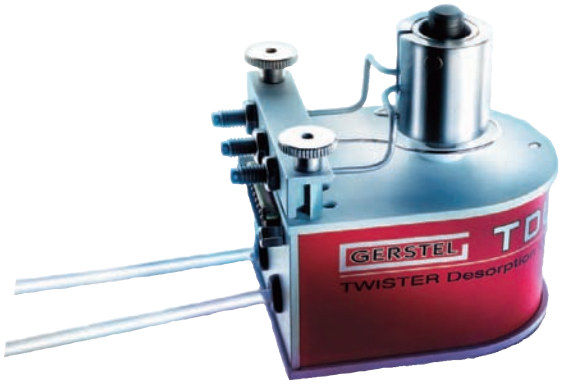

Thermal Desorption Unit

TDU

Specifications

TDU

Uses

- Thermal desorption of analytes that have been concentrated on a GERSTEL Twister® or on adsorbent placed in a TDU tube
- Direct thermal extraction of analytes from solid or liquid samples
- Direct injection of liquid samples into the TDU and subsequent transfer to the Cooled Injection System CIS
- Direct injection of liquid samples with a heavy matrix load into micro-vials placed in the TDU, followed by thermal extraction and removal of the matrix residue along with the used micro-vial
- Injection of liquid standards

System Configuration

- Compatible with most standard GCs
- GERSTEL Cooled Injection System CIS fitted with a special TDU liner is used for analyte focusing prior to GC or GC/MS analysis

Cooling Options

- Cryostatic cooling CCD
- Peltier cooling UPC

Minimum Temperatures

- +10 °C (with cryostatic cooling CCD)
- +10 °C (with peltier cooling UPC, depending on the transfer temperature)

Cooling Rate

- From 300 °C to 20 °C in 30 seconds (using the UPC)

Temperature Programming

- 2 temperature ramps
- Heating rate maximum 720 °C/min
- Initial temperature 10 … 350 °C
- 1. hold temperature 10 … 350 °C
- 2. hold temperature 10 … 350 °C
- Hold time maximum 650 min for each hold temperature

Sample Transfer Modes to the CIS

- Split
- Splitless
- Solvent venting

Transfer Temperature

- Maximum 350 °C
- Fixed or in TDU tracking mode (with max. 120 °C/min.)

Desorption Mode

- Retain tube - Standby Cooling
  The tube remains in the TDU after desorption, the TDU is cooled to the standby temperature.
- Retain tube - no Cooling
  The tube remains in the TDU after desorption, the cryo cooling is switched off at GC start.
- Remove tube - Standby Cooling
  The tube is removed from the TDU after desorption, the TDU is cooled to the standby temperature.
- Remove tube - no Cooling
  The tube is removed from the TDU after desorption, the cryo cooling is switched off at GC start.

Custom solutions for special performance requirements available upon request..

Thermal Desorption Unit TDU

Pneumatics

- Pressure release for sample loading and unloading
- Flow, pressure and split ratio controlled through the GC pneumatics, depending on the GC model, or through the CIS pneumatics.

Control

- Based on one of the controllers C505 or C506
- In combination with the GERSTEL MAESTRO software, integrated in the Agilent® Technologies ChemStation software or operated in stand-alone mode
- Only one method and one sequence table required for the complete system including GC/MS when integrated in the ChemStation software

Automation

- ATEX Option for automated processing of up to 196 Twisters® using the GERSTEL MultiPurpose Sampler MPS

Regulatory Certifications and Standards

- DIN EN 61010-1/A2:1996
- DIN EN 61326:2004-05
- IEC 61010-1:1990/A1:1992/A2:1995
- IEC 61326:2002
- UL STD 3101-1;93
- CAN/CSA C22.2 NO.1010.1-92

Operating Conditions

- 15 … 35 °C
- Relative humidity max. 50-60 %, non-condensing
- Max. 4615 m above sea level

Storage Conditions

- -20 … 50 °C
- Relative humidity max. 50-60 %, non-condensing
- Max. 4615 m above sea level

Dimensions (H × W × D)

- 94 × 124 × 77 mm

Weight

- 1.2 kg

Power Consumption

- Max. 110 Watt

Tube Types

- TDU tubes for GERSTEL Twister®
  60 × 6 × 5 mm (L × OD × ID)
- TDU tubes 60 × 6 × 4 mm (L × OD × ID)
- Length of heated area approximately 20 mm
- Empty or packed
- Special micro-vials for up to 100 µL sample volume available
- More detailed information is available in a separate flyer

TD Pneumatics Box

- Switches between TDU split and CIS split
- Controls pressure release for sample loading and unloading
- 4 LEDs provide quick status overview
- 1 × split output to CIS pneumatic
- 1 × TDU split input
- 1 × CIS split input
- 1 × compressed air input
- 1 × valve control interface
- 1 × pneumatic control interface
- Dimensions 200 × 100 × 175 mm (L × H × W)
- Weight 1.5 kg

Accessories and Options

- ATEX Option (Automated Tube Exchange)
  for automated liquid injection into the TDU liner, typically using a micro-vial insert, followed by thermal extraction of the liquid and tube exchange in a GERSTEL Thermal Desorption Unit TDU
- DHS,
  for automated dynamic headspace analysis of up to 98 samples
- Tube Conditioner TC 2
  for simultaneous thermal conditioning of up to ten TDU tubes or up to 50 Twisters® under a flow of inert gas
- Gas Sampler GS 1
  compact, microprocessor controlled whole air sampler with built-in sample changer for up to 10 TDU tubes
- MPS-HIT
  for automated Headspace or SPME injection through the TDU into the CIS

Thermal Desorption Unit TDU

Uses

Standard Thermal Desorption/ Twister®-Desorption

Principle

Analytes that have been concentrated on a GERSTEL Twister® or on an adsorbent placed in a TDU tube are thermally desorbed in the TDU.

Features

- No transfer line, analytes are transferred directly from the TDU to the CIS without loss of analytes
- Short cycle times and limited power requirement due to small thermal mass of the TDU
- When transport adapters for liquid injection are used, automated standard addition can be performed using the MPS

Applications

- Thermal desorption of analytes from liquid samples that have been concentrated on a GERSTEL Twister®
- Thermal desorption of analytes from gaseous samples that have been concentrated onto an adsorbent

Accessories Required

- Adsorbent filled TDU tubes

  or

- TDU tubes for desorption of GERSTEL Twister®

Adsorbents

- Tenax TA™, Tenax GR™
- Carbopack B + X, Carbopack B +C, Carbopack B, Carbopack C + B
- Carboxen 1000
- Carbosieve SIII™
- PDMS
- Coated magnetic stir bar, GERSTEL-Twister®

Types of Twister®

- Length 10 mm, coating 0.5 mm, PDMS volume 24 µL
- Length 10 mm, coating 1.0 mm, PDMS volume 63 µL
- Length 20 mm, coating 0.5 mm, PDMS volume 47 µL
- Length 20 mm, coating 1.0 mm, PDMS volume 127 µL
- Length 10 mm, EG/Silicone volume 32 µL

Automation

- Using ATEX Option and MultiPurpose Sampler MPS
- Max. 196 Twisters® per sequence

Direct Thermal Extraction

Principle

Direct thermal extraction of analytes from solid or liquid samples. Samples are kept inside sealed TDU tubes in an autosampler tray prior to analysis. Liquid samples are normally placed in micro-vials inside the TDU tube, solid samples are kept in place by a glass frit inside the TDU tube.

Features

- Samples are loaded into TDU tubes offline
- No cross-contamination since a new TDU tube is used for every sample
- When transport adapters for liquid sample injection are used, automated standard addition can be performed using the MPS

Applications

- Direct thermal extraction of samples that are not compatible with syringe injection. Examples are viscous liquids or solids

Accessories required

- TDU tubes with micro-vials

  or

- TDU tubes with glass frit

Automation

- Using ATEX Option and MultiPurpose Sampler MPS
- Max. 196 Twisters® per sequence

Thermal Desorption Unit TDU

Direct Liquid Sample Injection

Principle

The liquid sample is directly injected into the TDU tube inside the TDU and subsequently transferred to the Cooled Injection System CIS.

Features

- Direct injection of liquids into the CIS without first removing the TDU
- Venting of low boiling conmponents possible for samples with a heavy matrix load

Applications

- Analysis of samples with a heavy matrix load

Accessories Required

- Transport adapters for liquid injection
- TDU tubes with glass frit

  or
- TDU tubes packed with glass wool

Automation

- Using ATEX Option and MultiPurpose Sampler MPS
- Max. 196 Twisters® per sequence

Direct Headspace and SPME Injection

Principle

The sample is injected into the cold CIS though the hot TDU.

Features

- Direct injection into the CIS without first removing the TDU
- Parallel operation of Headspace or SPME and TDU
- No dicrimination of high boiling components during injection into the cold CIS

Accessories Required

- Liquid injection transport adapters
- TDU tubes, empty

Automation

- Using MultiPurpose Sampler MPS with Headspace or SPME option

Liquid Sample Injection to Micro-Vials

Principle

The liquid sample is injected into a TDU tube inside the TDU immediately prior to the extraction.

Features

- Sample injection into a closed TDU system
- Sample can be injected without having to use programmed speed
- No system contamination since sample matrix is removed with the used micro-vial and the used TDU tube
- No loss of analytes from the TDU tube through evaporation prior to extraction
- No contamination of the TDU tray
- Automated Standard Addition can be performed by the MPS

Applications

- Analysis of samples with a heavy matrix load, for example oils
- Analysis of large volume samples including solvent evaporation step
- Dynamic Headspace of liquid sample volumes of up to 100 µL

Accessories required

- Transport adapters for liquid injection
- TDU tubes with micro-vials

Automation

- Using ATEX Option and MultiPurpose Sampler MPS
- Max. 196 samples/Twisters® per sequence

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