

## Gas Chromatography

TurboMatrix  
Thermal Desorbers

Five different PerkinElmer® TurboMatrix™ Thermal Desorber (TD) models are available:

**TurboMatrix 100 TD.** Single-tube, manual-pneumatics model, upgradeable to the automated version. Also includes a separate trap-clean-and-test function, which saves time and protects the GC column and detector. Upgradeable to TurboMatrix 150 ATD.

**TurboMatrix 150 ATD.** Automated sampling of up to 50 tubes with manual pneumatics. Overlaps tube desorption with GC analysis for optimum productivity. Includes a separate trap-clean-and-test function which saves time and protects the GC column and detector.

**TurboMatrix 300 TD.** Single-tube model, incorporating programmable pneumatic control (PPC), upgradeable to the automated version. Supports pressure and flow control with linear velocity read-out of the carrier gas through the GC column. Also includes a separate trap-clean-and-test function which saves time and protects the GC column and detector. Upgradeable to TurboMatrix 350 ATD.

**TurboMatrix 350 ATD.** Automated sampling of up to 50 tubes, incorporating PPC. Supports pressure and flow control with linear velocity read-out of the carrier gas through the GC column. Overlaps tube desorption with GC analysis for optimum productivity. Allows the ability to condition tubes during chromatography to minimize downtime and enhance productivity and also includes a separate trap-clean-and-test function which saves time and protects the GC column and detector.

**TurboMatrix 650 ATD.** Automated sampling of up to 50 tubes, incorporating all of the performance features of the TurboMatrix 350 ATD model plus the ability to re-collect sample (on the source or a new tube) for repeat analysis, the ability to perform dry purge of the tube in sampling direction without the internal standard accessory, and the ability to perform tube and trap impedance measurement as a diagnostic of adsorbent bed condition.

## Hardware

|                                     |  |
|-------------------------------------|--|
| <b>Sample tube capacity</b>         | TurboMatrix 100 and 300 TD models: single industry-standard sample tube.<br>TurboMatrix 150, 350 and 650 ATD models: 50 industry-standard sample tubes.  |
| <b>Sample tubes</b>                 | Stainless steel, glass and glass-lined stainless steel sample tubes are available. Each tube is etched with a unique serial number for traceability. Stainless steel tubes may also be fitted with clips that accept adhesive labels for identification. Tubes can be ordered either empty or pre-packed with a variety of adsorbents for active and diffusive (passive) sampling. |
| <b>Desorptions</b>                  | Up to 98 or continuous.  |
| <b>PPC</b>                          | Standard on TurboMatrix 300 TD, 350 and 650 ATD. Provides control of carrier pressure, desorb flow rate, inlet split flow rate, outlet split flow rate with linear velocity read-out.  |
| <b>Tube and trap impedance test</b> | Checks if the packing has settled in the tube or trap or if the tube or trap packing is fragmenting, causing partial blockage. <b>Note:</b> <i>Standard on TurboMatrix 650 ATD.</i>  |
| <b>Tube and trap dry purge</b>      | Provides more efficient moisture removal. Trap dry purge supported on all models. Tube dry purge supported on TurboMatrix 650 ATD or with internal standard accessory.   |
| <b>Sample split re-collection</b>   | Allows sample re-collection on same or different tubes to enable repeat analysis, without the need for an additional autosampler. <b>Note:</b> <i>Standard on TurboMatrix 650 ATD.</i>   |
| <b>Functional features</b>          | Each of the five TurboMatrix Thermal Desorber models incorporates a combination of functional features summarized in the table below.  |

|   | <b>TurboMatrix<br/>100 TD</b> | <b>TurboMatrix<br/>150 ATD</b> | <b>TurboMatrix<br/>300 TD</b> | <b>TurboMatrix<br/>350 ATD</b> | <b>TurboMatrix<br/>650 ATD</b> |
|---|-------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|
| Automated sampling of up to 50 tubes                                  | No                            | Yes                            | No                            | Yes                            | Yes                            |
| Integral control from data-handling system                            | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Improved trap mounting  | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Improved high-temperature tube seal                                   | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Simplified transfer-line connection                                   | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Manifold and brazed connections                                       | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Trap dry purge  | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Separate trap-clean-and-test function                                 | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| MS mode   | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Gas preservation  | Yes                           | Yes                            | Yes                           | Yes                            | Yes                            |
| Tube conditioning during run  | No                            | Yes                            | No                            | Yes                            | Yes                            |
| Electronic carrier-gas pressure/flow control (PPC)                    | No                            | No                             | Yes                           | Yes                            | Yes                            |
| Inlet-split, outlet-split, desorb flow rate, electronic control (PPC) | No                            | No                             | Yes                           | Yes                            | Yes                            |
| Pressure-pulsed desorption  | No                            | No                             | Yes                           | Yes                            | Yes                            |
| Column leak test  | No                            | No                             | Yes                           | Yes                            | Yes                            |
| Sample-split re-collection  | No                            | No                             | No                            | No                             | Yes                            |
| Tube and trap impedance test  | No                            | No                             | No                            | No                             | Yes                            |
| Dry purge of tube in sampling direction                               | Optional*                     | Optional*                      | Optional*                     | Optional*                      | Yes                            |
| <i>*with the Internal Standard Option</i>                             |                               |                                |                               |                                |                                |

## Primary desorption oven

Temp range 50 °C to 400 °C; Desorption time 1.0 min to 999.0 min

## Quartz cold trap

Low temp range -40 °C to +150 °C (Peltier cooling – standard); -100 °C to +150 °C (LN2 cooling – optional)

High temp range -40 °C or -100 °C to 400 °C

Time at high temp 0.0 to 999.0 min

Heating rates 5 °C/sec, 20 °C/sec, 40 °C/sec and ballistic

Gas-flow direction Backflush flow for optimal use of traps with multiple adsorbents during trap heating

## Transfer line to GC

Length Choice of 1070 mm or 1800 mm

Temp range 50 °C to 300 °C

Material Direct connection of the column or fused silica tubing can be used to interface the unit with any gas chromatograph (GC).

## Heated valve

Material 316 stainless steel valve body and inert Valcon T-type rotor for valve temperatures from 150 °C to 300 °C (standard). Sulfinert deactivation of valves and fittings optional.

Sample flow path The tube desorption area, the cold trap and the transfer line are attached directly to the heated valve, minimizing the sample flow path. The heated valve is placed inside a single heated block, conveniently located at the front of the instrument and easily accessible.

## Pneumatics

Carrier gas **Manual pneumatics models** Manual pneumatic control via a precision pressure regulator, settable from 0 to 60 psig (0 to 400 kPa); Pressure control split flow rates and primary desorption flow rates are controlled using high-precision needle valves.

**PPC models** Pressure: 0 to 60 psig (0 to 400 kPa); Split flow: 0 to 200 mL/min; A composite measure of fraction of original sample transferred to GC column is displayed; Desorb flow setting range from 0 to 200 mL/min; Carrier gas flow: 0-20 mL/min; Pressure and flow control supported on any GC.

Pneumatic valve actuation All models require an external supply of dry (dew point -50 °C or below) compressed air in the pressure range of 70 to 90 psig (480 to 620 kPa). Consumption rate: 0.5 L/min (TD), 0.7 L/min (ATD).

Sample protection Initial check for adequate carrier gas pressure prior to tube loading. Sequence leak and pressure test completed on sample tube and cold trap before every tube desorption. Ambient temperature carrier gas purge of sample tube to remove air prior to desorption. Purge effluent is routed through the cold trap to avoid loss of volatile compounds. The TurboMatrix 650 ATD or standard addition accessory can also dry purge sample tube at ambient or elevated temperature in sampling direction to remove water prior to tube desorption.

## Control

|                                   |  |
|-----------------------------------|--|
| <b>Standalone operation</b>       | <p>Each thermal desorber is a self-contained, standalone unit that can be connected to any GC. The thermal desorbers are controlled through a color graphical touch-screen user interface. Set and actual values of all parameters may be displayed at any time.</p> <ul style="list-style-type: none"><li>• Simple, one-touch operation</li><li>• Single-method operation</li><li>• Sequence-based, multi-method operation of up to eight methods</li><li>• Password protection</li><li>• Ten operating methods can be stored in the instrument</li><li>• Parameters remain stored with last-used method directly available after power-up</li></ul>    |
| <b>Languages</b>                  | English, French, German, Italian, Chinese, Japanese, Spanish and Russian   |
| <b>Software control</b>           | Optional control software package available to operate TurboMatrix instruments from a Microsoft® Windows environment. The control software offers graphical representation of instruments and parameters with intuitive interaction. Sequence building follows the easy drag-and-drop principle. A run log tracks and saves information on samples and performed analyses for GLP compliance. Context-sensitive on-line help is available for all functions. Moreover, when configured into a PerkinElmer TotalChrom® CDS environment, all of the instrument's settings as well as the tube information and sequence build become part of the GC method. |
| <b>GC/data system interfacing</b> | Output signal lines for READY and RUN to start gas chromatograph and data-handling devices. Input lines for START, STOP and READY to control the thermal desorber externally.  |
| <b>Maintenance alarms</b>         | Settable injection counter alerts user when it is necessary to perform routine maintenance.  |
| <b>BCD/relay outputs</b>          | Used to provide output of BCD information regarding tube position numbers and relay output for timed control of external devices. <b>Note:</b> <i>Standard on all models.</i>  |

## Optional accessories

|                                   |   |
|-----------------------------------|---|
| <b>Internal standard addition</b> | Used to introduce a known quantity of a gaseous standard into the sample tube for internal-standard calibration and quality assurance. Internal standard is added to sample tube immediately before desorption and analysis in sampling direction to maintain sample integrity and allows standards with several compounds to be used on tubes with multiple adsorbents. Also enables dry purging of sample tubes, in sampling direction, for removal of water prior to desorption. |
| <b>On-line sampling</b>           | System for on-line sampling of ambient air, gas streams or canisters. Includes mass flow controller for sample control, Nafion drier and dry air purge control. Stream selector to switch automatically between sample and calibrant. Thermal desorber can still be used for tube desorption.   |
| <b>Liquid nitrogen cooling</b>    | For operation of the cold trap to -100 °C. Requires pressurized liquid nitrogen dewar with pressure release valve set to 25 psi (180 kPa).  |

## Physical details

Ambient operating conditions    Temperature range: 15 °C to 32 °C  
Humidity: 75 % maximum RH without condensation

Power requirements    100/120/240 V  $\pm$ 10%, 50/60 Hz, 1.2 kVA

### Dimensions

|        | <b>TurboMatrix<br/>100 and 300 TD</b> | <b>TurboMatrix<br/>150, 350 and 650 ATD</b> |
|--------|---------------------------------------|---|
| Height | 48 cm (19 in)                         | 48 cm (19 in)                               |
| Width  | 43 cm (17 in)                         | 43 cm (17 in)                               |
| Depth  | 34 cm (14 in)                         | 56 cm (22 in)                               |
| Weight | 25 kg (55 lb)                         | 34 kg (75 lb)                               |

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