

## Thermo Scientific TRACE GC Ultra

Multi-channel gas chromatograph

The Thermo Scientific TRACE GC Ultra is a multi-channel gas chromatograph, developed for the evolving requirements of the gas chromatography market. In addition to offering the most complete range of proprietary inlets, sensitive detection systems, smart accessories, and ancillary devices, the Ultra platform features unique technologies that raise the standard of Speed, Sensitivity and Separation in gas chromatography.

### Unique Techniques

#### Ultra Fast

##### *20 times faster analyses*

The Thermo Scientific UltraFast GC column module featuring heat-up rates up to 1200 °C/min, can dramatically shorten analysis cycles without compromising analytical resolution, precision, or reliability. Column modules are available for virtually any stationary phase.

#### Large Volume Capabilities

##### *50 times more sensitive*

Large-volume injections of up to 50 µL, available on a standard TRACE GC Ultra™ split/splitless (SSL) injector, extend sensitivity of conventional GC methods simply and effectively. A 450 µL capability available for On-column and PTV inlets completes the offering by meeting all requirements for trace analysis.

#### Backflush

##### *Twice as robust*

Injector-integrated backflush capability with optional upgrade kit keeps high-boiling contaminants out of the analytical column, improving overall robustness and reducing maintenance requirements.

#### Comprehensive Two-Dimensional Gas Chromatography (GCxGC)

##### *30 times higher peak capacity*

A comprehensive Two-Dimensional Gas Chromatographic approach (GCxGC) extends the separation capability of your TRACE GC Ultra system. Due to the proprietary Dual Jet CO<sub>2</sub> Cryogenic Modulator (\*) fully integrated in the GC, you can experience the most advanced separation technology for complex sample characterization.

(\*) Sold under license from Zoex Corp. for thermal modulation



### Ultra in Flexibility

In addition to a comprehensive range of injectors, a universal base body allows swift detector interchangeability and configurations with up to three detectors operating simultaneously, providing added value for your investment.

### Ultra in Solutions

Combined with the Valve Oven, the TRACE GC Ultra gas chromatograph delivers unmatched turn-key solutions even for the most demanding applications requiring multidimensional column switching techniques. Multiple packed or capillary columns, sampling and switching systems, and pressure regulators can all be effectively installed in an additional heated and readily accessible housing.

### Ultra in Reliability

The digital pneumatic modules assure highest accuracy and precision in carrier gas control. A proprietary Algorithm for Column Characterization grants utmost stability in both retention time repeatability and reproducibility.

### Ultra in Automation

A vast array of automatic sampling systems (for liquid, headspace and SPME\*) makes this GC able to withstand the highest workload requirements, operating unattended around-the-clock. Instrument control and acquisition, enabled by Thermo Scientific or third-party data systems, are made possible through a LAN interfacing capability.

\* Sold under license from Supelco®

## Thermo Scientific TRACE GC Ultra Gas Chromatograph

### Features and Technical Specifications

<b>Column Oven</b>		Programmability: 7 Ramps/8 Plateaus. Temperature range: few degrees above ambient to 450 °C. Maximum Temperature ramp: 120 °C/min. Typical heat-up: from 50 °C to 450 °C in 420 seconds. Typical cool down: 450 °C to 50 °C in 250 seconds. Sub-ambient: -99 °C with liquid N <sub>2</sub> , -55 °C with CO <sub>2</sub> options.	
<b>Injectors</b>			
Vaporizing Inlets SSL, Packed, Purged Packed B.E.S.T. PTV		Temperature range: 50-400 °C Heating rate: Up to 14.5 °C/sec (870°C/min). Programmability: 3 ramps/4 plateaus. Air-cooled down to few degrees above ambient temperature. Sub-ambient: -50 °C with liquid N <sub>2</sub> , -30 °C with CO <sub>2</sub> options.	
Non-Vaporizing Inlets Cold On-column		Septumless injector. No heating of the injector is required. Suitable for manual and automated operations. Cryogenic coolant not required.	
<b>Large Volume Options</b>			
Large Volume Cold On-column		Up to 450 µL injectable volume. Uncorect type desolvation precolumn. Heated Solvent Vapor Exit valve. LVI software assistant for parameter optimization. Suitable for clean matrices.	
Large Volume B.E.S.T. PTV		Up to 450 µL injection volume. Heated Solvent Split valve. Compatible with optional Backflush kit for PTV. Suitable for large volatility range samples in dirty matrices.	
Large Volume Splitless		Up to 50 µL injection volume. Compatible with manual or automated injections. Suitable for samples amenable to split-splitless injector.	
<b>Inlet Pneumatics</b>			
Digital (250 and 1,000 kPa)		Ambient Temperature and Pressure compensation. Gas saver. Assisted Leak Check Evaluation. Pressure surge. Proprietary Algorithm for Column Characterization (Linear velocity and Void Time calculation)	
<b>Detectors</b>	<b>MDA</b>	<b>Linearity</b>	<b>Selectivity or additional features</b>
Flame Ionization Detector	2 x 10 <sup>-12</sup> gC/sec	Better than 10 <sup>7</sup>	Flameout detection and timed programming capability. Acquisition rate 300 Hz
Thermal Conductivity Detector	600 pg Ethane/mL He	10 <sup>6</sup>	Automated software switch function
Electron Capture Detector	< 10 fg of Lindane	Better than 10 <sup>4</sup>	<sup>63</sup> Ni source, micro cell volume design
Nitrogen Phosphorus Detector	5 x 10 <sup>-14</sup> gN/s and 2 x 10 <sup>-14</sup> gP/s	Better than 10 <sup>4</sup>	N/C = 10 <sup>5</sup> :1; P/C = 2 x 10 <sup>5</sup> :1
Flame Photometric Detector	1 x 10 <sup>-13</sup> gP/s and 10 <sup>4</sup> (P), 5 x 10 <sup>-12</sup> gS/s (Malathion)	10 <sup>3</sup> (S) after linearization with suitable s/w	P/C=10 <sup>6</sup> :1; S/C=10 <sup>5</sup> :1 Dual flame photometric capability
Photo Ionization Detector	1 x 10 <sup>-12</sup> g of Benzene 1.3 x 10 <sup>-12</sup> g of Toluene	Better than 10 <sup>5</sup>	Lamp cooling system for temperatures up to 400 °C
Pulsed Discharge Detector	Low pg range	10 <sup>5</sup>	Non radioactive source
Digital pneumatics for detector gas controls			
<b>Valve Oven</b>		Independently heated valve housing able to accommodate up to 4 heated/2 unheated gas valves, 8 pressure regulators, 8 needle valves, In/out ports, packed and capillary columns. Maximum Temperature isothermal 175 °C.	
<b>UltraFast GC</b>		Only for SSL/FID or PTV-FID configurations. Heat up rate 1200 °C/min linear throughout entire Temperature range. Minimum Temperature: 40 °C. Maximum Temperature: 370 °C. 3 Ramps/4 Plateaus. Typical cool-down time: 370 °C to 50 °C in 1 minute.	
<b>GCxGC</b>		Proprietary CO <sub>2</sub> Cryogenic Dual-Jet Modulator. Modulation Cycle time selectable up to 20 s in 0.1 s steps. Proprietary synchronization with acquisition frequency. Dedicated HyperChrom Data System for instrument control, data acquisition and reprocessing.	
<b>System Automation</b>			
Liquid sampling AI 3000 II		Additional details for these products are available in their respective specifications. Compatible with SSL, B.E.S.T. PTV, PKD and PPKD Injectors. Maximum injectable volume 5 µL. Minimum 20 nanoliters with 0.5 µL syringe, "plunger-in-needle". Up to 8 sample vial capacity. Upgradable to AS 3000 II.	
AS 3000 II		Same as AI 3000 II but with up to 105 sample vial capacity.	
TriPlus™ AS		Compatible with all injectors. 2x150 position sample trays. Offers automated Large Volume injection capability up to 450 µL, solvent flush and internal standard injection modes. Available in "clone mode", with one sampling unit automating 2 adjacent GC or GC-MS. Upgradable to TriPlus Duo.	
Headspace Sampling TriPlus HS		2 X 54-position trays. Heated syringe (Maximum Temperature: 150 °C). 6 position Incubation Oven with shaker and heating. Multiple Headspace Extraction (MHE) device available. Upgradable to TriPlus Duo.	
Liquid and Headspace Sampling TriPlus Duo		Same as TriPlus AS and HS, offering both liquid and headspace sampling capability through 2 dedicated "snap-on" interchangeable turrets.	
Automated Sample Preparation TriPlus SPME		2 X 54-position sample trays. Variable fiber penetration depth, suitable for both liquid and headspace extraction. Optional 2-ports, inert gas purged, fiber conditioning station.	

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