



Mass spectrometry

ISQ 7610 single quadrupole GC-MS system

Unstoppable confidence in GC-MS analysis

Keywords

ISQ 7610, single quadrupole, GC-MS, Advanced Electron Ionization (AEI), ExtractaBrite, NeverVent technology, SmartTune, Vacuum Probe Interlock (VPI)

Performance benefits

- High sensitivity in full scan and SIM acquisition mode for trace detection levels of both targeted and untargeted analytes, with the inert Thermo Scientific™ ExtractaBrite™ ionization source
- Increased sensitivity available with the inert Advanced Electron Ionization (AEI) Source in a dedicated configuration
- Remove tuning complexity with SmartTune, a simplified tuning tool to easily maintain consistent response over time for longer
- Boost instrument productivity to unprecedented levels with the patented Thermo Scientific™ NeverVent™ technology

- Select from a fully upgradeable path, from base to advanced configurations, to increase flexibility and performance anytime you need it
- Allow method consolidation and decrease instrument downtime with an extended dynamic range and lifetime detector

Analytical testing laboratories working in food, environmental and forensic/toxicology analysis need to produce reliable results for every user and meet the regulatory needs. These labs need to ensure the instrument is always producing results and their workflows are not interrupted so that they can achieve a rapid return on their investment. In short, they need their analytical systems to provide unstoppable confidence.

The Thermo Scientific™ ISQ™ 7610 GC-MS system is a GC single quadrupole platform capable of boosting laboratory efficiency and productivity through increased robustness combined with superior sensitivity to fulfill your most challenging analytical needs.

Developed to enhance the user experience in routine workflows, the ISQ 7610 GC-MS system is streamlined to ensure great data consistency over time while offering new automated instrument control tools for unprecedented ease-of-use and a quick learning process, as required in a high-throughput laboratory.

The innovative technology of the ISQ 7610 GC-MS system is uniquely designed to offer truly scalable performance that addresses increasingly challenging regulatory requirements and offers more value through future-proof investments.

Fully upgradeable configurations are tailored to satisfy your current and future analytical needs for truly unstoppable performance.

ISQ 7610 single quadrupole GC-MS system specifications

Modes

- Electron Ionization (EI), Chemical Ionization (CI), with full-scan (FS), SIM, and FS/SIM simultaneous within sample injection
- AutoSIM and timed acquisition (t-SIM)

Ion source types

- Inert Thermo Scientific™ ExtractaBrite™ Electron Ionization (EI) source with dual filaments in all ionization modes, programmable to 350°C
- Inert Thermo Scientific™ Advanced Electron Ionization (AEI) source programmable to 350°C EI-only operation, with dual filaments assembly

- Optional Chemical Ionization (CI) with Positive Ion Chemical Ionization (PCI) and Negative Ion Chemical Ionization (NCI) dedicated ion volume or combined EI/PCI/NCI ion volume to conduct EI and CI experiments within the same analysis

NeverVent technology

- Exclusively available on VPI-enabled systems, V-Lock isolates the vacuum region of the mass spectrometer from the column—this enables an industry exclusive method to change GC columns quickly, with no venting required
- Optional Vacuum Probe Interlock (VPI) removes the entire ExtractaBrite source for maintenance or to change ionization modes without venting (available on ISQ 7610 GC-MS system with VPI configuration)

Mass filter and mass analyzer

- Dual-stage mass filter with off-axis ion guide pre-filter for noise reduction and solid, homogeneous non-coated, maintenance-free quadrupole rods
- Patented RF lens embedded in the ion source to protect the quadrupole from ion burns
- Fast quadrupole scanning up to 20,000 u/s

Mass resolution and stability

- Automatic tuning down to 0.4 u and manual tuning
- Better than 0.1 u/48 hours/ $\Delta T \leq 2K$

Detector

- Thermo Scientific™ XLXR™ detection system, with off-axis 10 kV dynode, discrete dynode electron multiplier and electrometer, linear range of $>10^7$ (0–110 μA)
- Electronic dynamic range $>10^9$

Mass range

- 1.2–1,100 u with unit mass resolution

Acquisition rate

- Ability to acquire more than 240 scans/s in SIM
- Ability to acquire more than 97 scans/s in FS when scanning over a range of 125 u

Pumping systems

- High-capacity large (>300 L/s), dual-stage turbomolecular pump
- Mechanical rotary vane 3.3 m³/h oil pump
- Optional oil-free scroll foreline pump
- Optional small-capacity (>85 L/s) turbomolecular pump

CI reagent gas capabilities

- Software-switchable dual reagent gas with digital flow control on a sample-by-sample basis
- Ammonia, methane, isobutane or specialty mixes of these gases and CO₂ presets

- PPINICI (pulsed positive ion negative ion chemical ionization) to switch on a scan-to-scan basis between positive and negative ionization mode

Electron energy

- Adjustable up to 150 eV dependent on ion source type

Emission current

- Up to 350 μ A

Transfer line temperature

- Up to 400°C

Microfluidics options for Thermo Scientific™ TRACE™ 1600/1610 GC systems

Dual-column, dual-detector or heart-cut 2D-GC configurations are achieved with highly inert microfluidic connectors based on the Thermo Scientific™ SilFlow™ technology featuring FingerTite metal ferrules for easy-to-install, zero-dead volume, and leak-free connections.

- Compatible with capillary columns in the range of 0.32-0.1 mm I.D
- Software assistant is available to support heart-cut 2D-GC method setup

ISQ 7610 Carrier Gas options

The ISQ 7610 can be operated with either helium or hydrogen carrier gas. The ExtractaBrite EI source with large turbo pump is recommended for analysis using hydrogen carrier gas. Using the Thermo Scientific™ HeSaver-H2Safer iConnect™ SSL inlet can greatly reduce helium consumption, reducing cost of analysis or allowing safe utilization of hydrogen without the need for a hydrogen sensor.

Direct sample probe system option (VPI enabled systems only)

- Switch to probe in <3 min with GC undisturbed
- Available in two styles: rapid heating filament Direct Exposure Probe (DEP, capable of flash vaporization or pyrolysis at up to 1,600°C) or slower volatilization Direct Insertion Probe (DIP, capable of accommodating solid samples in a quartz or aluminum crucible up to 450°C)

Data system software and options

- Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) software for chromatographers using MS, a common platform for GC, GC-MS, LC, LC-MS, IC, and IC-MS quantification
- Thermo Scientific™ TraceFinder™ software, a common platform for routine GC, GC-MS, LC, and LC-MS quantification
- TraceFinder packages for environmental and food safety, clinical research, and forensic/toxicology
- Retention Time Alignment tool easily and quickly maintains retention time during routine operation
- Instrument control and data connection via ethernet
- Multi-functional icon-based GC touch screen on TRACE 1610 GC configuration or minimized local interface with the TRACE 1600 GC configuration
- Commercial mass spectral library (latest edition) options, including:
 - NIST Mass Spectral Library with RI and MS/MS
 - Wiley Mass Spectral Library
 - Maurer/Pfleger/Weber Mass Spectral Library for Drugs, Poisons, Pesticides, Pollutants and their metabolites
- Data-driven instrument monitoring with Thermo Scientific™ SmartStatus™ intelligent software, utilizing historical trends and user notifications

AEI installation specifications

In EI SIM mode, with He carrier gas and either the Thermo Scientific™ AI/AS 1610 Autosampler, Thermo Scientific™ TriPlus™ 100 LS Liquid Autosampler, or TriPlus™ RSH/ RSH SMART Autosampler* (required and configured for liquid injections), eight sequential 5 fg Octafluoronaphthalene (OFN) splitless injections monitored for m/z 272 produce the following instrument detection limit (IDL), calculated from the chromatographic peak area with 99% confidence interval: IDL \leq 1 fg.

* In the case that an autosampler is not present at install, a single injection of 100 fg OFN will be run to demonstrate the signal to noise (S/N) reference specification

Installation specifications

Source type	Turbopump	S/N or IDL with He carrier gas
AEI*	Large	≤ 1 fg
ExtractaBrite, EI**	Large	≥ 2,000:1
ExtractaBrite, EI**	Small	≥ 750:1
ExtractaBrite, PCI***	Large	≥ 300:1
ExtractaBrite, NCI****	Large	≥ 2000:1

All IDL verifications require an autosampler

* Eight sequential 5 fg OFN splitless injections

** 1 µL of 1 pg/µL OFN *m/z* 272 when scanning 50–300 u Full Scan

*** 1 µL of 100 pg/µL Benzophenone (BZP) *m/z* 183 in PCI mode when scanning 80–230 u Full Scan using methane reagent gas

**** 2 µL of 100 fg/µL OFN *m/z* 272 when scanning 50-300 u Full Scan using methane reagent gas

Reference Signal-to-noise specifications

Ion source/concentration	Turbopump	S/N with He carrier gas
AEI SIM* 100 fg OFN <i>m/z</i> 272	Large	≥ 300:1
ExtractaBrite EI Full Scan 1 pg OFN <i>m/z</i> 272	Large	≥ 5500:1
ExtractaBrite EI Full Scan 1 pg OFN <i>m/z</i> 272	Small	≥ 1,000:1
NCI Full Scan 50-300 u** 200 fg OFN <i>m/z</i> 272	Large	≥ 2,500:1
PCI Full Scan, 80-230 u** 100 pg BZP <i>m/z</i> 183	Large	≥ 300:1

Not tested at installation by default; tested only if specifically requested for

*Tested as 1 µL of 100 fg/µL OFN

** using methane as reagent gas

Reference IDL specifications

Ion source/concentration	Turbopump	IDL with He carrier gas
ExtractaBrite EI SIM 10 fg OFN <i>m/z</i> 272	Large	2 fg
ExtractaBrite EI SIM 10 fg OFN <i>m/z</i> 272	Small	10 fg

Not tested at installation by default; tested only if specifically requested for

Configuration for analysis using hydrogen carrier gas as an alternative to helium has several benefits including reduction in operation cost, sustainable supply and optimal chromatography conditions. The ISQ 7610 with ExtractaBrite has been fully tested using hydrogen carrier gas and is the recommended configuration.

Hydrogen carrier gas specifications[^]

Recommended ISQ 7610 configurations	Installation EI specification (S/N)	Installation PCI specification (S/N)	Installation NCI specification (S/N)	Reference EI specification (S/N)	Reference IDL specification EI
ISQ 7610 NOVPI, VPI and VPCI with ExtractaBrite source	≥ 100:1*	≥300:1**	≥600:1***	≥1000:1*	3 fg ****

[^] The hydrogen carrier gas specifications will be tested at installation only when the system is ordered with the hydrogen carrier gas kit

* 1 µL of 1 pg/µL OFN *m/z* 272 when scanning 50–300 u Full Scan

** 1 µL of 100 pg/µL benzophenone *m/z* 183 in PCI mode when scanning 80–230 u Full Scan using methane reagent gas

*** 2 µL of 100 fg/µL OFN *m/z* 272 when scanning 50-300 u Full Scan using methane reagent gas

**** Eight sequential 10 fg OFN splitless injections

The use of hydrogen as carrier on the small turbomolecular pump system is not supported

System dimensions/weights

Equipment	Dimensions (height × width × depth)	Weight
Mass spectrometer	44 × 33 × 63 cm (17.5 × 13 × 24.5 in)	43 kg (94 lbs)
TRACE 1600 GC system	45 × 44 × 60 cm (18 × 17 × 24 in)	35 kg (77 lbs)*
TRACE 1610 GC system	45 × 44 × 67 cm (18 × 17 × 26 in)	35 kg (77 lbs)*

* Plus 0.8 kg (1.7 lb) each iConnect injector or detector module

Instrument configurations*

Instrument	Source option	Extended dynamic range and lifetime detector	Vent free source exchange	Vent free column exchange	Use of direct probes
ISQ 7610 small turbo	EI ExtractaBrite	✓	✗	✗	✗
ISQ 7610 NOVPI	EI ExtractaBrite	✓	✗	✗	✗
ISQ 7610 Vacuum probe interlock (VPI)	EI ExtractaBrite	✓	✓	✓	✓
ISQ 7610 VPICI	EI ExtractaBrite/ CI ExtractaBrite	✓	✓	✓	✓
ISQ 7610 Advanced electron ionization (AEI)	Advanced electron ionization (AEI) source	✓	✗	✗	✗

* Field upgradeable options available for all instruments

 Learn more at thermofisher.com/ISQ7610

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