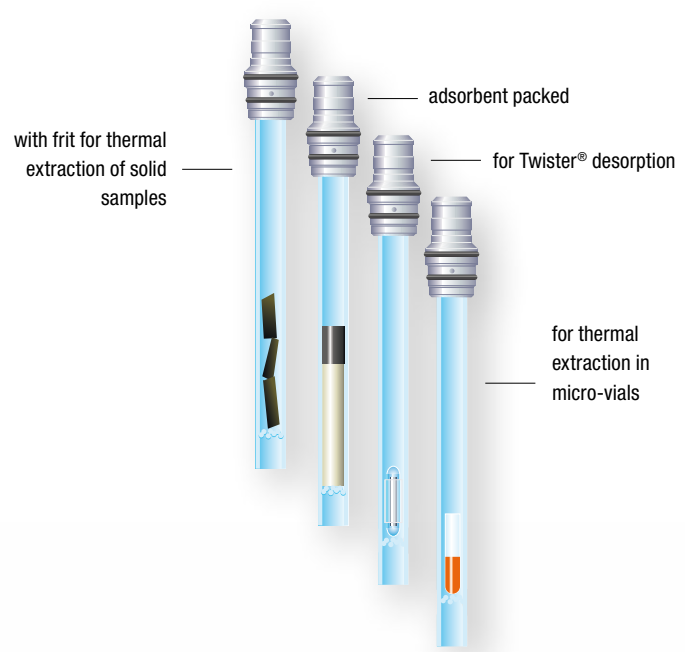
- Efficient and convenient operation by mouse-click
- Independent operation with any chromatography software
- One integrated method and sequence table for complete system including GC/MS when using Agilent Technologies ChemStation or MassHunter software
- Complete documentation and log
- E-mail notification of system status



The TD 3.5+ is coupled directly to the Cooled Injection System (CIS): The "Liner-in-Liner" design ensures best possible analyte transfer to the GC column without discrimination or cross contamination. The built-in TD 3.5+ alignment support simplifies liner replacement and mounting.



TD 3.5+ tubes



Automated micro-scale chamber



In the DHS L 3.5+, samples are placed in individual inert chambers with a volume of up to 1 liter at defined temperature and air exchange rate. Analytes are automatically collected at user-defined intervals followed by thermal desorption in the TD 3.5+ and GC/MS determination. Emission profiles can be established automatically and automated spiking of standards onto sorbent tubes can be performed for calibration and qualification purposes using the TSS option for MPS robotic. GERSTEL plus tubes with up to 30 % more sorbent can be used for improved analyte recovery and larger sampling volumes.

Samples can be analyzed in one automated sequence using one or more methods. The MAESTRO software integrated with the Agilent® MassHunter™ or ChemStation™ controls the complete process from sample introduction through thermal desorption to GC/MS analysis with one method and one sequence table ensuring efficient and error-free operation.

Automated Dynamic Headspace (DHS and DHS L)



The industry standard GERSTEL MPS autosampler combined with the Dynamic Headspace (DHS) option and the TD 3.5+ enable complete automation of the DHS technique. In the DHS station, VOCs are extracted from liquid or solid samples placed in standard headspace vials. The headspace above the sample is purged and analytes are concentrated on a user selectable sorbent filled trap (TD tube) at user defined sample and trap temperatures and flow. A dry purge step can be selected to purge humidity from the adsorbent bed. Analytes are subsequently introduced into a gas chromatographic system by thermal desorption of the trap in the TD 3.5+, resulting in maximum recovery, and lowest possible detection limits. Compared with the TDU 2, the DHS 3.5+ allows the analyst to use up to four times more sorbent for improved recovery of WVOCs and VOCs.



The DHS option offers improved performance for a wide variety of sample types, such as food, beverages, polymers, personal care products and pharmaceutical packaging. The DHS Large option enables direct analysis of larger samples in 1 L containers. The DHS is a highly useful general thermal extraction tool for GC/MS analysis.



Tube Spiking System TSS



The GERSTEL Tube Spiking System (TSS) enables automated generation of standard tubes for Thermal Desorption analysis. Using the GERSTEL MPS, adsorbent tubes are spiked with a user defined volume of liquid standard and the solvent purged with a defined flow of carrier gas as required for method calibration and validation according to international standard methods. Multiple TSS units can be mounted on the MPS for higher throughput.



Analysis of GERSTEL Twisters®



Stir Bar Sorptive Extraction (SBSE), based on the GERSTEL Twister®, is a solvent free technique for ultra-trace determination of organic compounds in aqueous matrices. The PDMS or EG-Silicone phase on the Twister efficiently extracts organic compounds while the sample is stirred. No additional sample preparation is needed. SBSE is up to 1000 times more sensitive than Solid Phase Micro-Extraction (SPME). TD 3.5+ performs thermal desorption of one or more Twisters. These are placed in a desorption tube fitted with a transport adaptor that also seals the tube. Contamination and loss of analytes are eliminated.

Up to 480 Twisters in individual tubes can be desorbed in one sequence using the MPS for automation. Analytes are transferred to the CIS for cryofocusing and subsequently introduced to the GC/MS column in split or splitless mode covering a wide concentration range. Multiple Twisters can be desorbed in one tube and several tubes can even be desorbed for each GC/MS run for extreme sensitivity and ultra-low limits of detection.

Sample Prep by Mouse-Click MAESTRO



The MultiPurpose Sampler (MPS) is an autosampler and sample preparation robot for GC/MS and LC/MS. Sample preparation steps are performed during the analysis of the preceding sample for best possible system utilization and highest sample throughput. Sample preparation steps are performed in a controlled, highly accurate and reproducible manner for best possible results. Every step is selected by mouse-click from a pull-down menu in the MAESTRO software and added to the overall GC/MS or LC/MS method. In addition to the TD functions, the following sample preparation techniques are available:

- Automated Liner EXchange (ALEX)
- SPME and SPME Fiber changer
- Multi-dimensional GC (MCS)
- Solid Phase Extraction (SPE)
- Derivatization and addition of standards
- Extraction, dilution and filtration
- Weighing, sonication, centrifugation and evaporation (^mVAP)
- Heating, conditioning and mixing
- Automated DNPH cartridge elution and LC determination

GERSTEL MAESTRO Software

Next generation software for automated sample preparation and sample introduction. MAESTRO optimizes performance and throughput of GERSTEL modules and systems.

- Stand-Alone operation, fully integrated in the Agilent ChemStation or MassHunter Software, or integrated with the Thermo Scientific® Xcalibur™ sequence table
- Sample Prep by Mouse-Click using PrepBuilder functions
- Scheduler for easy planning of sequences and of laboratory work-flow
- PrepAhead / Multiple Sample Overlap: Automated overlapping of sample preparation and analysis for maximum throughput
- Priority samples can be added to the system at any point in the analysis sequence
- LOG file and Service LOG file functions ensure traceability
- Automated E-mail notification if the sequence is stopped
- Real-time monitoring of all modules and parameters
- Interactive on-line help function



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