

Mobile GC-MS: On-Site Precision for Critical Analysis

Overview

The Mobile Gas Chromatography-Mass Spectrometry (GC-MS) system represents a new era in on-site chemical analysis, combining the power of laboratory-grade separation and detection with unparalleled mobility. Designed for rapid, accurate identification and quantification of a wide range of compounds, this compact instrument is ideal for emergency response, environmental monitoring, security, and forensic applications where time and mobility are critical.

Key Features and Specifications

Exceptional Mobility & Modular Design

- **Lightweight Design:** The entire system, including battery and carrier gas cylinder, weighs less than 20 kg.
- **Versatile Transport:** Supports vehicular, handheld, or shoulder-carry options for maximum flexibility.
- **Robust Construction:** Engineered for demanding field conditions, operating normally within 0–45° C and boasting an ingress protection rating of at least IP43.
- **Modular Quick-Release Structure:** Extending laboratory GC/MS modularity, the quick-release design for the chromatography and mass spectrometry modules allows for easy configuration with different column types based on user needs.

Advanced Mass Spectrometry

- **Quadrupole Analyzer:** Utilizes a quadrupole mass analyzer for reliable and precise mass detection.
- **Broad Mass Range:** Covers a mass range from 2u to 550u, suitable for a diverse array of small and semi-volatile molecules.
- **High-Performance Vacuum System:** Features an oil-free, high-speed turbomolecular pump (≥ 60 L/s) for a non-consumable vacuum system and long-term continuous operation, ensuring stable vacuum and high sensitivity even with direct 1.0 ml/min carrier gas flow.
- **High-Temperature Inert Ceramic Ion Source:** Ensures efficient ionization with dual filaments and thermal cleaning capabilities, significantly reducing maintenance requirements.
- **Multiple Scan Modes:** Offers comprehensive analysis capabilities with Full Scan, Selected Ion Monitoring (SIM), Simultaneous Scan & SIM, and Enhanced Scan modes.

Optimized Chromatography

- **Efficient Carrier Gas Delivery:** A carrier gas flow rate of no less than 1 ml/min, with carrier gas flowing directly into the mass spectrometer module.
- **Flexible Inlet Options:** Features a standard split/splitless injector supporting pulsed injection mode, with a split ratio settable up to 100:1, and an inlet temperature adjustable up to 280° C, accommodating various sample types.
- **Standard 30m Low Thermal Mass GC Column:** Utilizes a low thermal mass capillary column in place of traditional convective heating column ovens, resulting in reduced volume, improved separation efficiency, and consistent separation performance.

Versatile Sample Introduction

- **Integrated Modules:** Equipped with a standard split/splitless inlet, built-in adsorption enrichment, and a quantitative loop module.
- **Broad Compatibility:** Supports direct injection methods including gas-tight syringe, liquid, Solid Phase Microextraction (SPME), and gas sampling probes.
- **Software-Controlled Valve-Switching System:** For gaseous samples, the chromatography module features built-in adsorption enrichment and a quantitative loop, allowing software-controlled switching between these valve systems without manual intervention.
- **Expanded Capabilities:** Fully compatible with Mobile headspace and Mobile thermal desorption systems.

Quantitative Accuracy & Compliance

- **Internal Standard Quantitation:** Features robust internal standard quantitation for precise and reliable results.
- **Regulatory Alignment:** Complies with the requirements of "Emergency Determination of Volatile Organic Compounds in Ambient Air – Mobile Gas Chromatography–Mass Spectrometry Method."

Expandable Capabilities & Optional Accessories

To further enhance analytical versatility and sample preparation, the Mobile GC-MS system seamlessly integrates with the following optional accessories:

1. Mobile Headspace Sampler

Feature	Specification
Wide Operating Range	Functions efficiently in temperatures from 0° C to 45° C
Flexible Power	Features independent power supply or can be powered by the Mobile GC-MS
Multi-Sample Capacity	Equipped with at least 4 independent headspace heating positions
Precise Heating	Equilibrium heating temperature adjustable from 30° C to 80° C
Lightweight	Total weight (including battery) does not exceed 6 kg

2. Mobile Thermal Desorber

Feature	Specification
Dual Enrichment Modes	Supports both passive diffusion adsorption and active sampling for sample enrichment
Heated Transfer Line	Sample transfer line with adjustable heating and insulation (10° C to 100° C)
Flexible Carrier Gas	Can use external carrier gas or its built-in carrier gas supply
Wide Desorption Range	Sample desorption tube temperature range from ambient +10° C to 250° C
High Sensitivity	Achieves a detection limit of <1 ppb (Toluene) when paired with the Mobile GC-MS
High Flow Rate	Maximum purge flow rate of no less than 150 mL/min
Mobile Power	Powered by AC/DC adapter and includes an independent rechargeable battery for at least 3 hours of operation
Compact & Light	

Feature	Specification
	Weighs ≤ 6 kg (including battery and gas cylinder)

3. Mobile Solid Phase Microextraction (SPME) Unit

Feature	Specification
Mobile Design	Weighs ≤ 8 kg (including built-in battery and gas cylinder)
Triple Power Modes	Offers 220V AC power, internal battery, and external battery power options
Independent Sample Cells	Features 2 or more independent sample cells, ensuring no cross-interference
Temperature Control	Sample cell temperature range of 40° C to 90° C
Adjustable Stirring	Stirring speed of at least 300 to 2000 rpm
Conditioning Capability	Aging chamber temperature of at least 50° C to 280° C
Intuitive Interface	Equipped with a 5-inch or larger LCD screen for clear display

Applications

This Mobile GC-MS is an indispensable tool for:

- **Environmental & Emergency Monitoring:** Rapid detection of Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) in ambient air and other matrices.
- **Public Safety & Security:** On-site screening for explosives, chemical warfare agents, hazardous materials, and other harmful substances.
- **Forensics & Field Investigation:** Swift identification of chemical evidence at crime scenes or incident sites.
- **Industrial Monitoring:** Quick assessment of industrial emissions and process control.

Conclusion

The Mobile GC-MS delivers laboratory-grade analytical power directly to the field. Its compact, lightweight design, combined with high separation efficiency and accurate quantification, makes it an indispensable tool for time-sensitive, critical decision-making.