Experience more simplicity

on your journey to GC-MS/MS

Thermo SCIENTIFIC

Simply unique GC-MS/MS

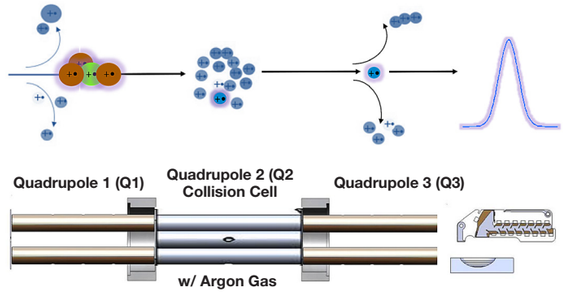
The Thermo Scientific™ TSQ™ Duo triple quadrupole GC-MS/MS system is like no other. It is tailored to chromatographers and single quadrupole GC-MS users who need easy access to powerful new workflows through MS/MS as well to satisfy their current methods requirements. The system accomplishes this by providing excellent performance, in both single quadrupole 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.

Routinely Powerful
Routinely Flexible
Truly Simple

Routinely **Powerful**

The TSQ Duo allows you to make a unique choice—the adoption of powerful GC-MS/MS workflows on your own terms. Whether you are tasked with environmental, clinical, toxicological, or pharmaceutical applications, this system prepares you to move with the changing laboratory environment and to face future competitive and regulatory pressures, all while delivering the results you need today.



The selected reaction monitoring (SRM) process allows high target selectivity through MS/MS.

The **precursor ion** is selected using Q1 and fragmented in the collision cell, generating a unique **product ion**.
This **product ion** is selected on the basis that isobaric matrix ions cannot produce it.
The **product ion** is selected on Q3 and transmitted for matrix-free detection.

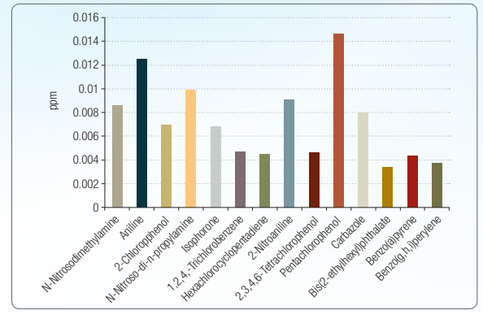
Powerful MS/MS

Unlike typical single quadrupole GC-MS instruments, sensitivity of the TSQ Duo GC-MS/MS system is not limited by matrix background. The power of selected reaction monitoring (SRM) cuts through heavy matrix background for clear detection of your target compounds. This advance can revolutionize your analytical workflows.

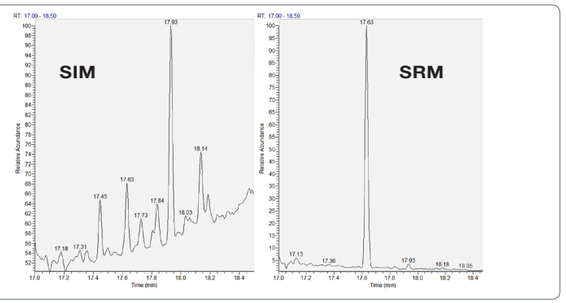
Triple Stage Quadrupole

TSQ Duo

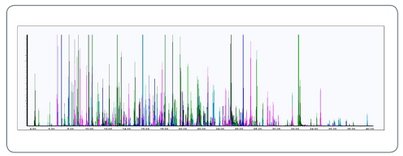
Single Quadrupole



Method detection limit calculated at 99% confidence level for SRM analysis of selected SVOCs in wastewater.



20 ppb of fenpropathrin in tea leaves showing clean, interference-free detection with SRM compared with SIM.

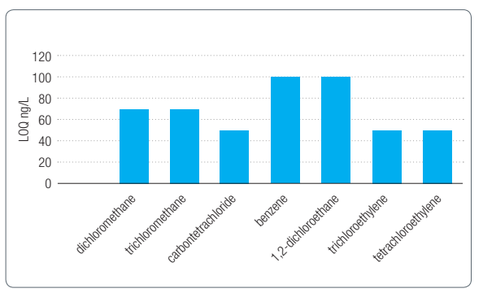


Three GC-MS/MS methods in one large multi-analyte SRM method analyzing 350 compounds in 40 minutes.

Powerful MS

Whatever the nature of your application, the TSQ Duo system delivers the rugged selected ion monitoring (SIM) and full scan results you need. It is the performance you have come to expect from a Thermo Scientific GC-MS system.

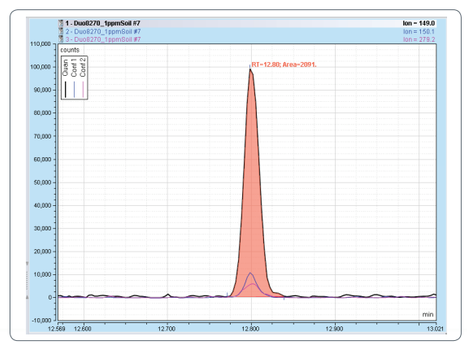
What does MS/MS allow?	What does this mean?	The Result
Reduction of selectivity in sample preparation	• Fewer method steps • More compounds possible • More matrices applicable	• Faster turnaround • More efficient methods • Less costly analysis • More flexible
Consolidated GC-MS methods	• More compounds analyzed together	• Faster turnaround • More efficient methods • Less costly analysis • More flexible
Compressed chromatography	• Faster run times	• Faster turnaround • More efficient methods
Easy data processing	• High-efficiency automatic integration	• Faster turnaround
More confidence	• Less susceptibility to a changeable matrix	• Faster turnaround • Higher quality



Method LOQ for headspace GC-MS SIM analysis of VOCs in surface water.

High-quality mass spectra are generated when using full scan, enabling higher confidence when working with libraries such as NIST.

Compound	NIST Library Match (forward search)
o-Nitroaniline	933
Acenaphthene	943
2,3,4,6-tetrachlorophenol	930
Isodrin	934
Napthylamine	923
Dimethylphthalate	913



di-n-octyl-phthalate 1ppm in soil overlay of extracted ions.

Routinely **Flexible**

Transcend the traditional and step into modern gas chromatography

The TSQ Duo triple quadrupole GC-MS/MS is as versatile and flexible in routine applications as you need your GC-MS system to be. Its Thermo Scientific™ TRACE™ 1300 Series gas chromatograph is configurable in real time with a breakthrough modular design. Not only does this flexibility allow you to address a huge variety of GC and GC-MS applications, it allows for zero-downtime offline maintenance procedures and the opportunity to add components for tomorrow's GC innovations.

Enable Quick Customization with GC Modularity

Interchangeable modules free your laboratory from the challenges and constraints of the past. Remove the complexity and eliminate the need for specialized service assistance or new system requirements with modular injectors and detectors. Transcending the traditional GC design model, the Instant Connect injector and detector modules are independent GC components that are fully self-sufficient subunits of the instrument, incorporating all electronic circuits and pneumatic controls together with the injector body or detector cell and storing calibration information for exceptional results consistency. With the TRACE 1300 Series gas chromatograph, the GC configuration can be modified in just two minutes, which is the time required for the removal of three screws to allow for the replacement of the previous module with the new module–all without the need for service personnel.

Simple and Flexible Configurations for Evolving Laboratory Needs

User-installable Instant Connect modules place the expertise and control in the hands of the operators without the requirement for special training, dedicated tools, or on-site service engineers. This unique modular design offers many advantages to the analytical laboratory when compared to traditional GC systems.

Benefits of the TRACE 1300 Series Gas Chromatograph

Ease of use and convenient scaling up of investments

Lower electricity bills and carrier gas consumption, and reduce the total number of GCs in the lab

- Build the configuration you need now and add to it only when necessary
- Share injector and detector modules among multiple GCs
- Use spare modules to secure your most critical analyses, without expensive back-up channels

Tailor configurations to application needs and workload requirements

Ensure constant laboratory response time – even when work schedules change unexpectedly

- Always choose the best configuration for any application
- Run up to four selective detectors simultaneously for rapid screening
- Quickly switch your GC-MS from an SSL to a PTV injector

Adopt the evolving, future-proof GC platform

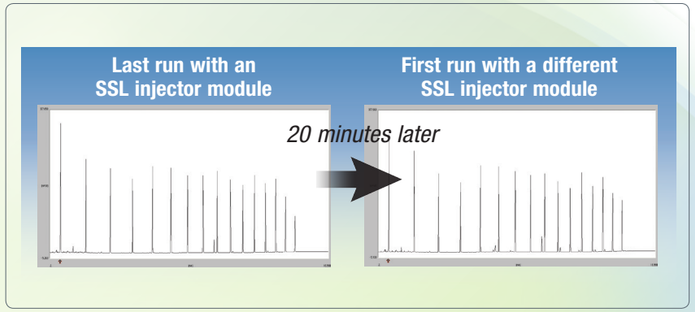
Address changing priorities with ease, without the need to purchase additional instrumentation

- Add newly developed modules to an existing TRACE 1300 Series GC at any time
- All modules traceable for GLP compliance upgrades are always possible and user-installable

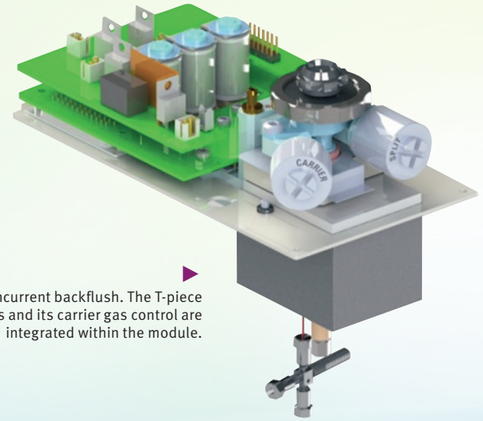
Maximize system uptime

Remove dirty injectors or detectors, replace them with clean ones, and start running samples in a few minutes

- Resume GC and GC-MS operations quickly
- Postpone maintenance when the laboratory schedule allows
- Make troubleshooting easy



A TRACE 1300 Series GC can recover normal operating conditions in less than 30 minutes, including oven cooling and column re-installation. The performance level is retained without the need for recalibration.



Instant Connect-SSL concurrent backflush. The T-piece for column connections and its carrier gas control are integrated within the module.

Backflush and Large Volume Capabilities

The capabilities of the Instant Connect injector modules are further enhanced by the available concurrent backflush options. These solutions enable the user to reverse the flow inside the injector, eliminating heavy or "undesired" compounds concurrently during the analysis run, protecting the column and detector while cutting down non-productive times, thus increasing throughput.

Truly **Simple**

Simplify your transition to triple quadrupole GC-MS/MS

The TSQ Duo GC-MS/MS enables truly simple operation whether you choose to use it in single or triple quadrupole mode. It also bridges the gap between single and triple quadrupole within the same instrument to allow easy adoption of powerful MS/MS workflows when required.

Using the instrument in single quadrupole GC-MS mode allows you to continue running your current set-up and established methods. When the time is right, integrated software tools will walk you through a step-by-step process to manage the transition to powerful triple quadrupole methods.

Option 1: Continue with SIM method

SIM Bridge

Current Method

TSQ Duo SIM Method

SIM Bridge

Option 2: Straight to MS/MS method

SIM Bridge

Ready to move to MS/MS

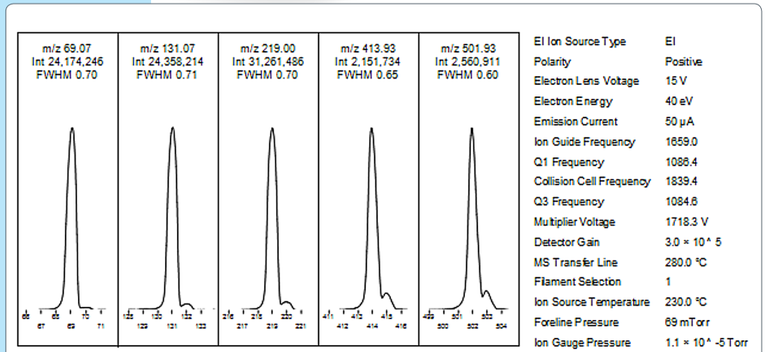
AutoSRM

Fully optimized SRM transitions

TSQ Duo SRM Method

Whether you are new to triple quadrupole GC-MS/MS or not, all you need is your current compound list and/or method.

Once you are up and running with SRM methods, optional software tools such as timed SRM (t-SRM) are available to keep your method optimal in the easiest way possible—no more complex time window set-up and extended time for running samples.

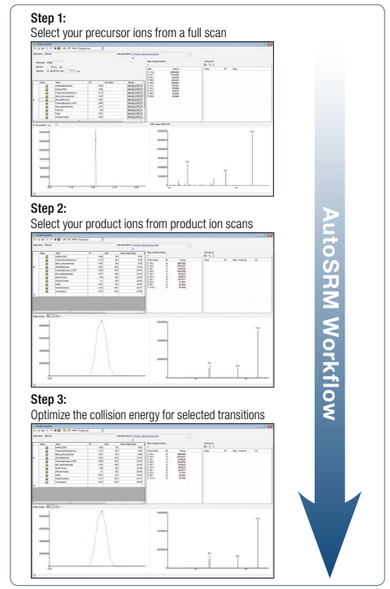


EI Ion Source Type	EI
Polarity	Positive
Electron Lens Voltage	15 V
Electron Energy	40 eV
Emission Current	50 µA
Ion Guide Frequency	1659.0
Q1 Frequency	1088.4
Collision Cell Frequency	1839.4
Q3 Frequency	1084.6
Multiplier Voltage	1718.3 V
Detector Gain	3.0 × 10^ 5
MS Transfer Line	280.0 °C
Filament Selection	1
Ion Source Temperature	230.0 °C
Foreline Pressure	69 mTorr
Ion Gauge Pressure	1.1 × 10^ -5 Torr

The TSQ Duo GC-MS/MS is as easy to operate routinely as a single quadrupole instrument, including tuning. Simple, fully automated tuning is available in both single and triple quadrupole modes, including leak checking.

SIM Bridge

The SIM Bridge tool allows SIM methods exported from other sources to be translated to the TSQ Duo method. Those SIM methods can be immediately run on the TSQ Duo system or through AutoSRM to translate the SIM information into a powerful SRM method.



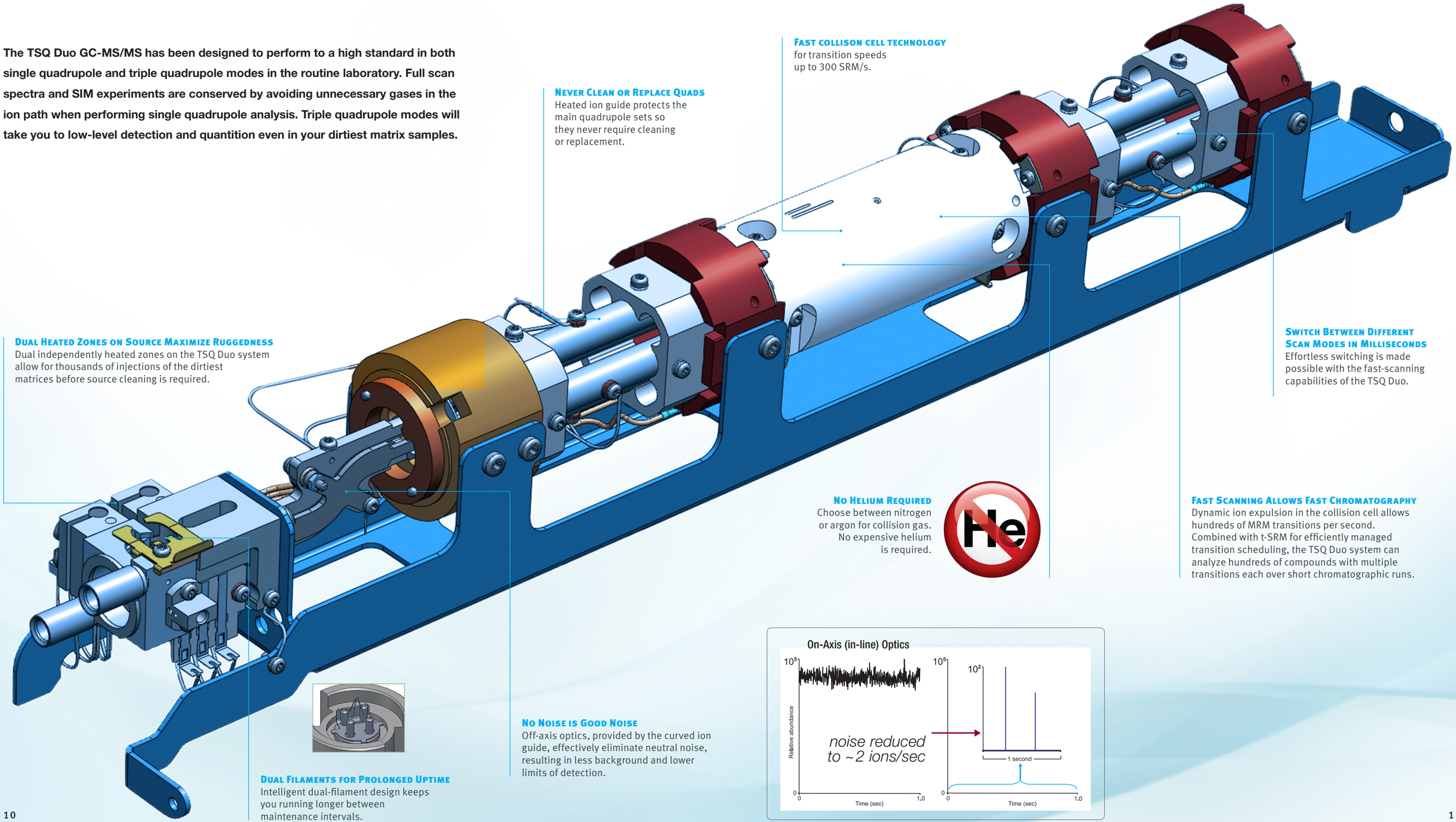
AutoSRM is your very own mass spectrometer method development expert integrated into your system. This software walks you through the development of full optimum SIM target ions or SRM transitions in a very simple and efficient workflow. If you like to develop from your current SIM method, SIM Bridge streamlines the workflow by importing your method details. All together, it is full MS and MS/MS method development independence even for the less experienced user.

Flexible design, optimized for MS and MS/MS

Industry-Leading Detector Linearity

The Thermo Scientific™ DynaMax detection system, standard on the TSQ Duo GC-MS/MS, offers industry-best linearity. Combined with the low detection limits attainable by SRM, this detector makes the mass spectrometer the ultimate quantitative instrument.

The TSQ Duo GC-MS/MS has been designed to perform to a high standard in both single quadrupole and triple quadrupole modes in the routine laboratory. Full scan spectra and SIM experiments are conserved by avoiding unnecessary gases in the ion path when performing single quadrupole analysis. Triple quadrupole modes will take you to low-level detection and quantition even in your dirtiest matrix samples.



Never Clean or Replace Quads

Heated ion guide protects the main quadrupole sets so they never require cleaning or replacement.

Fast Collison Cell Technology

for transition speeds up to 300 SRM/s.

Dual Heated Zones on Source Maximize Ruggedness

Dual independently heated zones on the TSQ Duo system allow for thousands of injections of the dirtiest matrices before source cleaning is required.

Switch Between Different Scan Modes in Milliseconds

Effortless switching is made possible with the fast-scanning capabilities of the TSQ Duo.

No Helium Required

Choose between nitrogen or argon for collision gas. No expensive helium is required.

Fast Scanning Allows Fast Chromatography

Dynamic ion expulsion in the collision cell allows hundreds of MRM transitions per second. Combined with t-SRM for efficiently managed transition scheduling, the TSQ Duo system can analyze hundreds of compounds with multiple transitions each over short chromatographic runs.

Dual Filaments for Prolonged Uptime

Intelligent dual-filament design keeps you running longer between maintenance intervals.

No Noise is Good Noise

Off-axis optics, provided by the curved ion guide, effectively eliminate neutral noise, resulting in less background and lower limits of detection.

Simply **Intelligent** Software Workflows

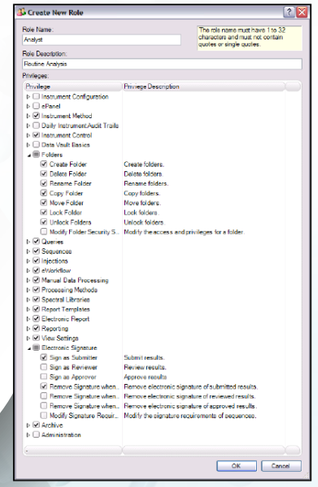
Streamline your lab with one data system for GC, LC, IC, and MS

Use Chromeleon CDS to control your entire chromatography lab. It is fully scalable from a single workstation to an enterprise-wide installation, and provides control of more than 350 modules from Thermo Fisher Scientific and dozens of other vendors.

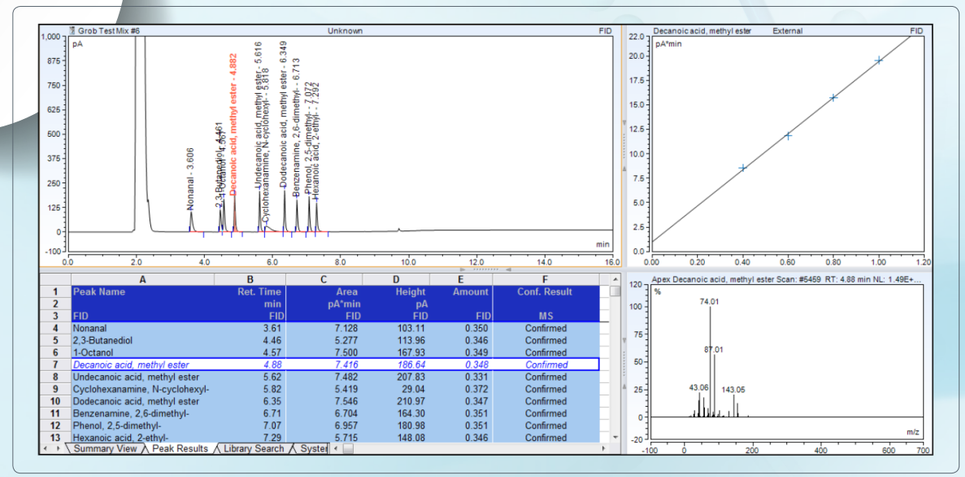
Key Benefits

- Streamline your lab by using one CDS to control all chromatography and MS hardware and process and report all your data
- Secure your data and results with built-in tools for GLP and 21 CFR Part 11 compliance
- Increase productivity with comprehensive tools including instant data processing, SmartLink, SmartPeaks™ integration assistant and dynamic library search

Control what users can see and edit



Quantitate on FID, confirm on MS



Boost lab efficiency with intelligent functionality

Chromeleon CDS contains intelligent functionality to make tasks easier and reduce errors. Spending less time on training and checking results increases efficiency in the lab.

'Right First Time' Analysis

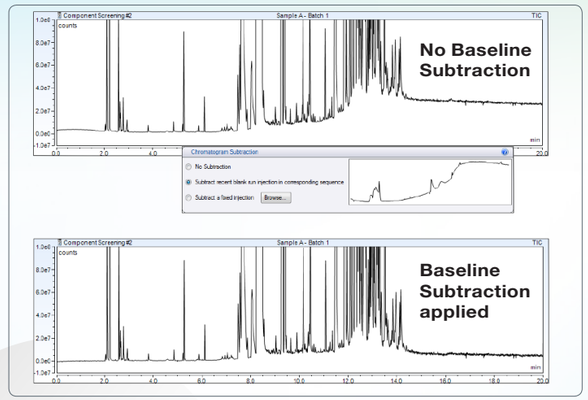
With built-in Results Testing and Intelligent Run Control, Chromeleon CDS can take a variety of automatic actions based on in-run chromatographic results, minimizing analytical errors and improving efficiency.

Dynamic Data Review and Processing

Dynamic Data Processing applies changes instantly to the entire sequence, without the need to perform 'batch reprocessing.' SmartLink functionality displays only data relevant to the current zoom or selected components.

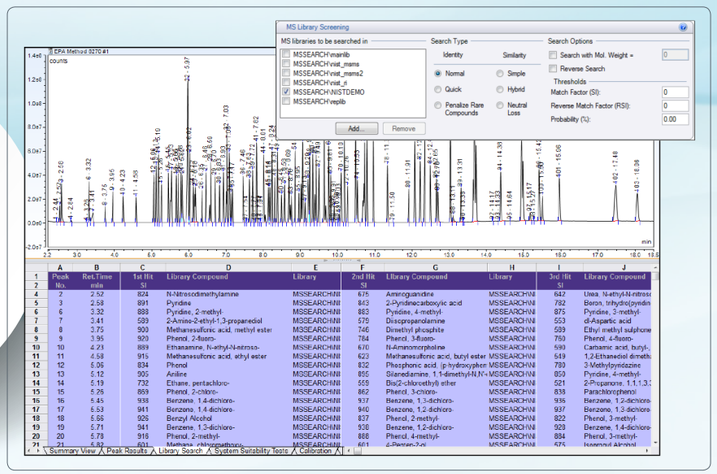
Immediate results

Chromeleon CDS provides a flexible spreadsheet-based report designer and a variety of default report templates. User-defined templates can be easily created and modified to meet reporting requirements with full traceability and without the need to export data to external spreadsheets.



Automatic subtraction of blanks or reference injections

Instant library search results of all peaks



Experience **More** Innovation

Expand throughput with liquid, solid, and gas sampling devices

Autosampling and Autoinjection Solutions

For maximum ease of use when executing liquid injections, the **Thermo Scientific AI 1310 Autoinjector** and the **Thermo Scientific AS 1310 Autosampler** guarantee the desired flexibility, throughput, and robustness. The AI 1310 Autoinjector is an eight-position sampling module. It combines the high precision of an automatic injection system with the ease of use of the plug-and-play concept and represents the ideal answer for those labs requiring highly reliable results for small batches of samples.

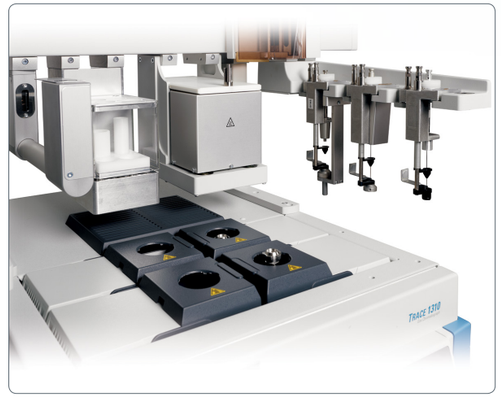
A tool-free upgrade is available to extend its sample capacity to the 155 positions found on the AS 1310 Autosampler.
Both of these samplers feature removable trays and can serve any type of GC injectors guaranteeing the utmost robustness. When dual column confirmation or double productivity is required, two AS 1310 Autosamplers are easily installed, allowing simultaneous injections on two ports, for higher analysis capacity of up to 310 samples.

Robotic Sample Handling Solutions

For additional productivity requirements, including liquid, headspace, and solid phase microextraction (SPME) injections or when unattended automated sample and standard preparation is needed, the **Thermo Scientific™ TriPlus RSH™ Autosampler** offers the most innovative solution.

This modern sampling system is able to automatically switch between injection modes during a single sequence to analyze, for example, liquid samples, followed by headspace analyses, then SPME.

The **Thermo Scientific TriPlus 100 LS Liquid Autosampler** is a high-capacity autosampler, dedicated to liquid analysis for simple and unstoppable productivity. This reliable and robust platform is ideal for high-throughput, liquid-only injection sequences and is fully compatible with the TriPlus RSH Autosampler accessories.



Headspace Sampling Solutions

For any high-throughput environment interested in the analysis of volatiles, static headspace gas chromatography with its simplicity and broad applicability is one of the most reliable and robust techniques. The **Thermo Scientific TriPlus 300 Headspace Valve-and-Loop Autosampler** offers the largest capacity of the sample tray and incubation oven, enabling users to quickly analyze a larger number of samples and achieve unparalleled productivity.

Helium method security through GC modularity

Ensure Uninterrupted Analyses and Save Budget by Conserving Helium

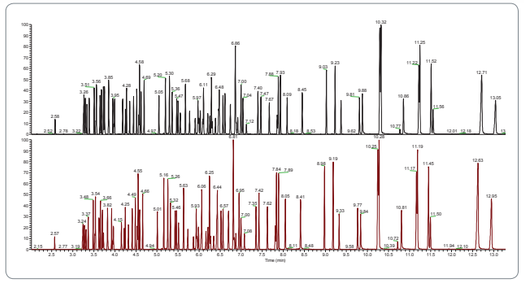
The helium shortage continues to inflict price pressure and supply concerns on laboratories that require such gas supplies to perform their research and analyses.

Realizing the importance of finding a safe, cost-effective solution, the proprietary Thermo Scientific **Instant Connect Helium Saver Module** was introduced to drastically reduce helium carrier gas consumption and extend helium cylinder lifetime for up to 14 years per instrument, without any GC or GC-MS method modifications. Helium is continuously saved, both while the GC is in operation and while it is idle. Previously acquired retention times remain unchanged and no method revalidation is required.

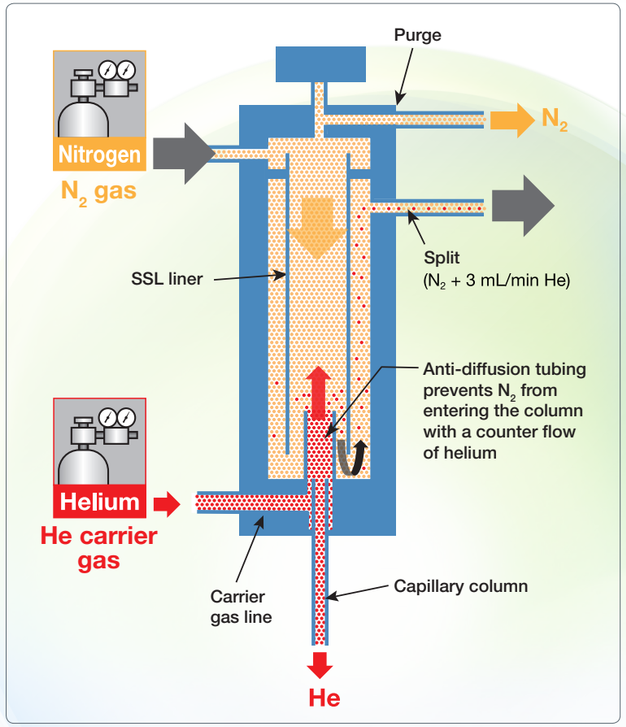
GC and GC-MS Operating Conditions*	Estimated Cylinder Lifetime	
	Conventional Operation	*With the Instant Connect Helium Saver Module*
Around-the-Clock Analysis *24 hours a day, 7 days a week, 365 days a year*	5 months	3.5 years
Daily Operations *Leaving the GC idle at the end of work days and on weekends*	15 months	14.6 years

** Conditions: Operating a TRACE 1300 Series GC with helium at 4 mL/min (sccm) using a typical helium cylinder of 48 L volume at 2250 psig.*

Using the Instant Connect Helium Saver Module, results from US EPA Method 8270D (semi-volatiles) remain unchanged.



The Instant Connect Helium Saver Module allows for an automatic reduction in helium flow to enable sample transfer to the column.



Simply **Better** Results

Thermo Scientific columns and consumables

Simplify and improve your analytical results with Thermo Scientific GC columns and consumables. These innovative products are designed to offer application-focused solutions to customers in the food and beverage, environmental, clinical, and petrochemical industries:

- Thermo Scientific™ TraceGOLD™ GC columns – low bleed, high reproducibility
- Consumables tested and certified on the TRACE 1300 Series GC
- Vials guaranteed for Thermo Scientific autosampler systems

www.thermoscientific.com

Africa +43 1 333 50 34 0
Australia +61 3 9757 4300
Austria +43 810 282 206
Belgium +32 53 73 42 41
Canada +1 800 530 8447
China 800 810 5118 (free call domestic)
400 650 5118
Denmark +45 70 23 62 60
Europe-Other +43 1 333 50 34 0
Finland +358 9 3291 0200
France +33 1 60 92 48 00
Germany +49 6103 408 1014
India +91 22 6742 9494
Italy +39 02 950 591
Japan +81 45 453 9100
Latin America +1 561 688 8700
Middle East +43 1 333 50 34 0
Netherlands +31 76 579 55 55
New Zealand +64 9 980 6700
Norway +46 8 556 468 00
Russia/CIS +43 1 333 50 34 0
Singapore +65 6289 1190
Spain +34 914 845 965
Sweden +46 8 556 468 00
Switzerland +41 61 716 77 00
UK +44 1442 233555
USA +1 800 532 4752

BR10378-EN-0914

Thermo SCIENTIFIC
A Thermo Fisher Scientific Brand