

# Prime-GC-MS-TQ

## Triple Quadrupole GC-MS/MS

*MRM Precision for Ultimate Selectivity*



### WHY CHOOSE PRIME-GC-MS-TQ

#### 01

##### ULTIMATE MRM SENSITIVITY

100 fg OFN injection delivers S/N  $\geq 15,000:1$ . IDL  $\leq 0.3$  fg for the most demanding trace-level quantitative analysis.

#### 02

##### WORLD'S FIRST SEGMENTED TQ

Global-first segmented conjugate hyperbolic quadrupole design (Q1/Q3) with detachable pre-quadrupoles and independent DC voltage control for unmatched resolution.

#### 03

##### HIGH-SPEED MRM ACQUISITION

800 MRM transitions per second with 0.5 ms minimum dwell time. SCAN/SIM/MRM simultaneous modes for maximum analytical flexibility and throughput.

#### 04

##### INTELLIGENT SOFTWARE SUITE

Built-in >1,000 compound pesticide database, AART retention time correction, automated method development, batch processing, and one-click standard curve generation.

### KEY ADVANTAGES

- Dual Vacuum Chamber — Independent ion source/quadrupole pumping,  $10^{-6}$ – $10^{-7}$  Torr
- Off-axis Pre-Quadrupole Q0 — Adjustable RF removes neutral particles, reduces contamination
- Flat Plate Quadrupole Collision Cell Q2 — Mass discrimination + multipole ion efficiency
- Segmented Conjugate Hyperbolic Q1/Q3 — Cold rod technology, no heating required
- Inert Ceramic Ion Source — Up to 350°C, dual filament, minimal sample adsorption
- 13-Pole Discrete Electron Multiplier — 1000 mm<sup>2</sup> area, 5x+ channel-type life
- Dynamic Range  $10^7$  — Linear response across seven orders of magnitude
- Mass Range 1.5–1250 amu — Broader than typical 1–1050 amu range
- Fast Startup <30 min — Ready for analysis in half an hour
- Column Backflush — Shortens runtime, reduces column bleed, eliminates ghost peaks

# Prime-GC-MS-TQ

Triple Quadrupole GC-MS/MS



## Q1 — SEGMENTED PRE-QUADRUPOLE

Independent off-axis Q0 with adjustable RF voltage removes neutral particles, blocks thermal radiation, and eliminates edge field effects for superior ion transmission.

## Q2 — FLAT PLATE COLLISION CELL

Unique flat-plate quadrupole combines mass discrimination of traditional quadrupole with ion transmission efficiency of multipole. Tighter electric field for higher collision efficiency and faster MRM.

## Q3 — CONJUGATE HYPERBOLIC ANALYZER

Precision-machined molybdenum alloy rods with cold rod technology. No heating required, ensuring stable isotope ratios and accurate mass analysis across the entire 1–1250 amu range.

## 13-POLE DISCRETE MULTIPLIER

1000 mm<sup>2</sup> active area (vs 106 mm<sup>2</sup> channel-type). Each pole works independently with 5x+ service life.

## DUAL VACUUM SYSTEM

Two 250 L/s turbo-molecular pumps create separate chambers. Ready in 30 minutes at 10<sup>-6</sup>–10<sup>-7</sup> Torr. Supports up to 10 mL/min column flow with optional dual-pump configuration.

## CORE TECHNOLOGIES

Global-Leading Patented Innovations for Maximum Performance



### DUAL VACUUM CHAMBER

Independent dual cavities: ion source + pre-Q / Q1+Q2+Q3 + detector

Individual exhaust: column gas flow does not affect quadrupole vacuum

10<sup>-6</sup>–10<sup>-7</sup> Torr ultra-high vacuum in 30 minutes

Anti-contamination: isolated ion source extends filament lifetime

Single pump 5 mL/min; dual pump option 10 mL/min



### OFF-AXIS PRE-QUADRUPOLE Q0

- Adjustable RF voltage + off-axis design removes neutral particles
- Reduces main quadrupole contamination, lowers noise, improves S/N
- Optimized transition electric field prevents ion overflow
- Eliminates edge field effect for efficient ion passage
- Blocks thermal radiation to maintain "cold rod" mass analyzer

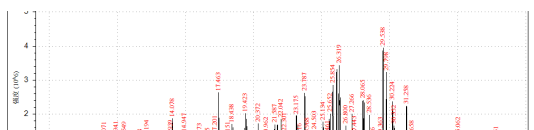


### 13-POLE DISCRETE MULTIPLIER

- 1000 mm<sup>2</sup> active area vs 106 mm<sup>2</sup> channel-type
- 5x+ service life over channel electron multipliers
- High-efficiency secondary ionization material
- Stable in air, long-term storage without degradation
- Water and contamination resistant; non-clogging design

## REAL-WORLD PERFORMANCE

### 226 Pesticide Residues in a Single Run



Per GB 23200.113 standard for plant-derived foods. Achieves quantitative limits of 0.001–0.008 mg/kg, exceeding the required 0.01–0.05 mg/kg by 6x–50x. All 226 compounds resolved with correlation coefficients  $r^2 > 0.99$ .

Instrument: Prime-GC-MS-TQ | Column: 30 m capillary | 1 ppm STD

## APPLICATION AREAS

### FOOD SAFETY

226 pesticides (GB 23200.113)

### ENVIRONMENTAL

VOCs, SVOCs, soil, air, water

### PHARMACEUTICAL

Drug residues, metabolomics

### WATER QUALITY

Geosmin, 2-MIB, chloropropanols

### NEW ENERGY

Battery electrolyte analysis

### RESEARCH

Flame retardants, N-nitrosamines

# Prime-GC-MS-TQ

## Technical Specifications

### MASS SPECTROMETER

Mass Range	1.5 - 1250 amu
Resolution	Unit mass, FWHM 0.4 amu
Mass Accuracy	±0.1 amu
MRM Sensitivity (OFN)	100 fg, S/N ≥ 15,000:1
Instrument Detection Limit (IDL)	≤ 0.3 fg (2 fg OFN, 8 injections)
MRM Transition Rate	800 transitions/s
Minimum MRM Dwell Time	0.5 ms
Scan Speed	Up to 20,000 amu/s
Dynamic Range	10 <sup>7</sup>
Ion Source Temperature	Up to 350°C
Quadrupole Temperature	Independent heating up to 200°C
Electron Energy	10 - 280 eV
Filament	Dual filament, front-accessible
Detector	13-pole discrete dynode electron multiplier

### GAS CHROMATOGRAPH

Oven Temperature Range	Ambient +4°C to 450°C
Oven Capacity	≥ 15 L
Temperature Ramp Rate	> 240°C/min (500°C/min optional)
Max Column Flow	5 mL/min (10 mL/min optional)
Cooling (450°C to 50°C)	< 3.5 min
Independent Heating Zones	11 (4 inlets, 5 detectors, 2 aux)
Injection Ports	Multi-mode SSI, PTV, MMI, optional
EPC Precision	0.001 psi
Autosampler	Up to 150 positions, dual-tower

### PERFORMANCE HIGHLIGHTS

≤0.3 fg

IDL (2 fg OFN, 8 injections)

≥15,000:1

S/N at 100 fg OFN MRM

800

MRM Transitions/s

1.5 - 1250

Mass Range (amu)

10<sup>7</sup>

Dynamic Range

### VACUUM SYSTEM

Main Pump	250 L/s Turbo-Molecular × 2
Fore Pump	4 m <sup>3</sup> /h Rotary Vane
Max Column Flow	15 mL/min (He)
Vacuum Design	Dual Cavity (independent exhaust)

### SOFTWARE

Operating Mode	SCAN / SIM / MRM / Simultaneous
MRM Functions	TMRM, DMRM, AART
Database	>1,000 pesticide compounds (GB2763)
Library Search	NIST, User-defined (5 concurrent)
Compliance	GLP/GMP, Audit Trail

### ELECTRICAL & ENVIRONMENT

Power Supply	220V ±10%, 50Hz
Power Consumption	1.5 kW
Ambient Temperature	18 - 35°C
Relative Humidity	≤ 80%