

Thermo Scientific TSQ Duo Triple Quadrupole GC-MS/MS

Tailored for chromatographers and current single quadrupole GC-MS users

The Thermo Scientific™ TSQ™ Duo triple quadrupole GC-MS/MS system is like no other. It is designed to provide easy access to powerful workflows through MS/MS, as well as satisfy current full scan (FS) and selected ion monitoring (SIM) method requirements. The system accomplishes this by providing excellent performance in both single and triple quadrupole modes that is easily achievable, even for less experienced users.

The TSQ Duo GC-MS/MS is the only cost-sensitive instrument featuring efficient, simply intelligent software workflows with the Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System, which enables truly simple, single and triple stage mass spectrometry in a single investment.



TSQ Duo Triple Quadrupole Mass Spectrometer

Ion Source Type

- Thermo Scientific™ ExtractaBrite™ EI source
- Solid, inert ion source includes ion volume, repeller, source lenses, RF lens and dual filaments, programmable from 50 °C to 350 °C

Mode (MS)

- Electron impact ionization (EI), with full scan (FS), SIM, and FS/SIM simultaneous within-sample injection optional timed acquisition (t-SIM), and FS/t-SIM

Mode (MS/MS)

- Multiple selected reaction monitoring (MRM/SRM), optional timed acquisition (t-SRM), combined SRM/FS, combined (optional) t-SRM/FS, product ion scan, precursor ion scan, neutral loss scan
- Ability to convert (optional) timed acquisition method (t-SIM/t-SRM) into general mode (segmented) method

Triple Stage
Quadrupole

TSQ Duo

Single
Quadrupole

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Software Features

- Automated SRM development (AutoSRM)
- SIM Bridge – a tool to import SIM and SRM acquisition tables in comma-separated-values (CSV) formats into AutoSRM and instrument method
- Automated acquisition window adjustment based on retention time
- Compound-based acquisition method setup
- Customizable automated tuning

Mass Analyzer

- Heated, off-axis ion guide for noise reduction and solid, homogeneous, non-coated, maintenance-free quadrupole rods
- Fast quadrupole scanning, up to 20,000 u/s

Mass Resolution

- Automatic tuning down to 0.4 u
- Selectable SRM resolution settings in method at autotune value, 0.7, 1.5, and 2.5 u

Detector

- Thermo Scientific™ DynaMax™ XR detection system, with off-axis 10 kV dynode, discrete dynode electron multiplier and electrometer, linear range of $>10^7$ (0–68 μ A)

Collision Energy Range

- 0–60 eV

Mass Range

- 1.2–1100 u

Scanning Capabilities

- Up to 20,000 u/s
- Ability to acquire more than 97 scans/s in FS when scanning over a range of 125 u
- 1.0 ms minimum SRM dwell times
- Up to 300 SRM transitions/s

Pumping Systems

- High-capacity (>300 L/s), dual-stage turbomolecular pump
- Mechanical rotary vane 3.3 m³/h oil pump
- Foreline convection gauge
- Optional oil-free scroll pump
- Ion gauge (optional)

Electron Energy

- Adjustable from 0 eV to 150 eV

Emission Current

- Up to 350 μ A

Transfer Line Temperature

- Up to 400 °C

Gas Chromatograph

(Thermo Scientific™ TRACE™ 1300 GC or TRACE 1310 GC)

Please refer to GC and autosampler specification sheets for additional details

- **TRACE 1300 GC: Intuitive, single-button start/stop for ease of use with minimal local instrument interaction**
- **TRACE 1310 GC: Complete icon-driven touch screen user interface for direct local instrument control**

Autosamplers

• AI/AS 1310, TriPlus RSH, TriPlus 100 LS, TriPlus 300 HS, and more Instant Connect Modules

- User-installable injector or detector assembly can be installed in less than 2 minutes
- 0.001–1000 kPa digitally controlled carrier gas with gas saver and septum purge
- Split/Splitless (S/SL) injector with optional large volume kit for injections up to 50 μ L
- Multi-mode programmed temperature vaporization (PTV) injector including on-column capabilities and large volume injection up to 250 μ L
- Integrated backflush optional for both S/SL and PTV
- 1000 kPa digitally controlled carrier gas with gas saver and septum purge
- Detector fast data acquisition rate: up to 300 Hz

Oven Temperature

- Operating temperature range: ambient 3 °C to 450 °C
- Operating temperature range with liquid N₂ Cryo: -100 °C to 450 °C
- Operating temperature range with CO₂ Cryo: -50 °C to 450 °C

Oven Performance

- Number of ramps/plateaus: 32/33
- Maximum heating rate: 125 °C/min
- Oven cool-down (22 °C ambient): 450 °C to 50 °C in <4 min

GC Analytical Performance

- Retention time repeatability: <0.0008 min
- Peak area repeatability: <0.5 % RSD
- Pressure set points minimum increments: 0.01 kPa—0.001 psi in all ranges

Hydrogen Kit Option

- **Optional hydrogen kit (includes hydrogen sensor and ion volume) required for use with hydrogen carrier gas on the TRACE 1300/1310 GC with the TSQ Duo MS**

Instant Connect Helium Saver Module

- Compatible when connected to a TRACE 1300 Series GC
- Save helium during the analytical run and when instrument is idle
- Analytical conditions remain the same; methods remain intact
- Realize significant savings in helium supply throughout the lifetime of your GC or GC-MS instrument

Microfluidics Options for TRACE 1300/1310 GC

- NoVent for easier column replacement without venting the system
- Dual Detector kit for splitting column effluent to two detectors (including MS)
- Consists of low-volume, highly inert SilFlow™ technology with finger-tight connectors

Data System Software and Options

• Chromeleon Chromatography Data System (CDS)

- Commercial mass spectral library options, including NIST and Wiley libraries; Mass Spectral and GC Data of Drugs, Poisons, Pesticides, Pollutants and their Metabolites (Maurer-Pfleger-Weber library)

Performance Specifications

GC triple stage mass spectrometers are most frequently applied to trace quantitative analysis in complex matrices. This means that the ability of the system to select against matrix (reduce chemical noise) is a critical performance factor to be taken into consideration. This ability can be demonstrated using a signal-to-noise ratio (S/N measurement). In addition, a S/N ratio provides a guarantee against instrument contamination on installation. Finally, low-level precision and instrument detection limits (IDL) provide the complete picture.

Standard Installation Specifications*

(Helium as carrier gas)

Electron Ionization SRM

- 1 μ L of 100 fg/ μ L octafluoronaphthalene (OFN) will produce the following minimum signal-to-noise for the transition from m/z 272 to m/z 222: **6,000:1**

Reference Specifications†

Electron Ionization Full Scan

- 1 μ L of 1 pg/ μ L OFN will produce the following minimum signal-to-noise for m/z 272 when scanning from 50–300 u: **1,500:1**

Instrument Detection Limit

- 4 fg or less OFN derived at the 99% confidence level from area precision of eight sequential injections of 1 μ L, 10 fg/ μ L OFN, acquired in EI SRM

System Dimensions/Weights

Total width of the connected GC/MS system is 80 cm (31 in). System can be operated with back of MS pushed directly against wall or other object. Additional space should be allotted for data system and printer.

System Dimensions (height \times width \times depth)

Mass Spectrometer 44 \times 40 \times 89 cm (17.5 \times 16 \times 35 in) 61 kg (135 lbs)

TRACE 1300 GC 45 \times 44 \times 60 cm (18 \times 17 \times 24 in) 35 kg (77 lbs)

TRACE 1310 GC 45 \times 44 \times 67 cm (18 \times 17 \times 26 in) 35 kg (77 lbs)

* Helium standard specifications are performed using a 15 m \times 0.25 mm i.d. \times 0.25 μ m System Qualification Column (SQC).

† Reference specifications are typical performance specifications and not confirmed at install.

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